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Potential student interest on Income Share Agreements and its role in solving student loan debt in the United States of America

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ABSTRACT

This dissertation aims to understand the potential interest of students in adopting Income Share Agreements as a mainstream alternative to the traditional student loans. Considering the situation in the United States of America and the need for a change in the education financing mechanisms (deduced from the excessive cumulative student loan debt and respective default rates), innovative mechanisms are required that connect the students with their education, while not disregarding the existing widening of the inequality gap in education.

After a review and analysis of academic papers on income share agreements, an online questionnaire was conducted to study the main variables that impact the perceived interest in the mechanism, from the student perspective. Results show that the conditions of the contract itself are not significant in affecting the student's interest (except for the term of the contract), while the personal preferences (risk aversion) and income estimation (both short and long-term) are the main drivers of interest.

This dissertation also provides valuable insights on the role of Income Share Agreements in solving the student loan debt crisis existent in the United States of America. The mechanism could be a crucial alternative to the traditional financing mechanisms, while improving the quality of education and the engagement of the students with their university.

Keywords:

Income Share Agreement, student debt, tertiary education, financing mechanisms

SUMÁRIO

Esta dissertação visa compreender o potencial interesse dos estudantes em adotar Acordos de Partilha de Rendimentos como alternativa aos tradicionais empréstimos estudantis. Considerando a situação nos Estados Unidos da América e a necessidade de uma mudança nos mecanismos de financiamento da educação (deduzida pela excessiva dívida acumulada de empréstimos estudantis e respetivas taxas de incumprimento), são necessários mecanismos inovadores que liguem os estudantes à sua educação, sem descurar o atual agravamento do fosso de desigualdade na educação.

Após a análise de artigos científicos sobre Acordos de Partilha de Rendimentos, foi conduzido um questionário online para estudar as principais variáveis que têm impacto no interesse no mecanismo, do ponto de vista do estudante. Os resultados mostram que as condições do próprio contrato não são significativas para afetar o interesse do estudante (exceto no que diz respeito à duração do contrato), enquanto as preferências pessoais (aversão ao risco) e a estimativa de rendimentos (tanto a curto como a longo prazo) são os principais fatores de interesse.

Esta dissertação fornece também valiosos conhecimentos sobre o papel dos Acordos de Partilha de Rendimentos na resolução da crise da dívida dos estudantes existente nos Estados Unidos da América, através da substituição do mecanismo tradicional de financiamento, melhorando a qualidade da educação e o envolvimento dos estudantes com a sua universidade.

Palavras-chave:

Acordo de Participação no Rendimento, dívida dos estudantes, ensino superior, mecanismos de financiamento

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GLOSSARY

ISA – Income Share Agreement

USA – United States of America

PbR – Payment by Results

IBR – Income Based Repayment

SRI - Socially Responsible Investment

CI – Change in Interest variable

HS – High School GPA variable

CG – College GPA variable

IC – Post-graduation Income variable

IE – 10-year Income Estimation variable

KI – Knowledge of Financing Instruments variable

RP – Repayment Percentage variable

TT – Term variable

GP – Grouping variable

RA – Risk Aversion variable

II – Initial Interest variable

1. INTRODUCTION

1.1. Background

Student loans have been a common issue in the United States for the last decades. To obtain tertiary education, individuals incur debt to pay for the high tuition fees and other education-related expenditures. These same individuals then spend years repaying the loans, which often becomes an unbearable burden, with financially unsupportable interest payments, as often the promises of successful careers and high-income are unfulfilled. The situation is increasingly worrisome when considering unemployment, as many borrowers are left with little to no income while the debt interest accumulates. Hence unemployment is proven to be a trigger for higher delinquency and default on student loans (Fuinhas et al., 2019).

Overall, student loan debt has risen to over 1.7 trillion in the last quarter of 2020 – a 4% increase compared to the last quarter of 2019 and a 99,6% increase in 10 years (Federal Reserve Bank of St. Louis, n.d.). Considering the skyrocketing tuition fees in the last decades, the role of the government in education comes into question, as well as a possible restructure of the education system and fund's allocation (Zumeta et. al, 2012).

According to OECD's Government Spending Indicators, the United States of America are the second-highest OECD country in total expenditure on educational institutions per full-time equivalent student for tertiary education, with close to double the OECD average. Therefore, a better financing model is necessary to cover this expenditure and avoid the accumulation of student loan debt.

Impact investment, with its specific mechanisms, has surged lately to solve these societal issues and allow for a more efficient allocation of both governmental and philanthropic resources. These mechanisms could potentially connect impact investors, philanthropic organizations or private traditionally financial investors with individuals searching for innovative models to finance their post-high school education that do not involve incurring in, many times, life-standing debt.

With their inherent peculiarity of shifting the risk from the student to the investor, ISAs could play a crucial role in reducing student default and debt levels and consequently allowing debt-averse students to obtain their post-secondary school degrees (Boatman et al., 2017; Palacios et al., 2014). The model works as follows: an investor will finance the tuition and other education-related costs, with the student committing to repay a percentage of its post-graduation future income for an agreed number of repayments.

If unemployed or with a monthly/yearly income under a predefined threshold, the student is exempt from repaying anything to the investor. This particularity conveys the risk-shifting aspect of the mechanism, as the student is protected against unemployment or the possibility of low future income. These situations would otherwise enhance the possibility of default and bankruptcy in traditional student loans. Instead, the student will repay only when their income is enough to have financial sustainability and repaying capacity.

1.2. Relevance and Problem Statement

With its framework being first suggested by Milton Friedman in 1955, there is a lack of literature on why these agreements do not have a preponderant role in the education environment, especially in high student loan debt countries. While much research might focus on the potential improvements of the mechanism from the investor's side, the students' interest in ISAs is still in an infant state of research. Hence, it is crucial to understand the main interest drivers of students' interest in these models, as they are the benefiter and the focal point of all operations, and, without their primordial interest, there would be no need to implement ISAs.

The scope of this dissertation is to understand the potential interest from the students in ISAs as direct substitutes to student loans by analysing the different personal characteristics and preferences that affect said interest. This purpose substantiates in the following research questions:

- **RQ1:** Overall, how interested are students in the income share agreement (ISA) mechanism to finance their higher education?
- **RQ2:** Is the interest heavily dependent on the contract conditions of the ISA?
- **RQ3:** Other than the contract conditions, which other individual characteristics/ preferences affect the interest in ISAs?
- **RQ4:** How does the interest in the mechanism change when presented with the traditional student loan conditions?

1.3. Research methods

To answer these research questions, both primary and secondary data were utilised. Secondary data comprised mainly academic articles and reports regarding the research topic, which deliver a good basis for further primary data investigation. As for primary data,

quantitative research was collected through an online questionnaire that inquired the respondents about their perceived interest in the ISA model, connecting it with some variables (both demographic and preferences) that might explain that interest.

1.4. Dissertation outline

The following chapter comprehends a literature review and develops a conceptual framework, with the corresponding hypotheses and analysing the topic's relevance considering the current student loan situation in the USA, presenting an overview of the main past cases of ISA implementation. The third chapter presents the methodology approach to answer the research questions, with a comprehensive explanation of the questionnaire logic and statistical tests applied to the gathered data. The fourth chapter presents the main results of the data analysis. Lastly, the fifth and last chapter contains the main findings of the dissertation, as well as the main limitations and necessary further research on the topic.

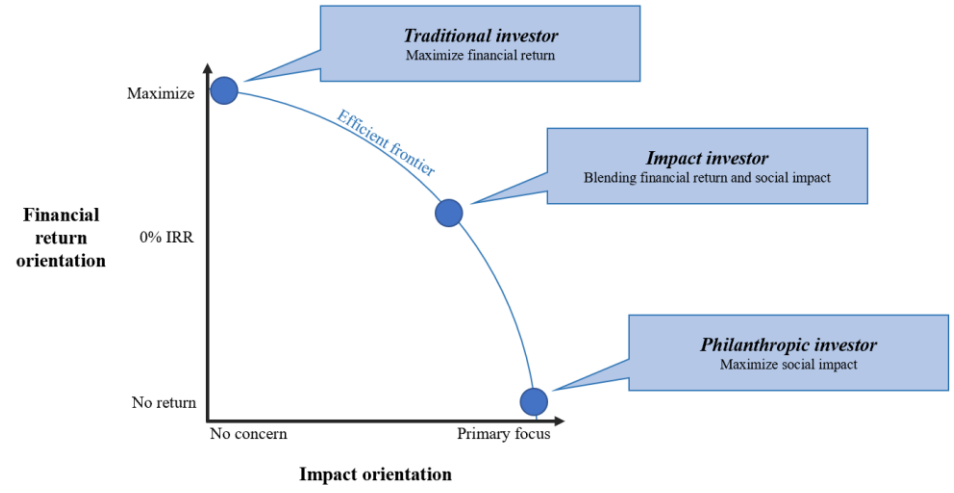
2. LITERATURE REVIEW

2.1. What is impact investing?

Over the past two decades, impact investing - also commonly known as socially responsible investments (SRI) - has risen in importance, translated into an increase in cash-flows for such purposes. According to the GIIN's latest Annual Impact Investor Survey, the market size for impact investing in 2019 is $715 billion (compared to the previous year's $502 billion), revealing an astonishing CAGR of 17% between 2015 and 2019 regarding repeat respondents' assets under management described as SRI.

Classic asset pricing models traditionally describe the investor's utility function as an objective relation between utility and consumption or wealth, describing wealth creation as the primary objective for financial investments (Barber et al., 2021). Similarly, impact investors seek the goal of achieving market-adjusted financial returns through the provision of capital. However, their utility is not derived merely from financial variables (consumption or wealth) but instead dependent additionally on non-financial impact (e.g. social or environmental). Bollen (2007) argues that the utility function of investors cannot, therefore, be described as a unidimensional function, but alternatively as a multi-attribute function integrating both financial and non-financial criteria.

Following a simplistic approach that aggregates non-financial variables as one single criterion - social impact – and financial variables as another criterion – financial returns –, we can define a spectrum of investor's preferences. Consequently, the investor would be placed depending on the personal utility attributed to each variable.



Adapted from: Trelstad, April 2009

Figure 1: *Investor's spectrum*

On the upper left side of the spectrum (Figure 1), traditional investors follow thorough portfolio optimization analysis and evaluate the risk-adjusted returns of their investments. Moving towards the right side, the investor becomes gradually less agnostic towards social impact, progressively perceiving the social output of its investment as an additional return (Besley & Ghatak, 2005; Chowdhry et al., 2019).

It is important to note that the analysis of this framework is based on the investor's motivations and not on the type of investment, to avoid traps such as greenwashing. Greenwashing investments intentionally brand investments as socially responsible to benefit from positive externalities and obtain higher financial returns due to the underlying false message (Starks et al., 2017). Hence, an investor is not considered an impact investor by investing in projects/organizations that provide social impact and financial return. Instead, the impact investor is naturally motivated by the potential social return of the investment.

Accordingly, there are three types of investors based on the simplistic trade-off model between (non-risk adjusted) financial return and (non-risk adjusted) social impact: profit-maximizing investors, impact investors and philanthropic investors (Trelstad, 2009). Thorough definitions can be found in Appendix 2.

2.2. Impact Investor

As previously explained, impact investors present a social motivation for their investment. Hence, there is an underlying willingness to pay for impact, as some are willing

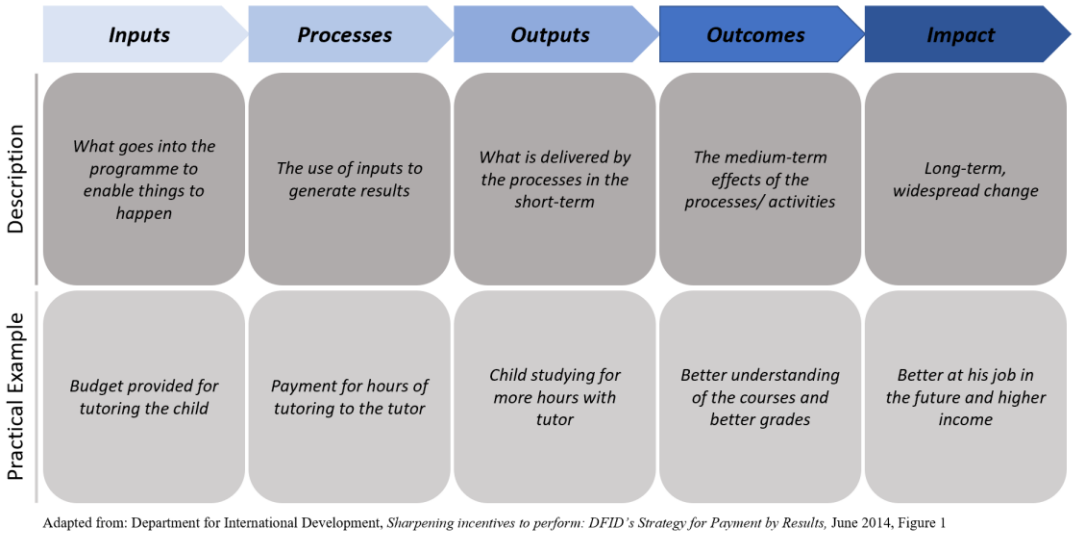
to forego some of the financial return to obtain social impact (Riedl & Smeets, 2017). The willingness to pay is not the same across impact investors (as shown in Appendix 3), with literature claiming the average willingness to pay to be between 2.5 and 3.7 ppts lower IRR (Barber et al., 2021).

Other than the post-investment phase, impact investors also evidence differentiated sensitivity towards performance in the screening process. Impact investors are less sensitive towards past negative returns when compared to conventional investors, whilst valuing positive past returns more than conventional investors (Renneboog et al., 2011). Regarding current performance, impact investors present lower sensitivity (Benson & Humphrey, 2008; Renneboog et al., 2011) and lower fund flow volatility than conventional investors (Bollen, 2007). This empirical evidence supports the argument that impact investors conduct a multivariable analysis of their investment (instead of purely financial). Block, Hirschmann, Fisch (2021) claim the targeted societal problem, founding team authenticity and financial sustainability as the main criteria considered in the screening phase by impact investors.

When analysing the potential effective trade-off between social impact and risk-adjusted return of stocks, the literature based on empirical studies is vast and has presented contradicting results. Some suggest that socially responsible investments are not priced differently by capital markets and do not perform significantly differently from conventional investments (Bauer et al., 2005; Hamilton et al., 1993; Renneboog et al., 2008; Statman, 2000). Others, such as Galema, Plantinga and Scholtens (2008), deny these results and argue that they are due to the empirical methodologies applied, as the decrease in book-to-market ratios characteristic of SRI shadows its real effect on the results of the studies.

2.3. Payment by results

Payment by results (PbR) is an investment return mechanism used broadly in impact investing. The model is based on rewarding investors only upon delivering a measurable outcome, and the returns depend on the accomplishment of pre-determined metrics. A practical example is: when tutoring for his child, a tutor income can be based on the hours spent tutoring (traditionally), or instead based on the child's test results (PbR). In essence, the mechanism motivates the tutor to provide output and create a measurable outcome, generating impact to the benefited.



Adapted from: Department for International Development, *Sharpening incentives to perform: DFID's Strategy for Payment by Results,* June 2014, Figure 1

Table 1: *Example of PbR mechanism – child tutoring*

Table 1 shows how the impact creation occurs principally from the outcomes through the efficient employment of inputs, implementation of processes and utilization of the outputs. PbR deviates from the traditional reward system applied throughout society and financial markets, where the returns, in most cases, are based on outputs or even processes, therefore not generating the necessary incentives for the stakeholders to create real measurable results.

2.4. Application to impact investing – Income Share Agreements

Income Share Agreements (ISA) are an impact investing mechanism created to facilitate students' access to higher education, supporting financially insecure and debt-averse students. Investors will provide upfront capital to finance students' education, while students commit to paying back with a pre-determined percentage of their post-graduation income for a contracted duration. ISAs are considered a PbR mechanism, as the investor's return depends on the students' post-graduation success (income) and is consequently reliant on providing a positive educational outcome.

The concept originated from the work of Milton Friedman (1955), which, although not embraced fully, served as the basis to the existing models of ISA, exploring the idea of potentially investing in human capital - students - as if they were a corporation (Schwartz, 2015). In his work, Friedman describes the government as a crucial stakeholder in assisting the population when obtaining higher education since society would benefit from positive externalities of being composed, in general, by more educated individuals. With such

regulatory support, the market would then serve as external financing, activating the mechanism and providing the necessary capital to educate the population segments who otherwise would not do so.

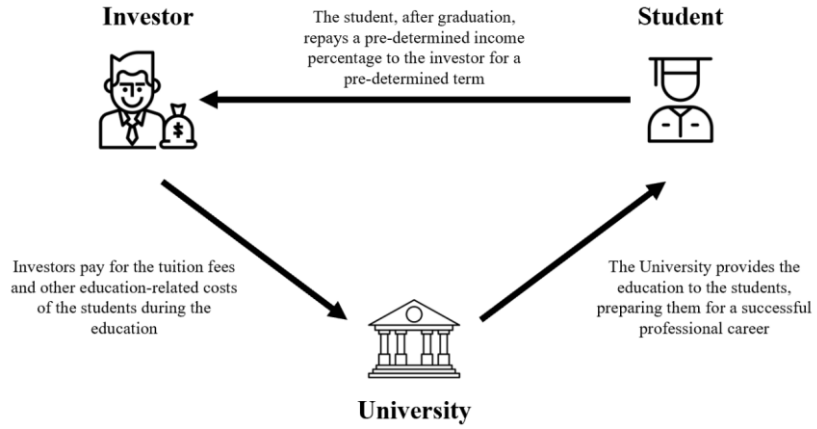


Figure 2: *Income Share Agreement model*

Since the target segment of ISAs is financially insecure and debt-averse students (Boatman et al., 2017; Palacios et al., 2014), the mechanism comprises students obtaining tertiary education, especially in countries where the costs are unaffordable - such as the United States of America. With total student loan debt escalating from a little over USD 1 trillion in 2013 (Matthews, 2013) to USD 1.70 trillion at the end of 2020 (Federal Reserve Bank of St. Louis, n.d.), an education financing reform in the USA is due.

An example of initial governmental support to ISAs would be U.S. Senator Marco Rubio's and U.S. Representative Tom Petri's bill, introduced in April 2014, denominated Investing in Student Success Act. The objective was to "make higher education more affordable and more accessible" through ISAs, while highlighting important adaptions required for the mechanism's success, such as the setup of adequate legal frameworks (Petri, 2014).

More recently, in 2019, Senators Warner and Coons proposed another bill evoking ISAs denominated “ISA Student Protection Act of 2019”. The bill is a crucial step towards creating a structured framework for ISAs in the country since it established ground rules for consumers by defining a “Qualified ISA”. The main criteria for “Qualified ISA” can be found in Appendix 4, which include a repayment and a duration cap.

2.5. College cost in the United States of America

The education system, more specifically the tertiary level of education, is extremely expensive in the United States of America and has risen considerably in the latest decades (Zumeta et. al, 2012). The government has made considerable efforts to remedy the issue. Examples of such would be the "Affordability in Higher Education" bill in 2003, by U.S Congressman Howard McKeon, which intended to cap the allowed increase in the yearly tuition rate (McKeo et. al, 2003), or the mandate of Barack Obama from 2009 to 2017, where the affordability of college was publicly set as a priority.

Regardless of the governmental efforts, these have been proven unsuccessful, as tertiary education has become increasingly unaffordable (Perna & Li, 2006; Zumeta et al., 2012). Multiple factors such as the limited financing options, the limited government financial support for the lower-income population and the reductions in state funding have a preponderant impact on such increase (Institute for Research on Higher Education, 2016). As the United States Constitution attributes higher education funds allocation responsibilities to each state, and the recent years of constant budget deficits, states have been pressured to decrease state aid to educational institutions (Finney, 2014), which results in further increases in tuition fees from the institutions as a way of recovering lost revenues (Mitchell et al., 2017).

Naturally, with the increase in tuition prices, the intrinsic value of obtaining a degree has been questioned, as its potential net financial benefit needs to be revaluated (Carnevale et al., 2015) and the decision of obtaining higher education becomes one of the most important financial decisions of the general population (Carnevale, 2011; Rothwell & Kulkarni, 2015). The common belief that higher education degrees naturally guarantee a successful job in the future is still present though (Brown et al., 2012), conveying the idea of it being a mandatory step towards professional success (Johnstone, 2004).

Nevertheless, the reality is many times different. After graduation, students are often left with empty promises of guaranteed successful careers and large sums of student debt to repay, ending up in a worse position than they would have been otherwise without having pursued a degree (Hillman, 2012). Regardless, the degree in itself does not harm the student, as students with higher degrees tend to do better in the professional world, both in terms of job success and earnings (Baum, 2014). In fact, according to the National Center for Education Statistics, the median annual income for full-time workers ranging from 25 to 34 with either a Bachelor's degree or a Master's degree is USD 57,900, compared to a high

school completion median of USD 34,900, representing an increase of about 66% in the yearly earnings.

Consequently, the problem is in the cost of obtaining the degree, re-arising whether the higher education cost burden should fall solely on the students or if the government and society (through taxpayer's money) should carry some of the risk (Johnstone, 2004). Literature suggests that the latter is justified, as a more educated population fosters the economy and reduces the unemployment rate since many jobs require a higher education degree (Carnevale et al., 2015; Johnstone, 2004; Toutkoushian & Paulsen, 2016).

2.6. University tuition – the widening of inequality gap

Raising tuitions becomes more worrisome when we consider the potential increase in social inequalities.

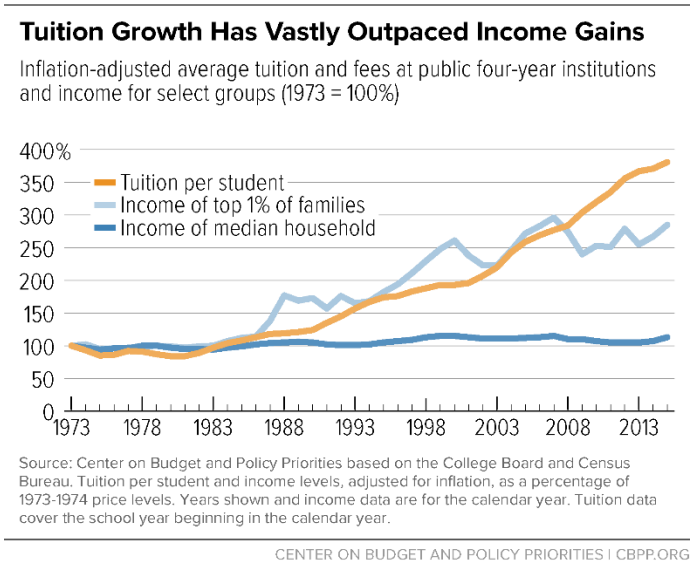


Figure 3: *USA's tuition increase compared to household income*

As observed in Figure 3, the sharp increase in tuition (281% between 1973 and 2015) has been steeper than the increase in household income. Even the top 1% income families were outpaced (186% increase vs 281%), although the main focus should be the major discrepancy compared to the median household. In the whole term, the median household income grew by a mere 13% (compared to the 281% of tuitions increase), and in the 2008-2015 term grew by only 2.1%, compared to a 34% tuition increase (Mitchell et al., 2017).

This simple stat already evidences the widening of the inequality gap, as the median and lower-income households have more difficulty keeping up with the steep increase. On the

other hand, the accelerated increase in tuition has also affected lower-income families in what regards their tertiary education, such as:

- Tuition costs increase reduces the probability of enrolment in college from lower-income students. Literature consensually alleges that the increase in tuition harms enrolment, presenting a negative marginal effect as the income of the household increases, therefore harming mostly lower to mid-income families and minority communities, such as communities of colour or the Hispanic community (Leslie & Brinkman, 1987; Jackson & Weathersby, 1975; Hemelt & Marcotte, 2011; Flores & Shepherd, 2014; Conger & Turner, 2017; Allen & Wolniak, 2019).

- Lack of knowledge about financial aid processes aggravates the decline in enrolment. Increasing financial aids does not necessarily increase enrolment due to the general lack of knowledge about the subject, especially in lower-income families. Therefore, the mere increase in tuition fee, even if accompanied by a similar increase in financial aid, would decrease individuals' enrolment from lower-income families (Bettinger et al., 2009).
- Tuition increase causes lower-income students to attend less-selective universities. Literature suggests that the increase in tuition causes a shift from lower-income students, even high achieving ones, towards less selective universities, based merely on the financial constraints resulting from tuition increases (Dillon & Smith, 2017; Terenzini & Cabrera, 2001). The effect is higher in lower-income households of colour compared to lower-income white households (Bowen et al., 2009).

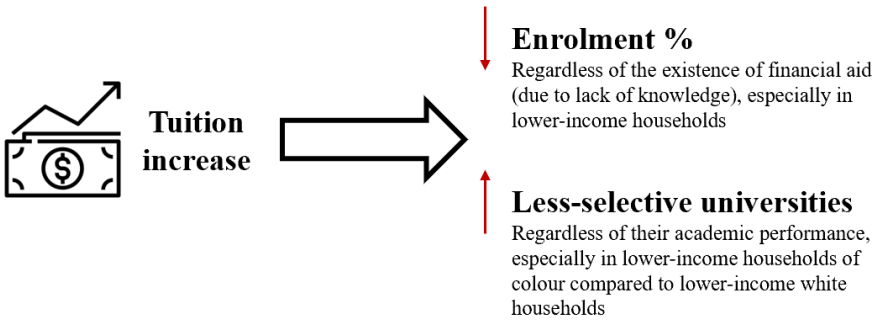


Figure 4: *Widening of the inequality gap from increasing tuitions*

The impact of the recent rise in tuitions in widening the inequality gap is summarized in Figure 4.

Lastly, the inequality gap has also increased when analysing the financial stability of debt-incurring students, as Black and Hispanic students tend to have the greatest financial need when paying for college (Long & Riley, 2007; Oliver & Shapiro, 2006). With the average default rate of Federal Student Loans circling the 10% mark throughout the years and continuing to rise, and some educational institutions reaching the 40% default rates (Douglas-Gabriel, 2017), black neighbourhoods show almost twice the default rates than mostly white neighbourhoods (Marte, 2019).

2.7. United States of America Loan Market

Financing mechanisms have become pivotal for a university degree as the tuition fees become unbearable. When referring to "student loan debt", the literature invokes federal, private and parent loans borrowed with the intent of supporting tuition fees and any additional intrinsic costs for education (Mitchell et al., 2017).

Considering that Income Share Agreements are financing mechanisms mostly for tertiary education, it is important to analyse federal and private loans - the debt mechanisms for such education -, as parent loans are not considered direct substitutes, since ISAs target lower-income families - assumed not to have the financial capacity to incur in a parent loan.

2.7.1. Private loans

Private loans represent the loans provided by private institutions without government regulation (Baum, 2016). Possible lenders of such loans would be a bank, credit union, state agency, or even a school (Federal Student Aid, 2012). Due to the lack of governmental regulation, private loans offer less protection than federal loans while requiring a good credit score or a co-signer. The interest rates are mainly fixed, with repayment starting while the student is still at school and not allowing the possibility of loan forgiveness or loan consolidation (Federal Student Aid, 2012).

2.7.2. Federal loans

Introduced in 1958 through the National Defense Loan Program, federal loans are funded by the federal government, with terms set by law, therefore benefiting from protections otherwise unavailable in private loans (Baum, 2016; Federal Student Aid, 2012).

Generally the preferred option for a student loan, the federal loans enable the repayment period to start only after graduation and usually offer fixed rates lower than private loans. The ability to have subsidised loans, consolidate debt, or have the loan forgiven in case of employment in the public sector are other conditions that favour federal loans to the detriment of private loans (Federal Student Aid, 2012).

Other than the fixed-rate repayment structure, federal loans also provide several options of different repayment plans, already having repayment options structured similarly to the Income Share Agreements. Specific characteristics of each model are presented in Appendix 5.

2.8. Cases of ISA in Education

2.8.1. Tuition Postponement Option

The first materialization of the ISA idea dates back to 1971, some years after the publication of Milton Friedman (1955). Implemented in the University of Yale by the hands of James Tobin (who later won the Nobel Prize in Economic Sciences in 1981 (The Nobel Prize, 1981)), the "Tuition Postponement Option" came as a solution employed to justify increasing the tuition fees by USD 1,500. Appendix 6 provides a deeper understanding of the ISA conditions.

This mechanism was phased out in 1978 and wound up in 2001. The University of Yale assumed all outstanding debt due to the growing dissatisfaction among students as refusals to make the payments without any incurring repercussions were common. The main conclusions to take from this program are:

- Grouping students in repayment cap creates dissatisfaction in better-performing students;
- Lower interest rates, although initially more appealing, require longer agreement term;

- Long-term agreements increase the investor's vulnerability to possible changes in the political or economic environments (such as legal frameworks alterations or inflation).

2.8.2. 13th Avenue

The next ISA worth studying is the 13th Avenue Funding, whose pilot was implemented in Allan Hancock College. The characteristic that stands out is its objective to be a "community controlled, equity-based funding" model for education in its community - Santa Maria, California. Accordingly, the instrument intends to interconnect the community members in the program while targeting mostly immigrants and low-income students (Matthews, 2013). The conditions of the model can be found in Appendix 7.

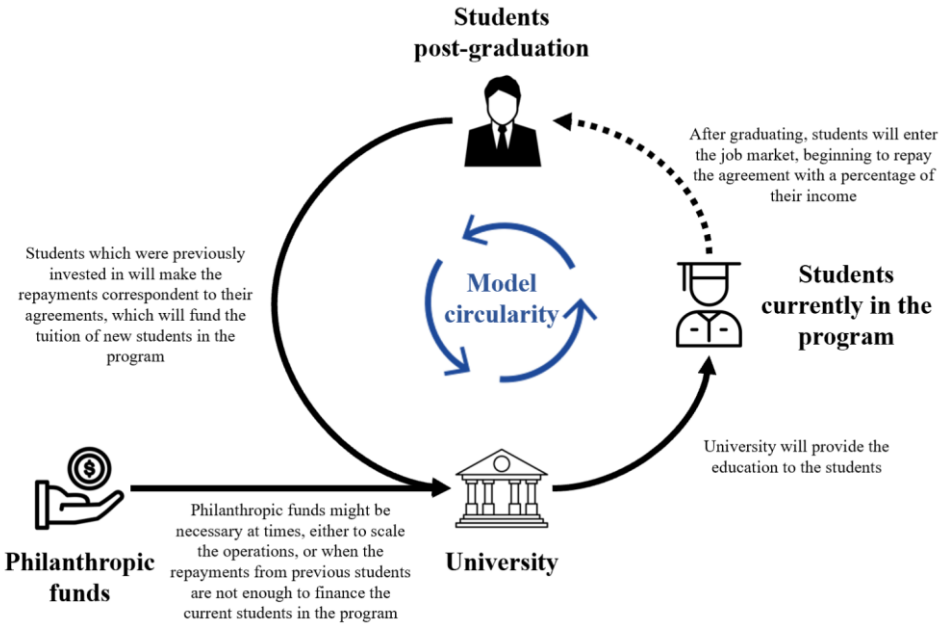


Figure 5: *13th Avenue model*

In the model (presented in Figure 5), new students that enter the program have it financed by the previously financed members of the community (who are now employed). By creating a loop based on the community, the model calls for the collective sense in all members. The main conclusions drawn are:

- Involving the community creates a collective view of the ISA, as the participants will be personally attached to the model (since they were previously invested in as well), being more willing to repay/re-invest, solving the issue of enforceability;
- The initial investment for such a model should be from philanthropic sources, probably from a community source, before the model itself becomes self-sufficient;

- Since the model is based around economic self-sufficiency from previous students, a potential scale up needs to be gradual or at the expense of a considerable injection of funds in the following years (since the model would not be self-sufficient for the next few years);
- Although appealing to investors, grouping repayment cap mechanisms are not appealing to students (as observed in the Tuition Postponement Program).

2.8.3. Income-Based Repayment Swap

In 2011, Professor Heather Hughes and Professor Benjamin Leff from the American University Washington College of Law tried to implement their ISA. Faced with the lack of regulatory framework for such mechanisms, they proposed an innovative model based around a student loan derivative idea, entitled income-based repayment swap (IBR swap). The conditions can be found in Appendix 8.

The model intended to connect investors and students while leveraging on the well-established regulatory framework for traditional debt instruments, as the student would still borrow money from financial institutions. The investor would then be responsible for making the loan repayments in exchange for an outside agreement between the student and investor for a percentage of his future income (Leff & Hughes, 2013). The structure of the agreement would be as following:

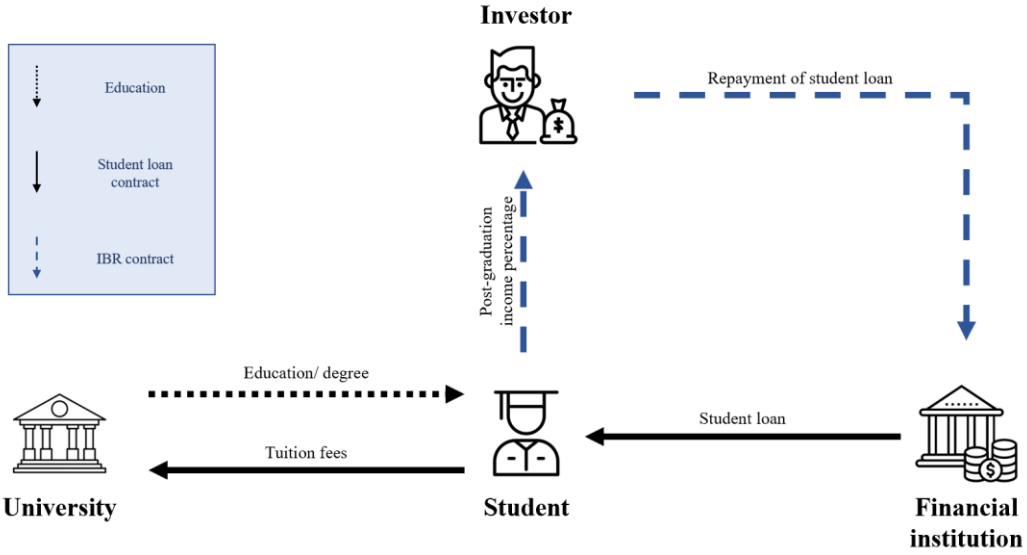


Figure 6: *IBR swap model*

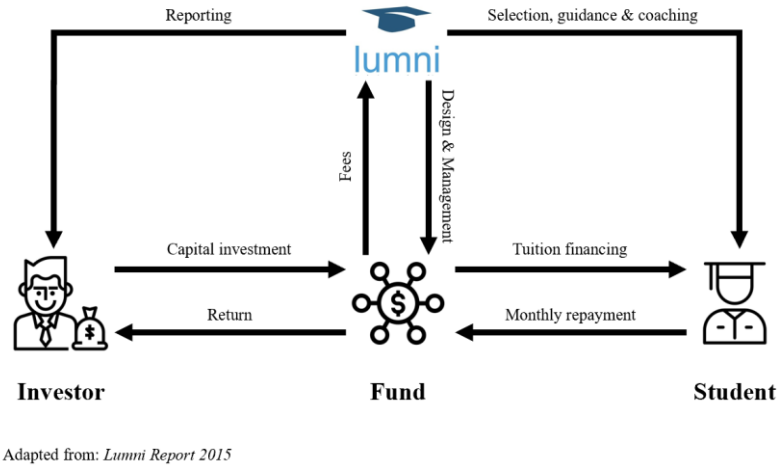
Hence, the IBR swap works as a derivative - an agreement that transfers risks between two parties, which value is derived from an underlying asset. In this case, the exchange is between the student and the investor. The investor provides fixed payments for the student to repay the loan, and the student provides a variable repayment contingent on its income. The main conclusions are:

- The combination of the ISA with a student loan would diminish the investors' risk related to the enforceability of the agreements. Without employing any initial capital, student default would not incur the investor into complete capital loss, as the investor would stop repaying the student loan. This possibility also diminishes the enforceability challenge, as a termination of repayment to the investor would make the student responsible for the student loan repayments regardless;
- The two simultaneous agreements would allow for a constant comparison of conditions, meaning that the student would easily notice if the ISA became more expensive than the alternative. Hence, students would most likely withdraw from the agreement as soon as they hit a stable professional state and a yearly income that surpasses the "breakeven price"; On the other hand, a reduced income from the student (compared to the fixed student loan repayment) could also generate a default situation from the investor (since no initial capital is loss);
- By implying the need to obtain a student loan, the model is, therefore, less interesting to loan-averse students (a major target for ISAs);
- Since the agreements are simultaneous, the ISA requires the same term of the student loan, as the student would otherwise naturally default as soon as the student loan repayments were completed.

2.8.4. Lumni

Perhaps the most active ISA project worldwide would be the Lumni project. Initially implemented in Chile in 2002, the project has also helped students in Columbia (since 2007), Mexico (2009), the United States of America (2010), and Peru (2012). Close to 7,000 concurrent students were financed in 2018, and the plan was to reach the milestone of 30,000 cumulative total students until 2021 – currently, it is over 10,000 students (Inter-American Development Bank, 2016; Putilov et al., 2018).

The business model comprises four different stakeholders: Lumni, investors, students and fund (also managed by Lumni). Figure 7 explains the flow of the model. Appendix 9 provides a description of each stakeholder's responsibility.



Adapted from: *Lumni Report 2015*

Figure 7: *Lumni's business model*

The differentiating feature of Lumni, when compared to other ISAs, comes from the customized personal contract offered to each student, based on a multi-variable algorithm that computes a salary expectancy for that specific student. Based on this estimate, the agreement is formulated to pay the amount equivalent to a traditional loan if the student earns his estimated income.

Due to the constant increase in the database as the ISA progresses, the estimates for students become progressively more precise. Hence, Lumni can manage its students efficiently and group them in a diversified fund to decrease volatility in the results while maintaining a respectful level of returns to the investors. Although diversified, most of Lumni's funds are created to target specific societal issues, allowing investors to invest in social issues of their interest (e.g. students displaced due to war conflicts, specific regions).

From the student's perspective, Lumni works on their engagement to the program, with mandatory workshops organized by the Lumni Academy every semester to develop strengths, assess weaknesses, and improve key competency skills. The symbolic monthly payment was also introduced to build a repayment culture, which will then develop into loan repayment after graduation.

The main conclusions to withdraw from Lumni's model are:

- There is the possibility to create an interesting financial return, as Lumni has provided 9,1% average annual returns to investors on its investment funds, which usually have a duration of ten years (Inter-American Development Bank, 2016);

- Lumni's diversification method is attractive. Their portfolios present 30 times the diversification of regular equity market portfolios (Inter-American Development Bank, 2016);
- The constant support provided to the students (through skill development and workshops) reduces the voluntary default rate of the students (2% in Lumni), due to their engagement with the program;
- Access to data enables the creation of statistical analysis that reduces the volatility by grouping. Therefore, representative data (such as employability, entry-level salaries, salary growth) by sector is crucial to create an accurate estimation algorithm;
- Philanthropic funds are important to support the operations, either as a kickstart or as a backup to recover from defaulting cases, as more than half of Lumni's funding comes from philanthropic sources;
- Lumni's model has only been applied to highly technical university degrees, such as engineering, and is expected to be harder to implement in more subjective degrees such as arts (due to the difficulty in estimating future income);
- Lumni might serve as a primitive proof of concept for ISAs, since its success has evidenced the potential for ISA's implementation, providing significant education benefits to the student and significant returns to the investors involved.

2.8.5. ISA in Portugal

In Portugal, the concept of ISAs is not well developed since student loans are not as common as in other countries where tuition fees are higher.

Currently, Fundação José Neves, created in 2019, is the main booster of the mechanism in the country by offering Income Share Agreements to students who wish to pursue education degrees. As specified in their website, "Independently from their personal or professional situation, or from their economic capacity, can benefit from the ISA Fundação José Neves students in their normal cycle of education and also professionals who are already in the job market – even if they are currently unemployed – but want to invest in the development of their competencies", which shows the inclusiveness of the program, especially considering that no financial guarantees are needed to apply for these agreements (Fundação José Neves, n.d.).

With 131 formations/degrees from 22 different institutions in Portugal for students to enrol under this agreement (as of March 2021), they are required to study, live and have a fiscal residence in the country, meaning that the possibility of ISA from the Foundation José Neves for international students is still not available.

The agreement is completed by signing a contract that specifies the payment conditions. The student also acknowledges understanding the contract's peculiarities, committing towards fulfilling the degree, actively searching for a job placement and providing relevant documents related to their post-graduation earnings.

Another example is StudentFinance, a fintech that brought the ISA model to Europe, having recently started its operations in Portugal. The objective is to improve education in technical sectors (such as programming and computing), provide viable financing options to the students, and connect them with a vast network of predominant companies interested in new talent (StudentFinance, n.d.).

2.9. Major Challenges for ISA in Education

From the analysis of existing literature and past cases, we can conclude some challenges that might defy the viability of implementing ISAs.

The first concern would be the attractiveness for investors, especially financially-oriented investors. Considering the impact aspect of ISAs, the financial return is not expected to be as high as typical investment possibilities, which would deflect many investors. Anyhow, for the potentially interested investors, the potential increase in return and decrease in risk relies on diversification, with some literature suggesting that ISAs can be interesting from the perspective of diversifying a portfolio and hedging against market risk (Yu & Salyards, 2008).

The second major challenge for ISA implementation is data availability, as a large dataset is required to elaborate an algorithm that correctly estimates students' future income. The lack of past examples to rely on has hindered creating such an accurate estimation model, although companies such as Lumni or Pave already provide an extensive algorithm to assess the potential benefit of a student (Surowieki, 2013; Nisen, 2015). A withdrawal of the existing ban on student unit records and the dissemination of data on the professional outcomes of graduates would also facilitate a rapid agglomeration of data for the estimation model to base itself in (Palacios et al., 2014).

The lack of a legal framework supporting such mechanisms regarding transparency and enforceability is also a major challenge. In terms of transparency, the government's lack of support in obtaining legitimate information involving the student (e.g. data that influences the pre-contract estimation of income or the post-graduation accurate disclosure of income) hinders the interest of investors (Nerlove, 1975). In terms of enforceability, clear regulation is fundamental for situations such as bankruptcy, as currently it is still dubious.

Literature suggests, regarding the student, that psychological effects such as moral hazard or adverse selection might also damage the efficiency of the ISA. These effects comprehend the change in behaviour of the students post-graduation when in an ISA compared to normal financing mechanisms since students might be less proactive in their career growth due to the naturally lower reward from any incremental income (a percentage would be automatically repaid to the investor.) A similar example would be poker players, who tend to perform worse when investors contribute with a part of their entry fee in tournaments in exchange for a percentage of their winnings - similarly to what happens in an ISA (Madonia & Smith, 2017). Anyhow, there are examples of the opposite. For example, Muhammed Ali was financed by investors at the beginning of his career in exchange for a percentage of winnings, just like writers are many times funded before publishing a book in exchange for a future percentage, without evidencing diminished earnings (Surowieki, 2013).

Lastly, the negative perception of investments in human capital is also a concern for the ISAs. Many critics suggest that these financing structures turn students into a modern form of indentured slaves since the investor may obtain excessive control over the individual (Oei & Ring, 2015), although the current legislation prevents the investor from coercing specific actions on the individual, in an attempt to prevent such control (Petri, 2014).

2.10. Conceptual Framework and Hypotheses

The hypotheses that compose the conceptual framework were formulated based on the concepts analysed in the literature review, namely the main triggers and variables for potential student interest in such agreements, in order to allow for future optimisation of the ISA's offer that attracts more students without harming the investor's preferences.

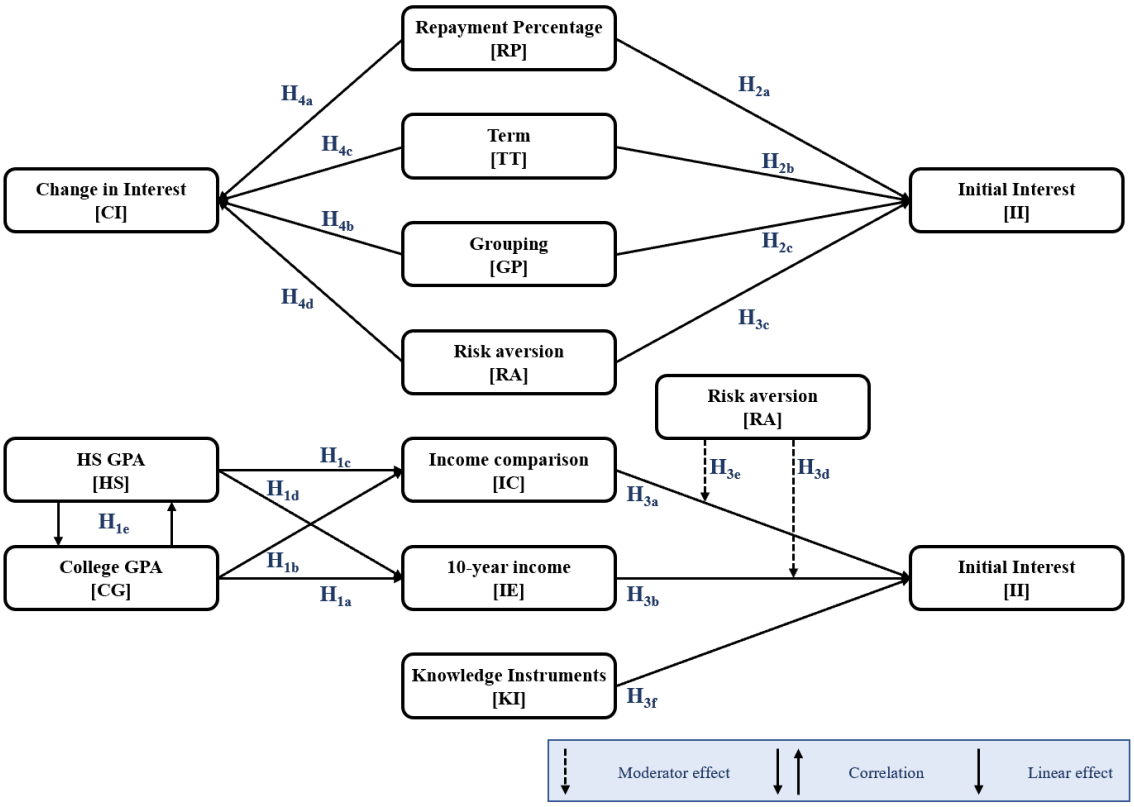


Figure 8: *Conceptual Framework*

2.10.1. Hypotheses

H1: Higher (lower) academic performance increases (decreases) the income estimations after graduation.

The first hypothesis considers the effect of both high-school and college GPA on income estimations. Literature has shown that high-school performance positively affects future earnings, both short-term (Crawford et al., 1997; Bishop et al., 1985) and long- term (French et al., 2015). College performance, major and selectivity evidence the same result (Hamermesh & Donald, 2008; Hoekstra, 2009; Jones & Jackson, 1990; Loury & Garman, 1995; Monks, 2000; Thomas, 2003; Zhang, 2008), with some studies suggesting that high-school achievement is significantly correlated to college performance (Betts & Morell, 1999; Cohn et al., 2004). As evidence shows that fourth-year students portray knowledge about the salaries in their field (Betts, 1996), we can assume that students with higher academic performance will estimate higher incomes after graduation.

H2: Income Share Agreement's conditions will affect the perceived interest in ISAs.

The second hypothesis regards the effect of contract conditions in the interest of ISAs. Traditional economic theories suggest that students will base their financing decision merely on financial cost-benefit analysis since it is one of the most important decisions in most individual's life (Carnevale, 2011; Carnevale et al., 2015; Rothwell & Kulkarni, 2015). Considering the need to adapt contract conditions depending on the student's potential (Surowieki, 2013; Nisen, 2015) and the financial and social constraints faced by people incurring in debt - working long hours and financial sacrifices (Perna, 2008; Tierney & Venegas, 2009), we can assume that harsher repayment conditions (term and repayment percentage) will decrease the interest on the mechanism. As grouping repayment mechanisms have created dissatisfaction in students of past cases (Putilov et al., 2018), we can assume that it will decrease initial interest in the mechanism.

H3: Sample characteristics and preferences will impact the perceived interest in ISAs.

The third hypothesis relates to the effect of sample characteristics (income estimation and knowledge of financial instruments) and personal preferences (risk aversion) on the student's interest in ISAs. As students accurately estimate their future income (Betts, 1996) and the repayment amount is dependent on the income estimation, it is expected for students with higher income estimations to have less interest in ISAs, as they would thoroughly evaluate the important financial decision (Carnevale, 2011; Carnevale et al., 2015; Rothwell & Kulkarni, 2015).

This effect is expected to be moderated by risk aversion, since risk and loan-averse individuals value the insurance against future income uncertainty highly (Farrington, 2019; Peek et al., 2017; Holt, 2016; Palacios et al., 2014), increasing their interest in ISAs (Boatman et al., 2017; Peek et. al, 2016; Palacios et al., 2014).

Since the mechanism is aimed at low-income students who need financing (Matthews, 2013; Putilov et al., 2018), we assume that higher knowledge of financing instruments (having received either a student loan or financial aid) will evidence higher interest in the ISAs.

H4: Income Share Agreement's conditions and risk aversion of the respondent will affect the value of net change in perceived interest in ISAs before and after presented with standard student loan conditions.

As previously described, the decision regarding financial decision is based on benefit-cost analysis (Carnevale et al., 2011; Kulkarni & Rothwell, 2015; Carnevale et al., 2015). When presented with the traditional loan conditions, the respondents will better compare both options, making them more sensitive to their differences and enhancing the effects observed in H2.

Risk aversion will play a part in this change, as students (especially risk-averse ones) are typically willing to pay a premium for agreements not labelled as loans (Field, 2009; Caetano et al., 2011). Therefore, the risk-averse student will be less sensitive to the changes in contract conditions, as they will still highly value the insurance against future income uncertainty (Farrington, 2019; Peek et al., 2017; Holt, 2016; Palacios et al., 2014).

3. METHODOLOGY

3.1. Research approach

When performing research, three main methods might apply: exploratory, descriptive and explanatory (Saunders et al., 2019). Exploratory research is the initial research of theoretical concepts to comprehend the existing theories regarding the subject. It is used mainly towards hypothesis formulation rather than hypothesis testing (Brotherton, 2014) - exploratory research was utilised in the literature review chapter. Descriptive research consists of data and information collection, which will fill the missing aspects of the topic, therefore providing a more comprehensive understanding of the situation (Brotherton, 2014) - the next chapters of data collection through the online questionnaire consist of descriptive research. Explanatory research connects exploratory and descriptive research, deriving conclusions and relationships between the variables (Saunders et al., 2019) - the last chapter of conclusions will be composed by explanatory research.

Regarding the potential research approaches, there are three main types: quantitative, qualitative and mixed (Creswell, 2007). The quantitative approach consists of systematic investigations based on quantifiable data and statistical or mathematical analysis. Qualitative research regards the analysis of non-numerical data, such as interviews or videos. Mixed research approach compromises both quantitative and qualitative research.

This dissertation will utilise a quantitative research approach by statistically analysing the data gathered in an online questionnaire.

3.2. Secondary Data

As the basis for the literature review, secondary data was collected from online sources in academic articles that referenced the main research topic. The objective was to gather relevant insights from prestigious journals, which was difficult due to the relative lack of literature and subject novelty. The data collected allowed for an initial understanding of the research subject and served as the basis for hypotheses and conceptual framework formulation.

3.3. Primary Data

The primary data used in the dissertation was obtained through a quantitative approach. The approach consisted of an online questionnaire, which allowed for inexpensive and rapidly available data, as well as easiness of analysis. This method also has disadvantages since the questions cannot be clarified if the respondent has doubts (Malhorta & Birks, 2017).

3.3.1. Online Questionnaire

3.3.1.1. Data Collection

The study's main objective was to obtain data regarding the potential interest from individuals in ISAs as a potential form of educational financing. As analysed in the literature review, the mechanism would avoid large student loans being taken every year. Considering that the students are the focal point of this financing mechanism, it is important to understand the variables that influence their potential interest.

The data collection occurred through a survey distributed online in English. The survey was designed in Qualtrics and posted on the Amazon MTurk platform from the 5th of April to the 6th of May. The survey obtained a total of 314 responses, of which 265 were valid. The decision to utilize a paid platform was to reach the targeted population easily.

As for the target population, the survey intended to understand the interest of individuals in obtaining an ISA to finance their tertiary education, specifically in the United States of America. Posting on Amazon MTurk helped target the specific segment. It also ensured the legitimacy of the answers, as some requirements were selected when posting the survey on the platform: location of the United States of America, experience in the platform (number of previous surveys completed over 50) and the viability of the respondents (over 95% of previous surveys completed approval rate).

No specific requirement for age group was applied since, as explained in the literature review, the decision of tertiary education has become increasingly important in an individual's life (Carnevale, 2011; Carnevale et al., 2015; Rothwell & Kulkarni, 2015). Therefore, it is fair to assume that the decision will consider the individual's interest and the recommendations of the people close to him (family, friends). Hence, understanding the perceived interest from all age groups is important for assessing the ISA's potential without it being hindered by a differentiated perspective from older generations that advise the decision. No clause was also

applied regarding the need for tertiary education, capturing both populations who pursued and did not pursue tertiary education.

Regarding the sampling technique, this study applied non-probability convenience sampling. The non-probability aspect regards the fact that each respondent did not have a pre-determined fixed probabilistic chance of being selected for the sample. The sampling technique is also convenient, as the participants were "in the right place at the right time". The main benefits from the sampling technique applied are cost and time efficiencies (Malhorta & Birks, 2017).

3.3.1.2. Research design

The survey, which can be reviewed in Appendix 1, asked the respondents to approach all questions as if they freshmen in college, needing to finance their education. The respondents were informed that the survey had an estimated duration of 4 minutes. Overall, the respondents took between 31 seconds and 92 minutes 51 seconds to complete the survey, with an average completion time of 3 minutes 39 seconds.

Respondents were randomly assigned to one of eight different treatment groups, each of them covering different ISA offer conditions, by varying the following variables: repayment percentage (7,5% or 10%), agreement term (12 or 16 years) and cap mechanisms (individual or group).

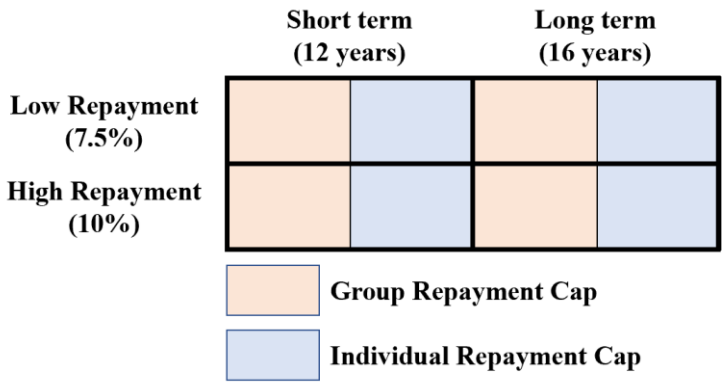


Figure 9: *Different offers presented to the respondents*

After explained the offer conditions, the respondent was asked to rate the ISA proposal with one of the five levels of interest and their perception of the two main conditions of the survey: repayment percentage and agreement term. This self-reported perceived interest will serve as the main dependent variable in the analysis.

The next questions assessed multiple characteristics of the respondent, namely high-school GPA (compared to peers), college GPA, post-graduation income expectation (compared to peers), estimated earnings in 10 years, financing instruments experience and risk aversion. A control question was also placed in this section to control for distracted respondents.

Later, respondents were informed about the usual conditions of traditional financing mechanisms (federal and private student loans) before being questioned again about their interest in the ISA. The change in interest observed before and after knowing the usual conditions will also serve as a dependent variable to the analysis.

Lastly, the relevant demographics of the respondents (age, gender and nationality) were recorded.

4. RESULTS ANALYSIS

This chapter addresses the analysis of data collected through the online questionnaire.

Firstly, a sample characterisation will be presented through descriptive analysis. Secondly, an outliers screening was complete to ensure that all responses positively contribute to analysing the hypotheses and consequent conceptual framework.

Lastly, hypothesis H1e will be analysed via a correlation analysis, while the remainder hypotheses will be analysed via simple linear regressions. Hypotheses H3d and H3e will be analysed via linear regressions with interactions to understand potential moderator effects.

4.1. Sample characterization

The survey's characteristics introduce some limitations to the validity of the results. The lack of information regarding the background of each respondent might create heterogeneity in majors, which can be a disadvantage as the perceptions of each respondent of above or below average GPAs might differ heavily. On the other hand, when grades are held fixed, the income estimation for each major is expected to be different (for example, between high performing engineering or language studies majors).

The sample provided was distributed evenly in what considers gender, with 51% of males, 48% females and 1% non-binary/prefer not to disclose.

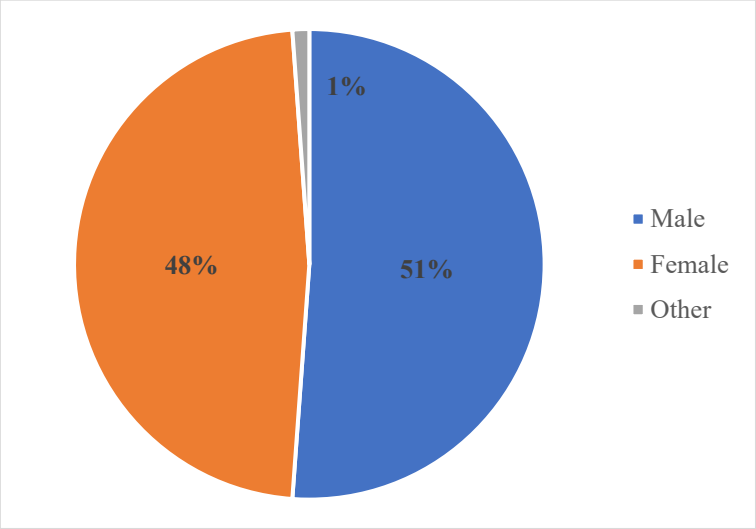


Figure 10: *Distribution of the gender variable*

Regarding the age of the participants and considering that the survey was posted on the Amazon MTurk platform, the distribution has a concentration of older participants higher than predicted. With the highest number of respondents in the]25-30] range (61 respondents), the sample has 58% of the respondents in the]25-40] range. A mere 13% of the respondents are in the]15-25] range (most likely to be pursuing tertiary education). However, this aspect does not harm the efficiency of the results. As aforementioned, the education financing decision is highly dependent on the parents' perception and recommendation as well, due to the importance of such a decision in the individual's future.

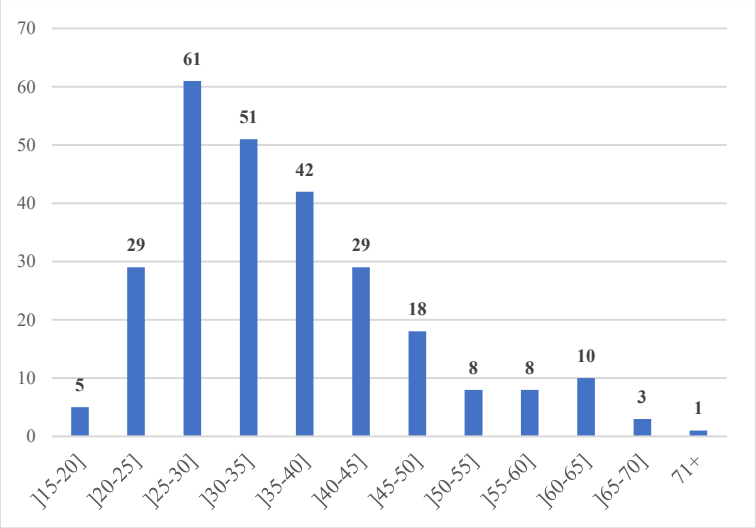


Figure 11: *Distribution of the age variable*

Grades were self-reported. Regarding the high school grades, the respondents were asked to compare their results to their peers, while the college GPA was asked in numerical values, with five available options. As a student needs a 2.0 GPA to obtain a degree, the lowest interval was “Below 2.0”, while the other ranges were created with a subsequent 0.5 increase (reaching the 3.5 – 4.0 range).

As expected from self-reported grades, especially in subjective ones (comparing to peers), most respondents reported average or above-average high-school performance, with a mere 7.5% and 0% reporting low and extremely low high-school performance, respectively. In terms of college GPA, the most concentration of answers was in the 3.0 – 3.5 interval.

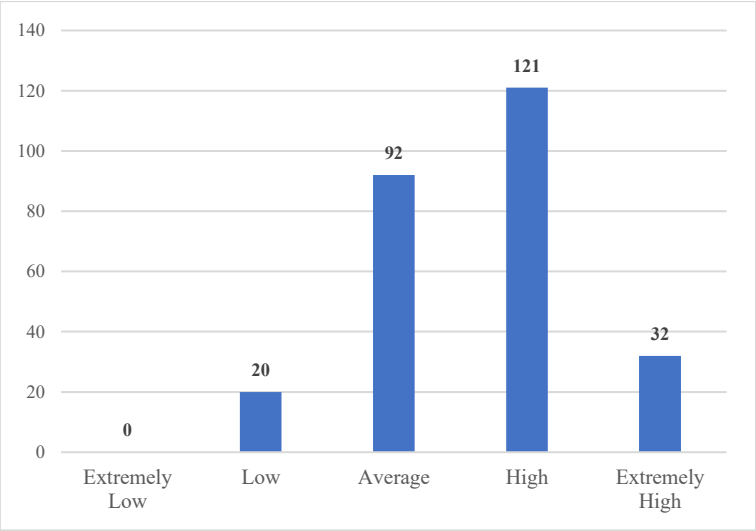


Figure 12: *Distribution of the high-school GPA comparison variable*

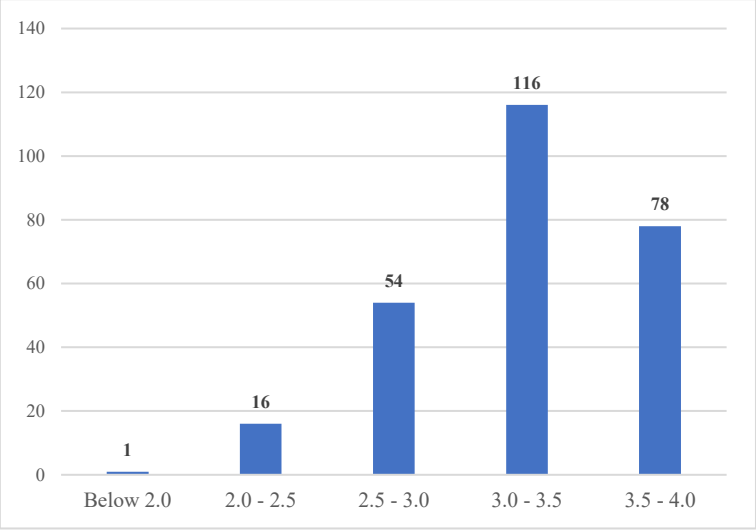


Figure 13: *Distribution of the college GPA variable*

The income expectations were also reported in the survey. The respondents were asked to compare their post-graduation salary expectation to their peers, as well as their 10-year post-graduation salary expectation. Comparing the answers' distribution, it is observable that the objective question got a more distributed pool of answers, while the comparison question once again showed a clear skew towards average and above-average responses since only 15% of the respondents reported below-average post-graduation income.

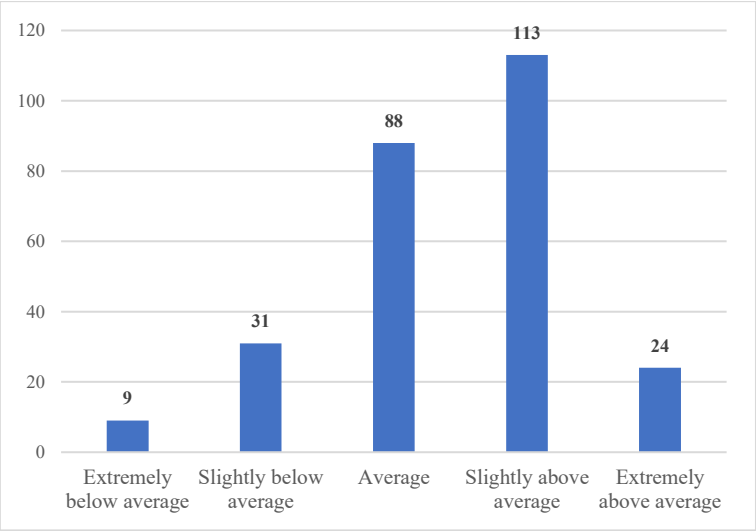


Figure 14: *Distribution of the post-graduation income comparison variable*

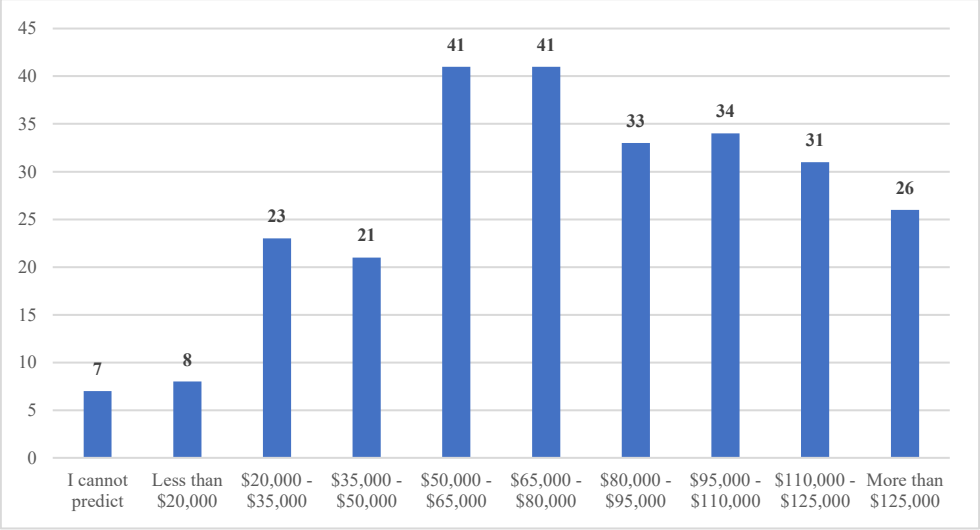


Figure 15: *Distribution of the 10-year income estimation variable*

Survey question number 11 measured the risk aversion of the respondents. By providing a scenario with two possible wins, both with the same probability (coin flip), the valuation provided by the respondent was analysed. As the scenario was a possible win of $20 for head and $40 for tails, the expected outcome is $30. Consequently, $30 was considered the neutral point for risk aversion, with values lower than $30 representing a high-risk aversion and values higher than $30 representing low-risk aversion.

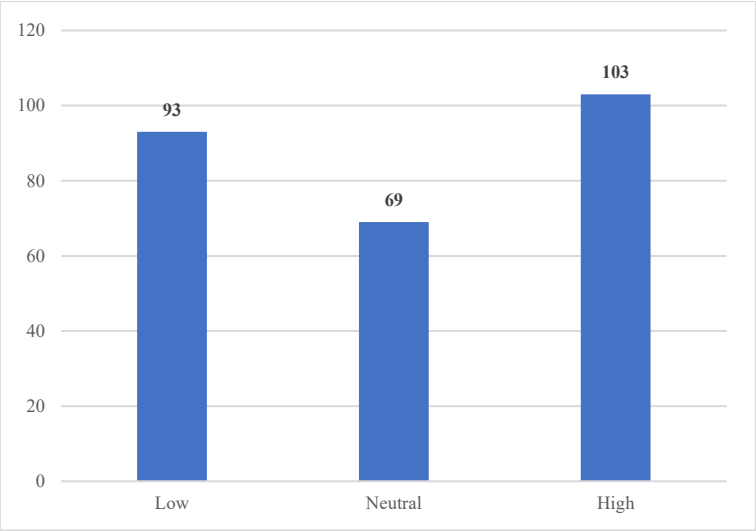


Figure 16: *Distribution of the risk aversion variable*

The respondents were also questioned about having received any previous financial aid or student loans. The questions were made separately so that the separate independent effects on interest could be analysed and create a new variable – "knowledge of financing instruments" – which consisted of the number of previously taken mechanisms. Most of the sample had already had access to financing mechanisms, with only 30% of the respondents responding "No" on both questions. On the other hand, 52% of the sample had already received both a student loan and financial aid.

	Student loan	Financial aid
Yes	152	173
No	113	92

Table 2: *Distribution of the student loan and financial aid responses*

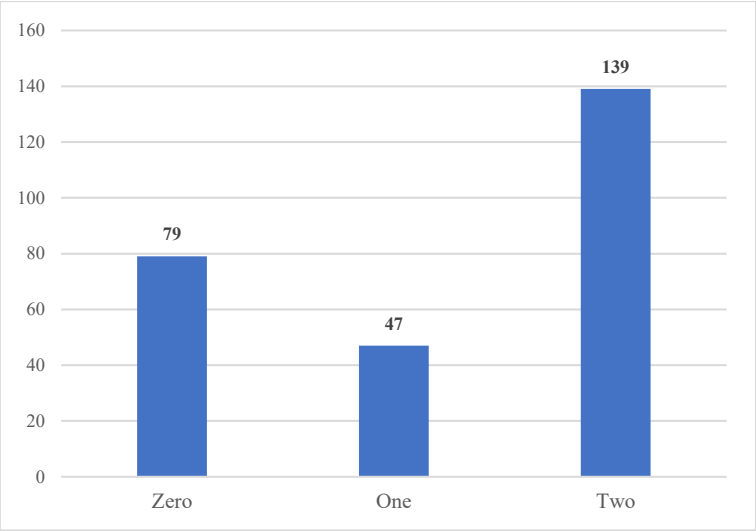


Figure 17: *Distribution of the knowledge of financing instruments variable*

As aforementioned, the ISA was offered in 8 different conditions - 2R (7.5, 10) x 2T (12, 16) x 2G (G, I). Qualtrics automatically attributed the offer to the respondent, equally distributing the number of respondents per offer. However, some respondents did not complete the survey and some answers were disregarded (due to failing the control question). The final distribution is summarized in Figure 18.

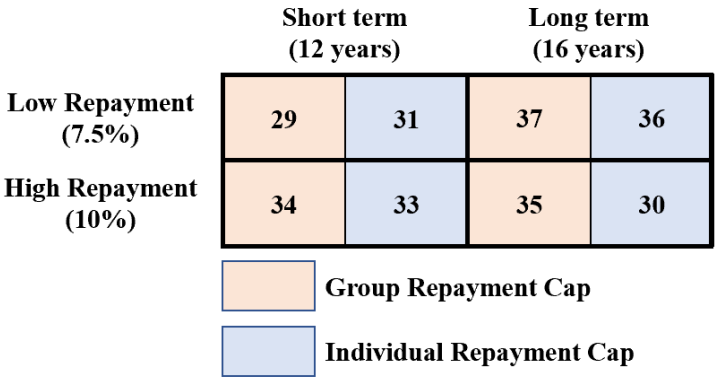


Figure 18: *Distribution of respondents, per ISA offer*

The initial interest for the offer provided will become the dependent variable. This interest was defined using a Likert-type five-point scale. The reasoning being using a five-point scale instead of a Likert-type seven-point scale was the novelty of the model, leading to the assumption that the respondent's perception of interest in the mechanism is not solidified well enough for them to segment their potential interest between those many options accurately.

The change between the interest reported before and after presenting the financing alternatives generated the new variable “Change in Interest”.

	7.5%	7.5%	7.5%	7.5%	10%	10%	10%	10%
	12 years	12 years	16 years	16 years	12 years	12 years	16 years	16 years
	Grouping	Individual	Grouping	Individual	Grouping	Individual	Grouping	Individual
Extremely Interested	24.1%	12.9%	16.2%	22.2%	23.5%	30.3%	5.7%	10.0%
Moderately Interested	41.4%	51.6%	29.7%	36.1%	32.4%	39.4%	37.1%	46.7%
Neutral	10.3%	12.9%	8.1%	16.7%	17.6%	12.1%	25.7%	10.0%
Moderately Uninterested	17.2%	6.5%	35.1%	11.1%	11.8%	15.2%	14.3%	16.7%
Extremely Uninterested	6.9%	16.1%	10.8%	13.9%	14.7%	3.0%	17.1%	16.7%

Table 3: *Distribution of the initial interest variable, per ISA offer*

	7.5%	7.5%	7.5%	7.5%	10%	10%	10%	10%
	12 years	12 years	16 years	16 years	12 years	12 years	16 years	16 years
	Grouping	Individual	Grouping	Individual	Grouping	Individual	Grouping	Individual
+4	0	0	0	0	0	0	0	0
+3	0	1	0	1	0	0	0	2
+2	1	2	4	2	2	0	0	2
+1	4	5	3	4	1	1	4	5
0	17	14	22	21	22	23	22	14
-1	5	6	7	6	7	6	7	4
-2	1	0	0	2	2	2	1	3
-3	1	2	1	0	0	0	1	0
-4	0	1	0	0	0	1	0	0

Table 4: *Change the in interest variable, per ISA offer*

	7.5%	7.5%	7.5%	7.5%	10%	10%	10%	10%
	12 years	12 years	16 years	16 years	12 years	12 years	16 years	16 years
	Grouping	Individual	Grouping	Individual	Grouping	Individual	Grouping	Individual
Interested	65.2%	64.5%	45.9%	58.3%	55.9%	69.7%	42.8%	56.7%
Neutral/ Not Interested	34.8%	35.5%	54.1%	41.7%	44.1%	30.3%	57.2%	43.3%

Table 5: *Distribution of the binary initial interest variable, per ISA offer*

	7.5%	7.5%	7.5%	7.5%	10%	10%	10%	10%
	12 years	12 years	16 years	16 years	12 years	12 years	16 years	16 years
	Grouping	Individual	Grouping	Individual	Grouping	Individual	Grouping	Individual
+1	2	1	2	2	5	3	3	2
0	22	25	30	32	23	21	26	24
-1	5	5	5	2	6	9	6	4

Table 6: *Change in the binary interest variable, per ISA offer*

4.2. Descriptive statistics

A statistic summary of each variable was computed (respondents, mean, standard deviation, minimum, quartiles and max) to get insights into the survey variables. Before conducting the summary statistic, some variable's scales were altered to better describe the respondents (Appendix 10).

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Initial.Interest	265	0.340	1.290	-2	-1	1	2
I.Interest.Binary	265	0.570	0.496	0	0	1	1
Repayment.perception	265	-0.415	0.558	-1	-1	0	1
Term.perception	265	-0.453	0.583	-1	-1	0	1
Repayment	265	8.745	1.252	7.5	7.5	10	10
Term	265	14.083	2.002	12	12	16	16
Grouping	265	0.509	0.501	0	0	1	1
HS.GPA	265	3.623	0.794	2	3	4	5
College.GPA	265	3.958	0.880	1	3	5	5
Income.peers	265	0.423	0.931	-2	0	1	2
Income.estimation	265	5.298	2.364	0	4	7	9
Student.loan	265	0.574	0.495	0	0	1	1
Financial.aid	265	0.653	0.477	0	0	1	1
Knowledge	265	1.226	0.880	0	0	2	2
Risk.aversion	265	0.038	0.861	-1	-1	1	1
New.interest	265	0.234	1.202	-2	-1	1	2
New.interest.Binary	265	0.487	0.501	0	0	1	1
American	265	1.000	0.000	1	1	1	1
Age	265	36.547	11.122	19	29	43	72
Gender	265	1.528	0.557	1	1	2	3
Change	265	-0.106	1.032	-4	0	0	3

Table 7: *Summary of sample statistics*

Overall, looking at the mean values of each variable and the sample characterization mentioned above, the sample presents a neutral perception of most of the topics since the mean is relatively close to the average scale value in most of the variables. Another aspect is that both initial and new interest (on the 5-point scale) have presented, on average, positive

values, showing that the sample shows higher levels of interest in the ISA than uninterest. Considering that the binary initial interest variable has a mean above 0.5, we can conclude that most respondents were initially interested in the mechanism. However, the binary new interest variable shows that most respondents were either neutral or uninterested after presented with the traditional student loan conditions.

4.3. Validation of assumptions

Since most of the hypotheses' analysis was via linear regressions, some assumptions need to be considered:

- There is a linear relationship between the independent and dependent variables;
- Homoscedasticity: the residuals have the same variance for every level of the independent variable;
- Independence: the residuals are uncorrelated;
- Normality: residuals are normally distributed.

The data was therefore tested to ensure the compliance of such assumption. The data presents homoscedasticity for all hypotheses, except for H3a (studentized Breusch-Pagan test presented p=0.006), which was promptly corrected. The residuals are also not correlated, and observations are independent since the Durbin-Watson test result for all hypotheses was between 1,5 and 2,50. Furthermore, the residual error is normally distributed. Lastly, Tolerance and VIF values equal one, which shows there is no multicollinearity problem.

Hence, all assumptions were tested and validated.

4.4. Hypothesis testing

To confirm the potential relationships between the multiple explanatory variables and the outcome variables, several statistical tests were conducted.

4.4.1. Hypothesis 1

The first hypothesis comprehends the relationships and correlation between the respondents' academic performance and income estimation. In this sense, some Linear Regression Analyses were conducted (Appendix 11), with the effect of the academic

performance variables being tested regarding their effect on income estimation variables. Academic performance variables were also tested for correlation.

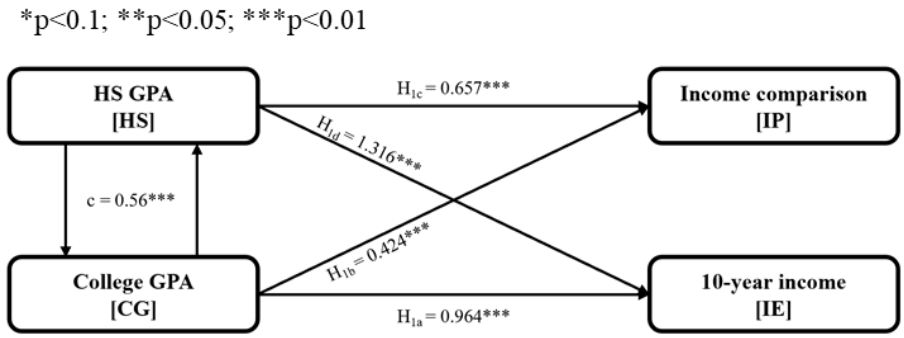


Figure 19: *Hypothesis 1 results*

H1a: Higher (lower) college GPA increases (decreases) the respondent's estimation of income 10 years after graduation.

The first hypothesis tests the influence of College GPA on the 10-year income estimation. Even though the Adjusted R-Squared is relatively small (.126), the Beta coefficient is statistically significant (p<.01). Considering the value of the Beta coefficient (.964), we estimate that an increase by 1 unit (equivalent to an increase in 0.5 in college GPA) will result in an increase of the 10-year income estimation by 0.964 units (equivalent to $ 14,460), and therefore positively influence the dependent variable.

We therefore conclude that the hypothesis H1a is supported by the data.

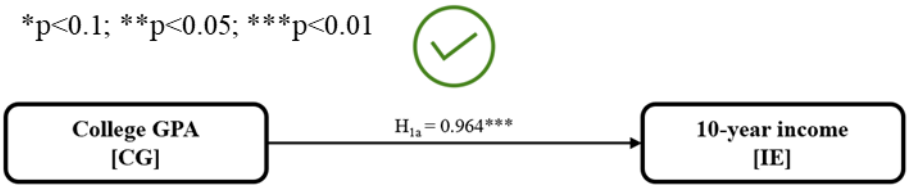


Figure 20: *H_{1a}*

H1b: Higher (lower) college GPA increases (decreases) the perception of post-graduation income.

The second hypothesis of this group concerns the impact of college GPA in the post-graduation income compared to their peers. The Adjusted R-Squared presents a higher value than the last hypothesis (.157) and the Beta coefficient (.424) is statistically significant at the 5% significance level (p<.01). Since the scale of the dependent variable is not numerical, there is no clear interpretation of the value of the Beta coefficient. Nevertheless, we can confidently estimate that college GPA positively influences the income expectation compared to peers.

We therefore conclude that the hypothesis H1b is supported by the data.

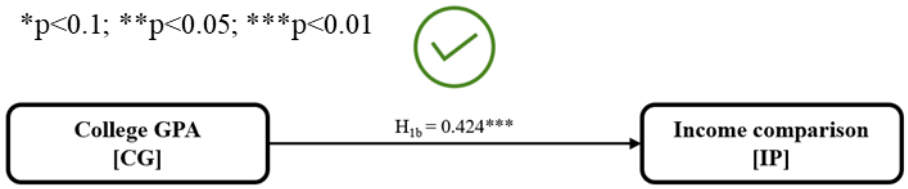


Figure 21: *H_{1b}*

H1c: Higher (lower) high-school GPA increases (decreases) the perception of post-graduation income.

The third hypothesis of this group concerns the impact of high-school GPA in the post-graduation income (compared to their peers). The Adjusted R-Squared presents a higher value than the last hypothesis that utilized college GPA as independent variable (.311 compared to .157), signalling that this model has a better goodness-of-fit when explaining the dependent variable. The Beta coefficient (.657) is statistically significant at the 5% significance level (p<.01). Hence, we can confidently estimate that high-school GPA positively influences the income expectation compared to peers after graduation.

We therefore conclude that the hypothesis H1c is supported by the data.

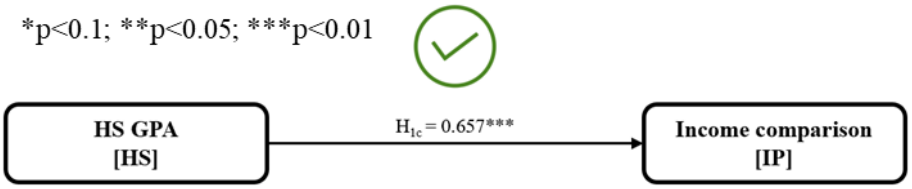


Figure 22*: H_{1c}*

H1d: Higher (lower) high-school GPA increases (decreases) the respondent's estimation of income 10 years after graduation.

The fourth hypothesis tests the influence of the high-school GPA perception on the 10-year income estimation. The Adjusted R-Squared is slightly higher (.192) than the same model with college GPA as independent variable (.126), and the Beta coefficient (1.316) is statistically significant (p<.01), therefore concluding that high-school GPA has a positive effect in the estimation of income in 10 years after graduation. Comparing the Adjusted R-Squared to the one of H1c, it is understandable that this model presents a smaller one, as high-school GPA should better explain the estimation of income when the dependent variable is a scale of comparison (H1c) than the income in 10-years utilizing numerical values (H1d) – e.g. a student from art major with excellent academic performance might have an estimation of income to be higher than its peers, although in numerical terms the income in 10 years will be lower than a worse academic performer that is studying engineering.

We therefore conclude that the hypothesis H1d is supported by the data.

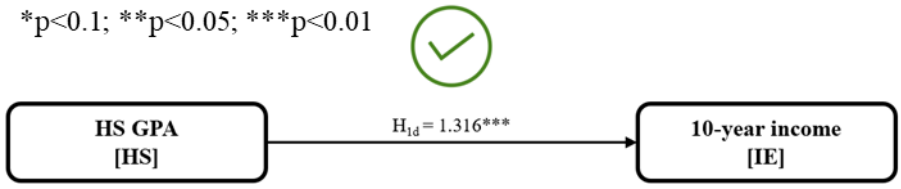


Figure 23: *H_{1d}*

H1e: High-school GPA is positively correlated with College GPA.

To test the correlation of both academic performance variables (high school GPA and college GPA), a Pearson correlation test was performed. The results of the test (r=.558, p<.001) imply a significant positive correlation, with the correlation coefficient of .558 indicating a moderate impact between the variables.

We therefore conclude that the hypothesis H1e is supported by the data.

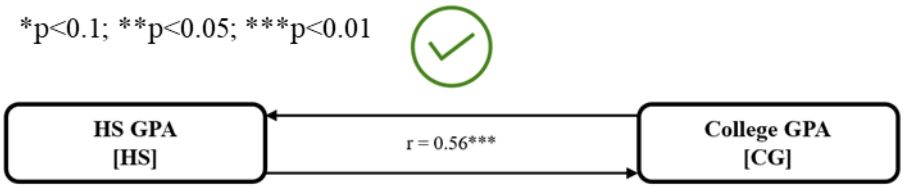


Figure 24: *H_{1e}*

4.4.2. Hypothesis 2

Hypothesis 2 analyses the impact of the contract conditions in the Initial Interest of the respondents in the ISA by performing Linear Regression Analyses.

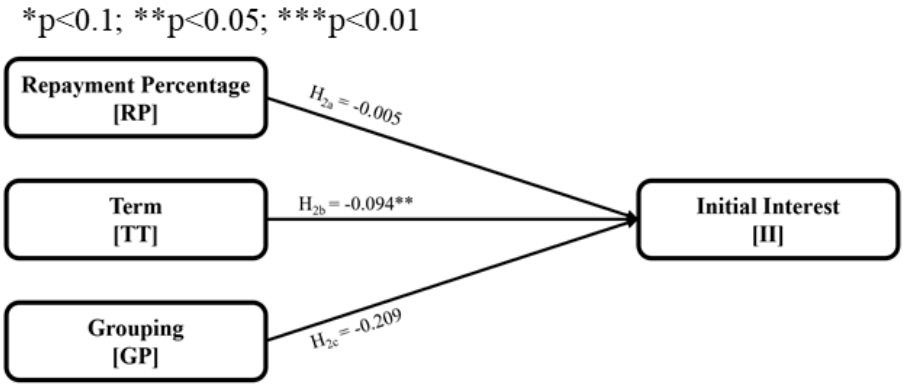


Figure 25: *Hypothesis 2 results*

H2a: Higher (lower) repayment percentage decreases (increases) the initial interest in ISAs.

The first hypothesis of this group regards the impact of the repayment percentage in the initial interest in ISAs. The Adjusted R-Squared is negative (- .004) and the Beta coefficient (- .005) is not statistically significant at the 5% significance level. Hence, we cannot reject the null hypothesis that repayment percentage does not impact the perceived interest in the mechanism.

We therefore conclude that the hypothesis H2a is not supported by the data.

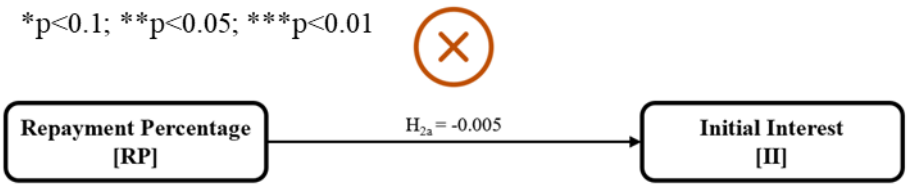


Figure 26: *H_{2a}*

H2b: Higher (lower) repayment term decreases (increases) the initial interest in ISAs.

The second hypothesis of this group concerns the impact of the contract term in the initial interest in ISAs. The Adjusted R-Squared is extremely residual (-.018), which evidences little goodness-of-fit. Regardless, the Beta coefficient (- .094) is statistically significant at the 5% significance level (p<.05). Hence, we estimate that the contract term has a statistically significant negative effect on the interest in the ISA.

We therefore conclude that the hypothesis H2b is supported by the data.

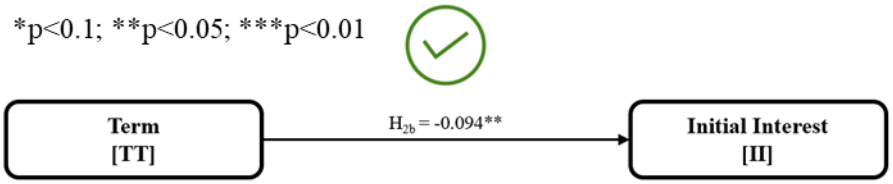


Figure 27: *H_{2b}*

H2c: Grouping (individual) feature in repayment cap decreases (increases) the initial interest in ISAs.

The last hypothesis of this group regards the impact of changing the repayment cap feature from grouping to individual in the initial interest in ISAs. The Adjusted R-Squared is residual (.003) and the Beta coefficient (- .209), although presenting the expected negative impact, is not statistically significant at the 5% significance level. Hence, we cannot reject the null hypothesis.

We therefore conclude that the hypothesis H2c is not supported by the data.

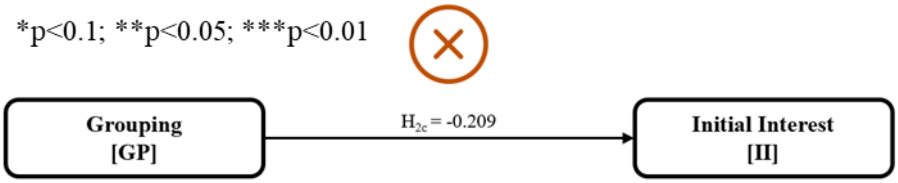


Figure 28: *H_{2c}*

4.4.3. Hypothesis 3

Hypothesis 3 analyses the impact of income characteristics (IC and IE) on initial interest, as well as the moderator effect of risk aversion in said impact. To do so, Linear Regression Analyses were conducted. To study the moderating effect of risk aversion, separate regressions were conducted with the inclusion of interaction terms (IC*RA and IE*RA).

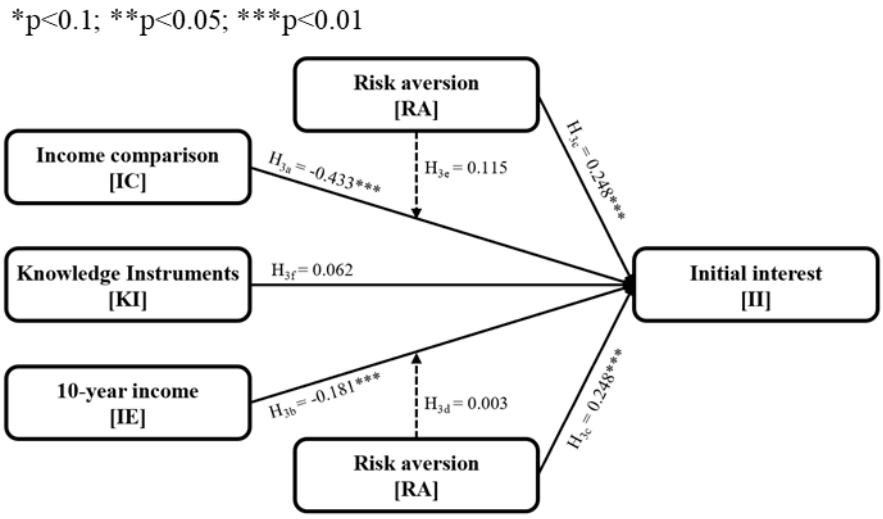


Figure 29: *Hypothesis 3 results*

H3a: Higher (lower) expected post-graduation income decreases (increases) the initial interest in ISAs.

The first hypothesis of this group regards the impact of the post-graduation income (compared to peers) in the initial interest in ISAs. After conducting a studentized Breusch-Pagan test, the presence of heteroscedasticity was detected (p=.006). After adjusting the heteroscedasticity, the linear regression was conducted. The Adjusted R-Squared is relatively small (.098), although the Beta coefficient (- .433) is statistically significant at the 5%

significance level (p<.01). The Bbeta coefficient value signals that an increase in the perception of post-graduation income compared to peers is estimated to reduce the perceived interest in the mechanism.

We therefore conclude that the hypothesis H3a is supported by the data.

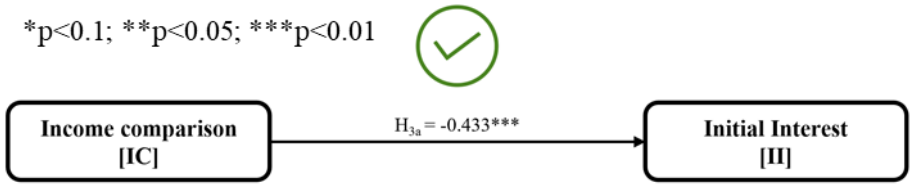


Figure 30: *H_{3a}*

H3b: Higher (lower) expectation of income 10 years after graduation decreases (increases) the initial interest in ISAs.

The second hypothesis of this group regards the impact of the 10-year income estimation in the initial interest in ISAs. Once again, the Adjusted R-Squared is relatively small (.106), although slightly higher than H3a. The Beta coefficient (- .181) is statistically significant at the 5% significance level (p<.01). The Beta coefficient value signals that an increase in the perception of 10-year income estimation reduces the perceived interest in the mechanism.

We therefore conclude that the hypothesis H3b is supported by the data.

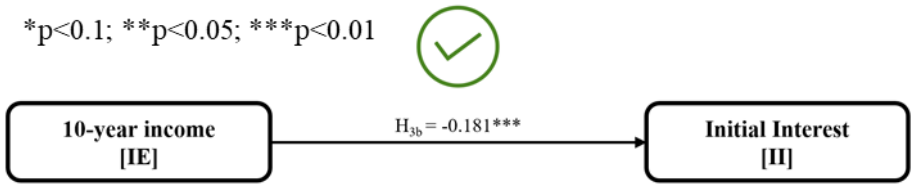


Figure 31: *H_{3b}*

H3c: Higher (lower) risk aversion from the respondent increases (decreases) the initial interest in ISAs.

The third hypothesis of this group considers the impact of the risk aversion preference of the respondent in the initial interest in ISAs. The Adjusted R-Squared is residual (.024).

The Beta coefficient (.248) is statistically significant at the 5% significance level (p<.01). The Beta coefficient value estimates that risk-averse respondents are more interested in the ISA.

We therefore conclude that the hypothesis H3c is supported by the data.

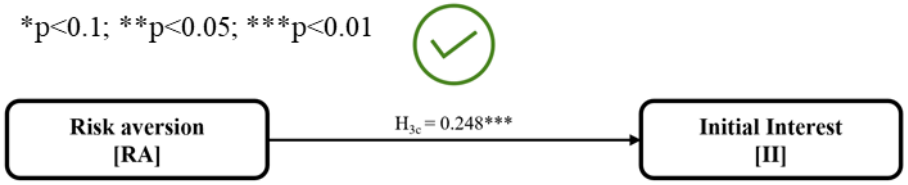


***Figure 32**: H_{3c}*

H3d: Risk aversion will moderate the effect of expectation of income 10 years after graduation on the initial interest in ISAs.

The fourth hypothesis of this group considers the moderating effect of the risk aversion preference on the impact of 10-year income estimation on the initial interest in the mechanism. The Adjusted R-Squared is only slightly higher than the one of H3b (.117 compared to .106), although lower than a model with risk aversion and 10-year income without interaction (.117 compared to .12), showing that the model has lower goodness-of-fit when including the interaction. The Beta coefficient of the interaction (.003) is not statistically significant at the 5% significance level, therefore we cannot reject the null hypothesis and cannot estimate that risk aversion has a moderating effect on the impact of 10-year income on the initial interest of ISA.

We therefore conclude that the hypothesis H3d is not supported by the data.

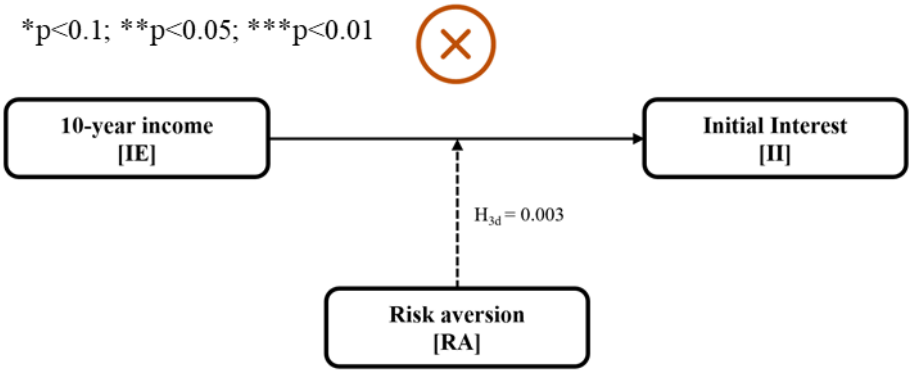


***Figure 33:** H_{3d}*

H3e: Risk aversion will moderate the effect of expected post-graduation income on the initial interest in ISAs.

The fifth hypothesis of this group considers the moderating effect of the risk aversion preference on the impact of post-graduation income comparison on the initial interest in the mechanism. The Adjusted R-Squared is slightly higher than the one of H3b (.116 compared to .094), showing that the model has a slightly better goodness-of-fit when including risk aversion and its interaction with the income variable. Although, the Beta coefficient of the interaction (.115) is not statistically significant at the 5% significance level. Therefore, we cannot estimate that risk aversion has a moderating effect on the impact of post-graduation income comparison on the initial interest of ISA.

We therefore conclude that the hypothesis H3e is not supported by the data.

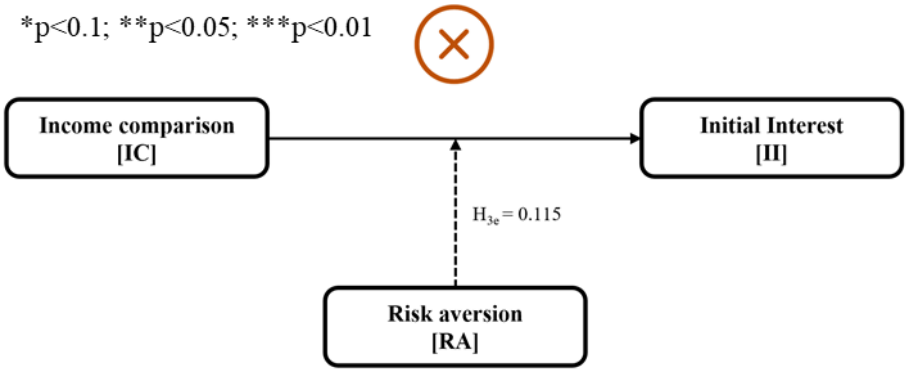


Figure 34: *H_{3e}*

H3f: Higher (lower) knowledge about financing instruments (financial aid and student loans) increases (decreases) the initial interest in ISAs.

The last hypothesis of this group regards the impact of previous knowledge about financing instruments in the initial interest in the mechanism. The Adjusted R-Squared is residual (.002) and the Beta coefficient (.062) is not statistically significant at the 5% significance level. Hence, we cannot reject the null hypothesis.

We therefore conclude that the hypothesis H3f is not supported by the data.

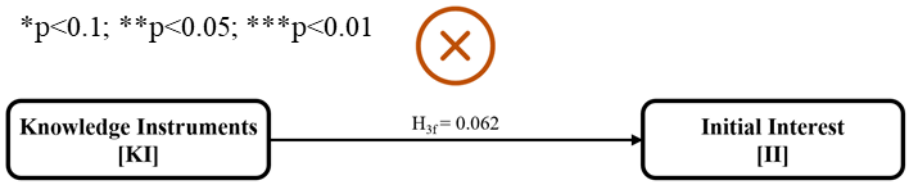


Figure 35: *H_{3f}*

4.4.4. Hypothesis 4

Hypothesis 4 analyses the impact of contract conditions (percentage, grouping and term) and risk aversion in the change in interest of the respondent before and after being presented with the standard conditions of student loans in the USA - the main substitute to the ISA mechanisms. To do so, the variable change in interest was created by subtracting the new interest from the initial interest, being considered as the dependent variable in multiple Simple Linear Regressions.

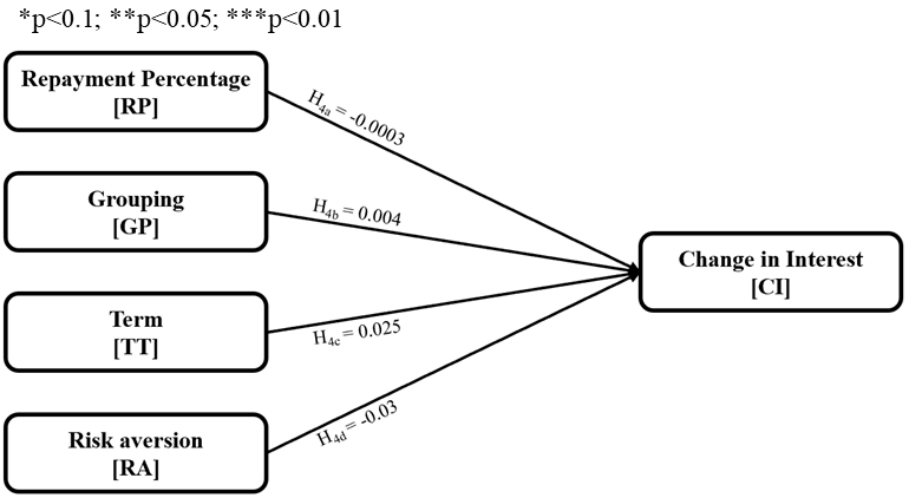


Figure 36: *Hypothesis 4 results*

H4a: Higher (lower) repayment percentage decreases (increases) the value of net change in perceived interest in ISAs before and after presented with standard student loan conditions.

The first hypothesis of this group regards the impact of repayment percentage in the change in interest. The Adjusted R-Squared is negative (- .004) and the Beta coefficient (-

.0003) is not statistically significant at the 5% significance level. Hence, we cannot reject the null hypothesis.

We therefore conclude that the hypothesis H4a is not supported by the data.

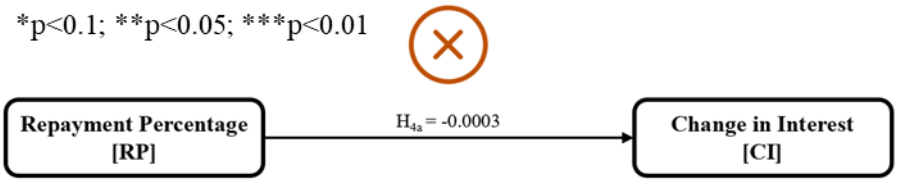


Figure 37: *H_{4a}*

H4b: Grouping (individual) feature in repayment cap decreases (increases) the value of net change in perceived interest in ISAs before and after presented with standard student loan conditions.

The second hypothesis of this group regards the impact of grouping in the change in interest. Once again, the Adjusted R-Squared is negative (- .004) and the Beta coefficient (.004) is not statistically significant at the 5% significance level. Hence, we cannot reject the null hypothesis.

We therefore conclude that the hypothesis H4b is not supported by the data.

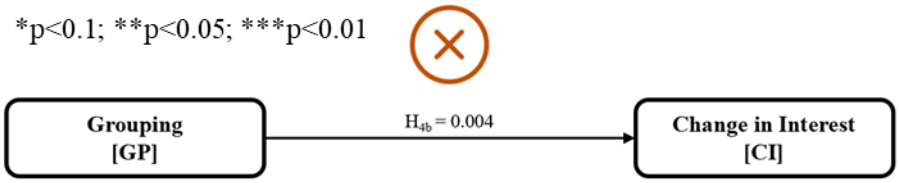


Figure 38: *H_{4b}*

H4c: Higher (lower) repayment term decreases (increases) the value of net change in perceived interest in ISAs before and after presented with standard student loan conditions.

The third hypothesis of this group regards the impact of the contract term in the change in interest. The Adjusted R-Squared is also negative (- .001) and the Beta coefficient (.025) is not statistically significant at the 5% significance level, hence not showing any effect of the independent variable in the dependent variable.

We therefore conclude that the hypothesis H4c is not supported by the data.

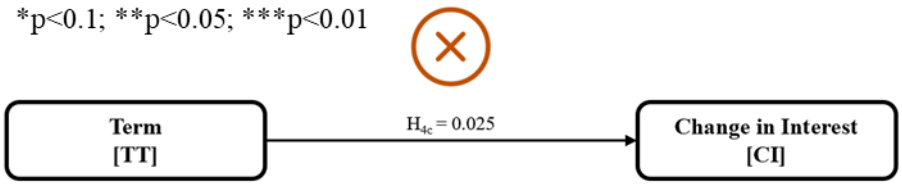


Figure 39: *H_{4c}*

H4d: Higher (lower) risk aversion increases (decreases) the value of net change in perceived interest in ISAs before and after presented with standard student loan conditions.

The last hypothesis of this group regards the impact of risk aversion in the change in interest. The Adjusted R-Squared is negative (- .003) and the Beta coefficient (- .03) is not statistically significant at the 5% significance level, not rejecting the null hypothesis.

We therefore conclude that the hypothesis H4d is not supported by the data.

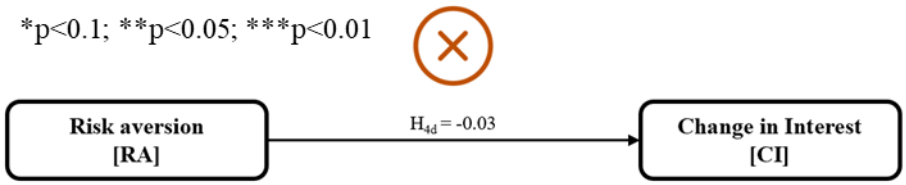


Figure 40: *H_{4d}*

4.4.5. Summary of hypotheses' testing

The summary of the hypotheses' testing chapter can be found in Figures 41 and 42, where the statistically significant variables and their effect in the dependent variable are highlighted.

*p<0.1; **p<0.05; ***p<0.01

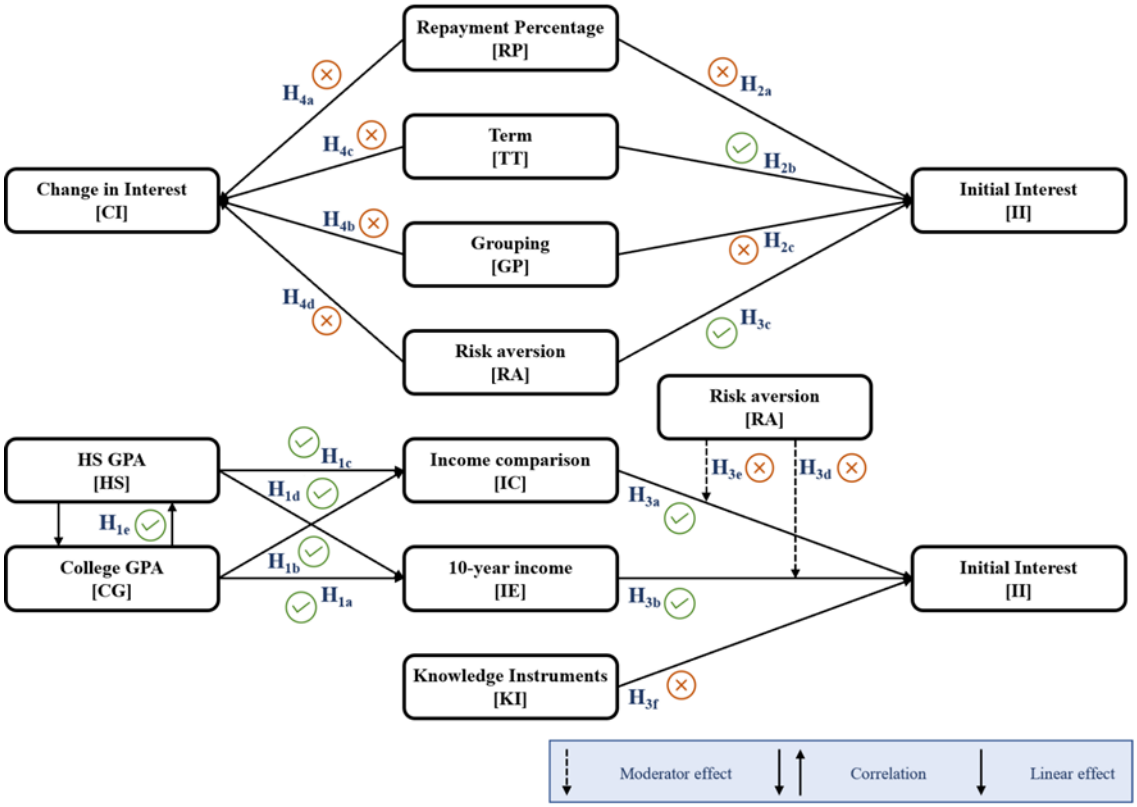


Figure 41: *Statistical significance of hypotheses on the Conceptual Framework*

Dependent variable	Initial Interest [II]	Income comparison [IC]	10-year income [IE]	Change in Interest [CI]
Negative effect independent variables That present statistical significance and negative effect on the dependent variable	Term [TT] Income comparison [IC] 10-year income [IE]	No variable to report	No variable to report	No variable to report
Positive effect independent variables That present statistical significance and positive effect on the dependent variable	Risk aversion [RA]	HS GPA [HS] College GPA [CG]	HS GPA [HS] College GPA [CG]	No variable to report

Figure 42: *Summary of statistically significant variables*

5. CONCLUSIONS AND LIMITATIONS

This chapter is dedicated to outlining the main findings, managerial and academic implications and the limitations and suggestions for further research on the topic.

5.1. Main Findings & Conclusions

This study set out to research the students' perception regarding ISA and the variables that influence such interest, allowing to draw conclusions about potential beneficial adaptations to the agreements and provide any initial idea regarding optimizing the student's interest in the mechanism.

RQ1: Overall, how interested are students in the income share agreement (ISA) mechanism to finance their higher education?

Overall, the sample's interest in the mechanism was satisfactory when considering both the 5-scale and the binary variable. Even when analysing the means of both scales before and after presenting the general conditions of student loans, close to half the participants still presented interest in the mechanism, with results in line with Delisle (2017), Holt (2016) and Peek and colleagues (2016), which is partially explained as the ISA was not labelled as a loan (Field, 2009; Caetano et al., 2011).

RQ2: Is the interest heavily dependent on the contract conditions of the ISA?

When analysing students' interest in ISAs, it is natural to assume that the contract conditions are a preponderant factor. Considering that individuals are heavily rational when taking such an important financial decision (Carnevale, 2011; Carnevale et al., 2015; Rothwell & Kulkarni, 2015), it would be fair to assume that increasing the repayment percentage and the contract duration would decrease the perceived interest, as the total amount of repayment would increase. The grouping mechanism, taking as reference the Tuition Postponement Agreement and the 13th Avenue examples, should also reduce the interest in such mechanisms (Putilov et al., 2018).

The results obtained portray a slightly different story. While we can estimate that the contract term harms the perceived interest with a 5% statistical significance, we cannot confidently estimate that repayment percentage and grouping repayment cap influence the student's perceived interest. The lack of statistical significance of the repayment percentage effect on initial interest could be slightly justified by the small difference between the two percentages presented (7,5% and 10%). However, this still represents a 33% increase in the monthly repayments made by the student, which would make an important difference in the return of a potential investor.

On the other hand, the higher contract duration effect, compared to the repayment percentage, can be justified by assuming an exponential increase in income in the first years of a professional career. As such, it would be more economically disadvantageous for a student to increase the contract duration, for example, by 33% (as in the survey example) than it would be to perform the same factor increase in the repayment percentage (Appendix 16) – therefore, we can assume that the respondents' performed financial benefit-cost analysis, in line with Carnevale (2011), Carnevale and colleagues (2015) and Rothwell and Kulkarni (2015).

The lack of statistically significant effect of the grouping repayment cap feature was understandable when looking at the existing examples of ISA that utilise these features. The grouping mechanism would only harm the student if the student exceeded his individual repayment cap (calculated as the average repayment cap per individual in the group), therefore raising dissatisfaction with the fact that he will need to keep repaying due to the group lacking. Additionally, since most of the better-performing students (with consequently higher income expectations) would not be interested in the ISA in the first place, we can assume that this dissatisfaction would only happen on rare occasions where the students greatly overcome their income estimation some years after entering the ISA. The results are somewhat in line with the ones observed in the 13th Avenue and the Tuition Postponement Option, as the dissatisfaction from the students was only evidenced later (Putilov et al., 2018).

Therefore, we can conclude that the students are not as dependent on the contract conditions as expected (except for the contract length), as these do not explain most of the variance in interest.

RQ3: Other than the contract conditions, which other individual characteristics/preferences affect the interest in ISAs?

From the analysis conducted, we can conclude that the main individual characteristics that influence the perceived interest in ISAs are risk aversion and income predictions (both short-term and long-term).

The risk aversion analysis showed that students that are less likely to take financial risks (and therefore more risk-averse) are more interested in the mechanism, as they value the insurance provided by the ISA in case of low-income level or unemployment (Farrington, 2019; Peek et al., 2017; Holt, 2016; Palacios et al., 2014). On the other hand, risk-averse individuals are less likely to adopt models that do not provide enough success examples to be considered valuable, which slightly counter-balances this effect of risk aversion on the interest. Regardless, risk aversion was statistically significant in positively affecting the interest of the individual in the ISA – in line with Boatman and colleagues (2017), Peek and colleagues (2016) and Palacios and colleagues (2014).

Both income estimation analyses (post-graduation income compared to peers and 10-year income estimation) showed extremely high statistical significance, supporting the hypothesis that income estimations negatively affect the interest in the ISA. As the repayment of the ISA is calculated based on income, and individuals accurately estimate their future income (Betts, 1996), a higher future income would lead to a higher repayment value, which would diminish the potential of ISA compared to traditional financing mechanisms with fixed repayment rates – as individuals would perform financial analysis to assess the better option (Carnevale et al., 2011; Kulkarni & Rothwell, 2015; Carnevale et al., 2015).. Therefore, it is understandable that income estimation is the main variable to affect the interest in ISAs negatively.

RQ4: How does the interest in the mechanism change when presented with the traditional student loan conditions?

From the analysis conducted (paired t-test in Appendix 15), we understand that the act of presenting the standard loan conditions has two different effects. When considering the overall level of interest, it does not provide a statistically significant difference. However, it is statistically significant when analysing a binary scale for interest at the 5% significance level ($p=.005$).

Since a bigger scale with multiple levels to characterize either interested or uninterested provides no difference in means, but a simple binary scale does present a statistically significant difference in means, we can conclude that the reference to the usual conditions of traditional student loans does impact the change in interest, although perhaps not in a straightforward way. These results show that students who are either very interested or very uninterested do not have a significant difference in means, but instead, the students on the verge (still indecisive) about their decision show a significant change in means when presented with the conditions of the student loan.

This result is coherent with the results presented above, as the students mostly rely on their personal preferences as the first basis of choice, such as risk aversion (Farrington, 2019; Boatman et al., 2017; Peek et al., 2017; Peek et. al, 2016; Holt, 2016). When indecisive, the students analyse and compare the contract conditions and their financial benefits (Carnevale et al., 2011; Kulkarni & Rothwell, 2015; Carnevale et al., 2015), justifying the statistical significance in the binary variable, while the extremely interested/uninterested students are hardly influenced by the conditions of the alternative, justifying the lack of statistical significance when considering the 5-scale.

5.2. Managerial & Academic Implications

In terms of academic relevance, this dissertation brings new insights regarding the implementation of Income Share Agreements to the infant existing literature, as the subject is barely studied. The combination of contract conditions with the individual preferences and perspectives of the students brings additional value to the possibility of implementing these mechanisms and attracting a good student base. Additionally, combining these aspects fills a gap in understanding the demand side of the mechanism and will allow for future development of literature from the investor's side, with a student-centred value proposition.

In terms of managerial implications, the results and conclusions of this study should be utilized by universities and organizations that intend to implement ISAs, as it helps understand the perception of the main benefiter of an ISA – the student. The lack of influence from the repayment percentage and grouping repayment cap might serve as an incentive towards creating the mechanism and obtaining external funding (e.g. investors), as these are the main drivers of financial returns. The grouping repayment cap feature will also allow for automatic diversification of the portfolio for the investor without reducing students' interest in ISAs. The case of Lumni, with its 9,1% average annual return to investors, can be

instrumental in justifying the potential return to investors, especially considering that ISA can be an efficient way to diversify a portfolio and hedge against certain market risks (Yu & Salyards, 2008).

The 13th Avenue case evidences the importance of integrating the community in the models. As such, leveraging on the collective side of the community will enhance the engagement of the participants in the mechanism, which will in turn reduce the default rate, helping solve the enforceability challenge.

Lastly, the organization and investor should be aware, more than ever, of the necessity of creating an accurate algorithm to estimate the income of each student based on his characteristics due to the importance given to income estimation from the student – as seen in Lumni and Pave (Surowieki, 2013; Nisen, 2015). Additionally, this increased importance of income estimation in student's interest might be seen as a two-edged sword: on the one hand, ISA might position as a source of additional value in courses with unclear income prospects; on the other hand, this approach might require significant philanthropic funds support, as investors are less likely to be interested in investing in unpredictable fields of study.

5.3. Limitations & Further Research

Since the study is part of the master dissertation, it is restricted by money and timeframe. Hence, some limitations should be considered by the reader.

Firstly, and although the survey collected a satisfactory amount of valid responses (265 responses), the respondents were assigned into eight different treatment groups. Hence, the number of respondents per group was not as satisfactory. For further research, increasing the number of respondents and the number of different scenarios would be crucial, especially in terms of the contract repayment percentages and the contract durations. Consequently, a more accurate understanding of the effect of changing both variables in the perceived interest of the student would be accomplished.

Secondly, the survey did not completely portray the real scenario of an individual looking for financing to obtain a degree. As stated in the survey, the respondents were asked to imagine themselves in that specific situation. For further research, it would be interesting to target a population obtaining financing towards tertiary education or still indecisive whether they will pursue a degree due to the financial implications of the traditional student loans, as well as the close family to which they may seek advice on the subject.

Lastly, the lack of qualitative insights is also a limitation. Therefore, it is required to gather qualitative insights from students, especially the ones that have already integrated an ISA, as the interest should not be the only variable to be considered, but also the overall satisfaction during and after the mechanism (a good example would be the lack of impact of grouping mechanisms in interest, although previous cases have shown its impact on dissatisfaction of students later). Qualitative insights, such as interviews, would allow interpretations of the model's past experience and potential flaws that might require optimisation. Therefore, further research should focus on analysing and inquiring students who have already incorporated these mechanisms, not only in quantitative but also in qualitative terms.

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APPENDICES

Appendix 1: Online Survey Guideline

Introduction

Imagine you are a freshman student who is starting his studies towards a Bachelor's Degree and intends to obtain a loan for $50,000 to pay for tuition fees and other expenses.

You are offered the possibility of adopting a mechanism named Income Share Agreement, where you would receive the $50,000 in exchange for a certain percentage of your future income post-graduation.

Agreement Conditions – I

The terms would be the following:

· After graduation, you will start paying 7,5% of your monthly income for a period of 12 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (12 years), in case the repayment is not complete, you would owe nothing;

· You would be grouped with 9 other students. In case the group, as a whole, reaches $1,000,000 total repayment (averaging $100,000 per student - 2x the amount received per student), the repayment would end, even if the repayment period is still not finished.

Agreement Conditions – II

The terms would be the following:

· After graduation, you will start paying 7,5% of your monthly income for a period of 16 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (16 years), in case the repayment is not complete, you would owe nothing;

· You would be grouped with 9 other students. In case the group, as a whole, reaches $1,000,000 total repayment (averaging $100,000 per student - 2x the amount received per student), the repayment would end, even if the repayment period is still not finished.

Agreement Conditions – III

The terms would be the following:

· After graduation, you will start paying 10% of your monthly income for a period of 12 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (12 years), in case the repayment is not complete, you would owe nothing;

· You would be grouped with 9 other students. In case the group, as a whole, reaches $1,000,000 total repayment (averaging $100,000 per student - 2x the amount received per student), the repayment would end, even if the repayment period is still not finished.

Agreement Conditions – IV

The terms would be the following:

· After graduation, you will start paying 10% of your monthly income for a period of 16 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (16 years), in case the repayment is not complete, you would owe nothing;

· You would be grouped with 9 other students. In case the group, as a whole, reaches $1,000,000 total repayment (averaging $100,000 per student - 2x the amount received per student), the repayment would end, even if the repayment period is still not finished.

Agreement Conditions – V

The terms would be the following:

· After graduation, you will start paying 7,5% of your monthly income for a period of 12 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (12 years), in case the repayment is not complete, you would owe nothing;

· In case you, as an individual, reach $100,000 total repayment, the repayment would end, even if the repayment period is still not finished.

Agreement Conditions – VI

The terms would be the following:

· After graduation, you will start paying 7,5% of your monthly income for a period of 16 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (16 years), in case the repayment is not complete, you would owe nothing;

· In case you, as an individual, reach $100,000 total repayment, the repayment would end, even if the repayment period is still not finished.

Agreement Conditions – VII

The terms would be the following:

· After graduation, you will start paying 10% of your monthly income for a period of 16 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (16 years), in case the repayment is not complete, you would owe nothing;

· In case you, as an individual, reach $100,000 total repayment, the repayment would end, even if the repayment period is still not finished.

Agreement Conditions – VIII

The terms would be the following:

· After graduation, you will start paying 10% of your monthly income for a period of 12 years;

· The payment only happens in case you are employed, and with a salary above $20,000 per year;

· After the repayment period (12 years), in case the repayment is not complete, you would owe nothing;

· In case you, as an individual, reach $100,000 total repayment, the repayment would end, even if the repayment period is still not finished.

Initial interest and perceptions

Q1: Considering the aforementioned Income Share Agreement, how interested would you be in the offer?

o Extremely Interested

o Moderately Interested

o Neutral

o Moderately Uninterested

o Extremely Uninterested

Q2: How do you consider the term of the contract?

o Too long

o Fair

o Would not mind a longer term

Q3: How do you consider the repayment percentage?

o Too high

o Fair

o Would not mind a higher percentage

Academic performance and income estimations

Considering your personal academic experience, answer the following questions

Q4: How would you classify your high-school GPA, compared to your peers?

o Extremely above average

o Slightly above average

o Average

o Slightly below average

o Extremely below average

Q5: What is your college GPA?

o 3.5 - 4-0

o 3.0 - 3.5

o 2.5 - 3.0

o 2.0 - 2.5

o Below 2.0

Q6: How would you estimate your income post-graduation to be, when compared to your peers?

o Extremely above average

o Slightly above average

o Average

o Slightly below average

o Extremely below average

Q7: How much attention are you paying when answering the survey? (please answer "slightly above average" - as this is a control question)

o Extremely above average

o Slightly above average

o Average

o Slightly below average

o Extremely below average

Q8: If you had to estimate, how much would you estimate your earnings to be in 10 years (annually)?

o More than $125,000

o $110,000 - $125,000

o $95,000 - $110,000

o $80,000 - $95,000

o $65,000 - $80,000

o $50,000 - $65,000

o $35,000 - $50,000

o $20,000 - $35,000

o Less than $20,000

o I cannot predict

Experience with financing instruments and risk aversion

Q9: Have you ever taken a student loan?

o Yes

o No

Q10: Have you received financial aid?

o Yes

o No

Q11: If there was a game of flip a coin, where you could win either $20 (heads) or $40 (tails), how much would you be willing to pay to enter?

Presentation of standard loan conditions and interest perception

Knowing that the available loans currently provide these rates (keep in mind none of these loans provide protection against unemployment or low levels of income):

· Average interest rates on federal student loans (which about 92% of borrowers have) range from 2.75% to 5.30%, with terms from 12 to 30 years

· Average interest rates on private student loans are generally higher but can range from 3.34% to 12.99% fixed and 1.04% to 11.98% variable, with terms from 12 to 30 years

Answer the following question again:

Q12: Considering the aforementioned Income Share Agreement, how interested would you be in the offer?

o Extremely interested

o Moderately interested

o Neutral

o Moderately Uninterested

o Extremely Uninterested

Demographics

Q13: Are you American?

o Yes

o No

Q14: What is your age?

Q15: Which gender do you identify with?

o Male

o Female

o Non-binary / third gender

o Prefer not to say

Appendix 2: Types of investors

Profit-maximizing investors	Impact investors	Philanthropic investor
The main focus of their investments is obtaining financial returns, presenting close to zero willingness to pay for any possible social impact from their investment that would jeopardize part of the financial return. Anyhow, profit-maximizing investors may still invest in socially responsible investments, although the motivation behind these investments is purely financial and to obtain the consequent financial returns (Trelstad, 2009)	Impact investors are those willing to forego some economic returns as long as the investment provides significant social impact. They are socially cautious and take social causes as an important screening aspect in any investment decision, with literature arguing that most impact funds' contracts present specific goals related to impact. These pre-determined social objectives/outputs signal the investor's clear intention to earn financial returns and achieve social impact (Geczy, et. al, 2018)	As opposed to the profit-maximizing investors, the philanthropic investor disregards economic return for their investment while valuing greatly the social impact created by said investment. Usually, foundations provide grants without expecting any additional return or even the initial invested capital, but instead expecting the funds to support social enterprises in scaling their operations and therefore enhance their social impact (Trelstad, 2009)

Appendix 3: Willingness to pay for impact per investor type

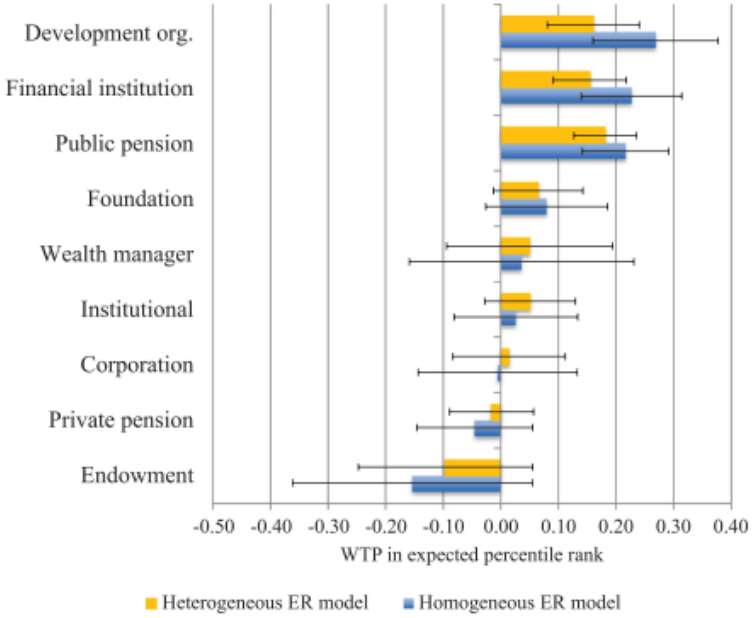


Fig. 3. Willingness to pay (WTP) for impact by investor type.
The figure presents estimates of the willingness to pay for impact derived from the logit estimation of Table 6, column (1) (homogeneous expected return model) and column (3) (heterogeneous expected return model). The WTP magnitude is the ratio of the impact coefficient for the LP type divided by the expected returns coefficient expressed in percentile ranks. Percentiles are based on performance relative to cohort funds, where cohorts are defined by fund vintage year and region. Black bands represent 95% confidence intervals on WTP estimates.

Source: Barber, Morse, Yasuda, 2020

Appendix 4: "Qualified ISA" conditions

Conditions:

- Repayment cap: 20%;
- Cap ((income percentage x monthly payments) / 12): 2.25;
- Income considered: payments from employment and even revenue sources other than employment, in case the individual has voluntarily chosen not to seek employment and is receiving significant revenue from another source
- Income excluded from the calculation: any amount paid to the individual under title II or XVI of the Social Security Act (42 U.S.C. 401 et seq., 1381 et seq.) or under a State program funded title IV under of such Act (42 U.S.C. 601 et seq.); or any amount received by the individual under the Child Nutrition Act of 1966 (42 U.S.C. 1771 et seq.);

- Threshold amount: 200 percent of the poverty line for a single person (as defined in section 673 of the Community Services Block Grant Act (42 U.S.C. 9902)); or in the case of a Qualified ISA entered into before January 1, 2020, 150 percent of such poverty line for a single person.

Number of monthly payments	Income repayment cap
135	20%
180	15%
270	10%
360	7,5%

The table illustrates the terms proposed in the "ISA Student Protection Act of 2019", with the maximum income repayment cap at 20% representing a maximum 135 months of repayment, while the maximum term length (360 months) capping the income repayment at 7,5% of the monthly income.

Appendix 5: Conditions of income-based loan plans´

	Revised Pay As You Earn Repayment Plan (REPAYE)	Pay As You Earn Repayment Plan (PAYE)	Income-Based Repayment Plan (IBR)	Income-Contingent Repayment Plan (ICR)
Eligible Borrowers	Any Direct Loan borrower with an eligible loan type may choose this plan	Must be a new borrower on or after Oct. 1, 2007, and must have received a disbursement of a Direct Loan on or after Oct. 1, 2011	Must have a high debt relative to the income	Any Direct Loan borrower with an eligible loan type may choose this plan
Monthly payments	10% of discretionary income	10% of discretionary income, but never more than what would have paid under the 10-year Standard Repayment Plan	Either 10% or 15% of discretionary income (depending on when the first loans were received), but never more than what would have paid under the 10-year Standard Repayment Plan	Lesser of: • 20% of discretionary income; • the amount the individual would pay on a repayment plan with a fixed payment over 12 years, adjusted according to income
Considerations	Payments are recalculated each year and are based on the updated income and family size. If married, both the individual's and spouse's income or loan debt will be considered, whether taxes are filed jointly or separately (with limited exceptions)	Payments are recalculated each year and are based on the updated income and family size. If married, the spouse's income or loan debt will be considered only if filed a joint tax return	Payments are recalculated each year and are based on the updated income and family size. If married, the spouse's income or loan debt will be considered only if filed a joint tax return	Payments are recalculated each year and are based on the updated income, family size, and the total amount of Direct Loans. If married, the spouse's income or loan debt will be considered only if filed a joint tax return or chosen to repay Direct Loans jointly with the spouse
Loan forgiveness	Any outstanding balance on the loan will be forgiven if the individual hasn't repaid the loan in full after 20 years (if all loans were taken out for undergraduate study) or 25 years (if any loans were taken out for graduate or professional study)	Any outstanding balance on the loan will be forgiven if the individual hasn't repaid the loan in full after 20 years	Any outstanding balance on the loan will be forgiven if the individual hasn't repaid the loan in full after 20 or 25 years, depending on when the first loans were received	Any outstanding balance on the loan will be forgiven if the individual hasn't repaid the loan in full after 25 years

Source: Federal Student Aid

Appendix 6: Tuition Postponement Option conditions

	Tuition Postponement Option
Repayment %	0,4% per $1,000 tuition postponed
Minimum payment	$29 / month
Term	35 years
Repayment cap	150% of initial loan + accrued interest
Grouping mechanism	Yes

Source: West, 1976

Appendix 7: 13th Avenue Funding conditions

	13th Avenue Funding
Repayment %	6%
Minimum income	$18,000 / month
Term	15 years
Repayment cap	Borrowed amount + 2% interest
Grouping mechanism	Yes

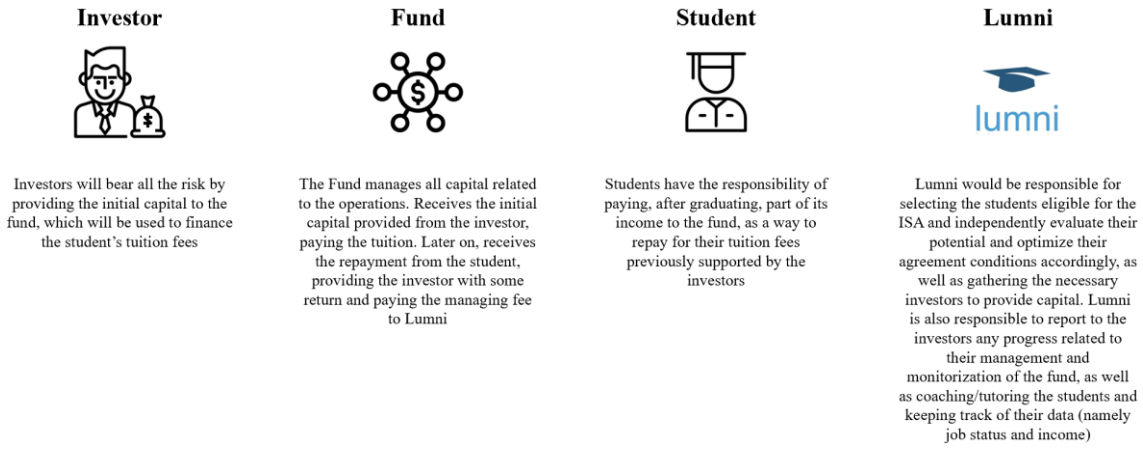
Source: The 13th Avenue Funding

Appendix 8: IBR Swap conditions

	IBR Swap
Repayment %	15%
Minimum income	Not defined
Term	Same as the student loan (usually 10 years)
Repayment cap	Non-existent, can leave when necessary (repaying his own student loan)
Grouping mechanism	No

Source: Leff, Hughes, 2016

Appendix 9: Stakeholder's role and responsibilities in Lumni



Source: Inter-American Development Bank, 2016

Appendix 10: Variable's scale alterations

• **Initial interest** and **new interest**: -3 to all data, turning the [1,5] scale into a [-2,2] scale. The scale was then inverted so that higher values represent a higher interest in the proposed ISA;

• **Repayment perception** and **term perception**: -2 to all data, turning the [1,3] scale into a [-1,1] scale;

• **High School GPA** and **College GPA**: [1,5] scale was reversed so that higher values represent higher GPA;

• **Income peers post-graduation**: -3 to all data, turning a [1,5] scale into a [-2,2] scale. The scale was then inverted so that higher values represent higher income comparing to peers;

• **Income estimation in 10 years**: -1 to all data, and the scale was inverted. [1,9] represent income estimations, with higher value representing higher estimations, and 0 representing "I cannot predict";

• **Student loan** and **financial aid**: were turned into a binary variable. 1 represents having received, 0 represents not having received each of the instruments.

Appendix 11: Hypothesis 1

Appendix 11.1: H1a

	Dependent variable:
	Income.estimation
College.GPA	0.964***
	(0.155)
Constant	1.480**
	(0.627)
Observations	265
R2	0.129
Adjusted R2	0.126
Residual Std. Error	2.211 (df = 263)
F Statistic	38.938*** (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 11.2: H1b

	Dependent variable:
	Income.peers
College.GPA	0.424***
	(0.060)
Constant	-1.254***
	(0.242)
Observations	265
R2	0.161
Adjusted R2	0.157
Residual Std. Error	0.854 (df = 263)
F Statistic	50.291*** (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 11.3: H1c

	Dependent variable:
	Income.peers
HS.GPA	0.657***
	(0.060)
Constant	-1.958***
	(0.222)
Observations	265
R2	0.314
Adjusted R2	0.311
Residual Std. Error	0.772 (df = 263)
F Statistic	120.394*** (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 11.4: H1d

```
================================================
                        Dependent variable:
                    ----------------------------
                         Income.estimation
------------------------------------------------
HS.GPA                          1.316***
                                (0.165)
Constant                         0.531
                                (0.611)
------------------------------------------------
Observations                      265
R2                               0.195
Adjusted R2                      0.192
Residual Std. Error        2.125 (df = 263)
F Statistic           63.778*** (df = 1; 263)
================================================
Note:                *p<0.1; **p<0.05; ***p<0.01
```

Appendix 11.5: H1e

```
Pearson's product-moment correlation

data:  Data$HS.GPA and Data$College.GPA
t = 10.897, df = 263, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.4687100 0.6355007
sample estimates:
      cor
0.5577098
```

Appendix 12: Hypothesis 2

Appendix 12.1: H2a

```
================================================
                        Dependent variable:
                    ----------------------------
                           Initial.Interest
------------------------------------------------
Repayment                       -0.005
                                (0.064)
Constant                         0.383
                                (0.561)
------------------------------------------------
Observations                      265
R2                              0.00002
Adjusted R2                      -0.004
Residual Std. Error        1.293 (df = 263)
F Statistic               0.006 (df = 1; 263)
================================================
Note:                *p<0.1; **p<0.05; ***p<0.01
```

Appendix 12.2: H2b

	Dependent variable:
	Initial.Interest
Term	-0.094**
	(0.039)
Constant	1.663***
	(0.559)
Observations	265
R2	0.021
Adjusted R2	0.018
Residual Std. Error	1.279 (df = 263)
F Statistic	5.718** (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 12.3: H2c

	Dependent variable:
	Initial.Interest
Grouping	-0.209
	(0.158)
Constant	0.446***
	(0.113)
Observations	265
R2	0.007
Adjusted R2	0.003
Residual Std. Error	1.288 (df = 263)
F Statistic	1.745 (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 12.4: Contract conditions linear regression

	Dependent variable:
	Initial.Interest
Repayment	-0.011
	(0.063)
Term	-0.093**
	(0.039)
Grouping	-0.199
	(0.157)
Constant	1.851**
	(0.809)
Observations	265
R2	0.027
Adjusted R2	0.016
Residual Std. Error	1.280 (df = 261)
F Statistic	2.451* (df = 3; 261)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 13: Hypothesis 3

Appendix 13.1: H3a

```
================================================
                         Dependent variable:
                     ---------------------------
                              Initial.Interest
------------------------------------------------
Income.peers                    -0.433***
                                 (0.081)
Constant                        0.523***
                                 (0.083)
------------------------------------------------
Observations                       265
R2                                0.098
Adjusted R2                       0.094
Residual Std. Error         1.228 (df = 263)
F Statistic            28.449*** (df = 1; 263)
================================================
Note:                *p<0.1; **p<0.05; ***p<0.01
```

```
            studentized Breusch-Pagan test

     data:  lminterest.peers
     BP = 7.5278, df = 1, p-value = 0.006075
```

```
t test of coefficients:

             Estimate Std. Error t value  Pr(>|t|)
(Intercept)   0.522675   0.077242  6.7667 8.528e-11 ***
Income.peers -0.433114   0.079823 -5.4259 1.308e-07 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Appendix 13.2: H3b

```
================================================
                         Dependent variable:
                     ---------------------------
                              Initial.Interest
------------------------------------------------
Income.estimation               -0.181***
                                 (0.032)
Constant                        1.298***
                                 (0.184)
------------------------------------------------
Observations                       265
R2                                0.110
Adjusted R2                       0.106
Residual Std. Error         1.220 (df = 263)
F Statistic            32.443*** (df = 1; 263)
================================================
Note:                *p<0.1; **p<0.05; ***p<0.01
```

Appendix 13.3: H3c

	Dependent variable:
	Initial.Interest
Risk.aversion	0.248***
	(0.091)
Constant	0.330***
	(0.078)
Observations	265
R2	0.027
Adjusted R2	0.024
Residual Std. Error	1.275 (df = 263)
F Statistic	7.432*** (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 13.4: H3d

	Dependent variable:
	Initial.Interest
Risk.aversion	0.183
	(0.207)
Income.estimation	-0.173***
	(0.032)
Risk.aversion:Income.estimation	0.003
	(0.035)
Constant	1.251***
	(0.185)
Observations	265
R2	0.127
Adjusted R2	0.117
Residual Std. Error	1.212 (df = 261)
F Statistic	12.667*** (df = 3; 261)
Note:	*p<0.1; **p<0.05; ***p<0.01

	Dependent variable:
	Initial.Interest
Income.estimation	-0.173***
	(0.032)
Risk.aversion	0.198**
	(0.087)
Constant	1.250***
	(0.184)
Observations	265
R2	0.127
Adjusted R2	0.120
Residual Std. Error	1.210 (df = 262)
F Statistic	19.069*** (df = 2; 262)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 13.5: H3e

	Dependent variable:
	Initial.Interest
Risk.aversion	0.182*
	(0.094)
Income.peers	-0.420***
	(0.080)
Risk.aversion:Income.peers	0.115
	(0.090)
Constant	0.513***
	(0.082)
Observations	265
R2	0.126
Adjusted R2	0.116
Residual Std. Error	1.213 (df = 261)
F Statistic	12.522*** (df = 3; 261)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 13.6: H3f

	Dependent variable:
	Initial.Interest
Knowledge	0.062
	(0.090)
Constant	0.264*
	(0.136)
Observations	265
R2	0.002
Adjusted R2	-0.002
Residual Std. Error	1.291 (df = 263)
F Statistic	0.467 (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 14: Hypothesis 4

Appendix 14.1: H4a

	Dependent variable:
	Change
Repayment	-0.0003
	(0.051)
Constant	-0.103
	(0.449)
Observations	265
R2	0.00000
Adjusted R2	-0.004
Residual Std. Error	1.034 (df = 263)
F Statistic	0.00004 (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 14.2: H4b

	Dependent variable:
	Change
Grouping	0.004
	(0.127)
Constant	-0.108
	(0.091)
Observations	265
R2	0.00000
Adjusted R2	-0.004
Residual Std. Error	1.034 (df = 263)
F Statistic	0.001 (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 14.3: H4c

	Dependent variable:
	Change
Term	0.025
	(0.032)
Constant	-0.456
	(0.451)
Observations	265
R2	0.002
Adjusted R2	-0.001
Residual Std. Error	1.033 (df = 263)
F Statistic	0.614 (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 14.4: H4d

	Dependent variable:
	Change
Risk.aversion	-0.030
	(0.074)
Constant	-0.105
	(0.064)
Observations	265
R2	0.001
Adjusted R2	-0.003
Residual Std. Error	1.033 (df = 263)
F Statistic	0.169 (df = 1; 263)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 15: Changes between initial and new interest

```
        Paired t-test


data:  Initial.Interest and New.Interest
t = 1.6671, df = 264, p-value = 0.09669
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.01913657  0.23045732
sample estimates:
mean of the differences
              0.1056604


         Paired t-test

data:  Initial.Interest1 and New.Interest1
t = 2.8307, df = 264, p-value = 0.005001
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 0.0252729 0.1407648
sample estimates:
mean of the differences
             0.08301887
```

Appendix 16: Calculations of repayment values

- Assuming a 2% growth rate of the salary
- Both scenarios will be calculated: 7,5% for 16 years, or 10% for 12 years
- The difference between the variables in both scenarios is an increase of 33% - 7,5% is increased by 33% to 10%; 12 years is increased by 33% to 16 years

Year	Salary	Repayment (7,5%)	Repayment (10%)
Year 1	$ 57,900	$ 4,342	$ 5,790
Year 2	$ 59,058	$ 4,429	$ 5,906
Year 3	$ 60,239	$ 4,518	$ 6,024
Year 4	$ 61,444	$ 4,608	$ 6,144
Year 5	$ 62,673	$ 4,700	$ 6,267
Year 6	$ 63,926	$ 4,794	$ 6,393
Year 7	$ 65,205	$ 4,890	$ 6,521
Year 8	$ 66,509	$ 4,988	$ 6,651
Year 9	$ 67,839	$ 5,088	$ 6,784
Year 10	$ 69,196	$ 5,190	$ 6,920
Year 11	$ 70,580	$ 5,294	$ 7,058
Year 12	$ 71,991	$ 5,399	$ 7,199
Year 13	$ 73,431	$ 5,507	$ 7,343
Year 14	$ 74,900	$ 5,618	$ 7,490
Year 15	$ 76,398	$ 5,730	$ 7,640
Year 16	$ 77,926	$ 5,844	$ 7,793

Plan	Total Repayment
16 years | 7,5%	$ 80,939
12 years | 10%	$ 77,657