MASTERS IN MANAGEMENT (MIM)

MASTERS FINAL WORK

DISSERTATION

INCENTIVES FOR ON-THE-JOB GREENING
AN EXPERIMENTAL APPROACH TO TEST PORTUGUESE SMALL AND MEDIUM ENTERPRISES RESPONSIVENESS

MARIA BASTOS DA COSTA

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RESUMO

Com a urgência da ação climática e a relevância dos empregos verdes, tendo como referência o quadro de apoios à Investigação e Desenvolvimento e o cenário nacional, esta dissertação produziu aprendizagens sobre o que poderá constituir um esquema de apoio à formação no trabalho para empregos verdes, com base nas preferências do público-alvo, as Pequenas e Médias Empresas Portuguesas. Através de um processo de investigação inovador, que combinou um *Discrete Choice Experiment* e perguntas qualitativas, são medidas as preferências entre uma dedução fiscal e uma subvenção, com os resultados a sugerir que a presença de uma dedução fiscal pode ser um pouco mais relevante para os empresários quando comparada com uma subvenção, num cenário em que as empresas não rentáveis seriam elegíveis para o incentivo fiscal. As empresas também valorizaram muito a presença de uma Certificação de empregos verdes e de um Selo de Excelência, mas as componentes de apoio à candidatura foram consideradas as características mais relevantes, especialmente para as empresas mais pequenas e mais experientes. Por sua vez, a burocracia da candidatura influencia fortemente a decisão de candidatura a um esquema de apoio, independentemente da dimensão da empresa ou da experiência com financiamento público de I&D. Os resultados também corroboram a relevância dos apoios não financeiros para impulsionar as PME portuguesas a cumprirem as metas ambientais, nomeadamente através da Consultoria para a criação de um 'Plano de Empregos Verdes', apesar de muitas empresas já estarem a fazer esforços significativos para tornar as suas operações e a sua força de trabalho mais 'verdes'.

Palavras-Chave: Empregos Verdes, Incentivos Financeiros, Preferências, Desenho de Políticas

ABSTRACT

With the urgency of climate action and the relevance of green jobs, using the framework of R&D support schemes and the national scenario as a reference, this dissertation provides insights on what could make up a support scheme for 'on-the-job greening', based on the preferences of the target public, Portuguese Small and Medium Enterprises. Through an innovative survey that combined a Discrete Choice Experiment and qualitative questions, preferences towards a tax deduction and a grant are measured, with results suggesting the presence of a tax deduction might be slightly more relevant for subjects when compared to a grant, in a scenario in which not profitable firms were not excluded from the fiscal incentive. Firms also highly valued the presence of a green jobs Certification and of a Seal of Excellence, but the application support components were deemed the most relevant scheme features, especially for the smaller and more experienced firms. In its turn, application paperwork strongly influences the decision to apply to a support scheme, regardless of firm size or experience with R&D public funding. Results also support the relevance of non-financial aid to propel Portuguese SME to meet environmental targets, namely through Consultancy for creating a 'Green Jobs Plan', even though many firms are already making solid efforts towards 'greening' their operations and their workforce.

Keywords: Green Jobs, Financial Incentives, Preferences, Policy Design

ABBREVIATIONS

DCE: Discrete Choice Experiment

SME: Small and Medium Enterprises

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CHAPTER 1 – INTRODUCTION

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Economies are facing profound changes due to climate change and the workforce needs to be prepared to respond optimally to the demands of international climate change agendas. Considering the urgency of taking action and the conclusions obtained in previous studies on the training methods more suited to teach green skills, investment in on-the-job training should be deemed a priority. As there is also a lack of support programs in Portugal that respond directly to 'on-the-job greening' and given the track record of low responsiveness by SME to existing supports that can be used for this purpose, this dissertation focuses on testing the presence of financial incentives for firms to invest on green qualifications on the workplace. The main research problem we are addressing is which financial incentives are best suited to motivate SME – as they make up 99% of national businesses - to invest more and faster in "green" qualifications. In particular, we conduct testing to judge on the effects of the presence of a fiscal incentive and a grant, both serving the purpose of partially covering expenses on 'on-the-job greening'. Furthermore, the results of the data retrieval can be used to ponder whether trends in existing R&D investment support apply in this context. To study this rather recent concern on green jobs in Portugal, we build an innovative survey that allowed for both quantitative and qualitative insights, recurring to a Discrete Choice Experiment (DCE) to statistically measure firms' preferences. With this exploration, it is possible to draw relevant conclusions on the preferences and receptiveness of SME to this type of funding, which can support the design of policies to encourage Green Employment.

Chapter 2 reports on the existing literature on the subject and relevant references for the formulation of research objectives, followed by a thorough briefing on the methodology employed in chapter 3. We analyse the results in chapter 4 and, in the final chapter 5, we draw the conclusions and reflect on limitations and future research.

CHAPTER 2 – LITERATURE REVIEW

2.1. *Climate change and the need for quick business transformation*

According to the United Nations' 2019 Report on the Emissions Gap, the Paris Agreement Target of limiting global warming to 1.5ºC is only feasible if nations manage to reduce global greenhouse gas emissions by 7.6% every year, between 2020 and 2030. And yet, even if all targets are met, temperatures will still rise 3.2ºC by the end of the century, leading to an increase in the already observed devastating climate events. This daunting scenario is, however, as much of an emergency as it is an opportunity for growth, namely due to the proved potential for (green) job creation in all economies (IBERDROLA, 2019).

The already rapid evolution of the environmental sector in response to this scenario is further enhanced by the pressures of environmental legislation and public opinion (Prata-Dias et al., 2009). For instance, the Portuguese government has been acting on aligning its action plans with the European Strategy, namely with the target for a 55% reduction of greenhouse gas emissions against 1990 values, until 2030. (Amado Gomes, 2021). But the expected direct and indirect positive impacts of public initiatives on sustainable development may have a limited effect on green employment, if the measures and policies are not appropriately articulated (Prata-Dias, et al., 2009).

The labour market implications of a transition towards green growth require effective public intervention so as to ensure the transition is fair for workers. In fact, the World Labour Organization, in a 2018 report, highlighted the existing synergies between social protection and sustainability when it comes to public policies, namely employment protection, subsidies, public employment programs and payment for environmental services (Amado Gomes, 2021).

On the private front, we are witnessing companies racing to align themselves with the sustainability requirements, whilst the demand for green jobs is growing steadily.

The forecasts are that, by 2030, 9 million jobs will be generated in Europe. In Portugal, the estimates are 70 000 jobs, 50 000 of which would be considered green jobs (Ambiente Magazine, 2017).

Lastly, we are witnessing an increase on both candidates' concerns on how much companies make sustainability a priority and on the demand for these profiles in a growing variety of sectors, from construction to technology, retail or banking. And with the current shortage of candidates with adequate experience or training, there is a tendency for wages to be higher than for other profiles (Gomes, 2021).

2.2. *Defining green jobs*

The concept of green jobs is no longer something only of the environmental sector, covering now all activity sectors and integrating not only labour and environmental principles, but being a key concept for an economy to thrive sustainably. There is also a belief that, ultimately, all jobs should become green jobs, albeit the economic, political, social and environmental dynamics of each country (Prata-Dias et al., 2009).

A green job is, in its nature, a fair job with worthy conditions, so we must learn to move away from paradigmatic examples such as the recycling sector, where jobs are most commonly precarious and there is a high-risk exposure to health dangers (Prata-Dias et al., 2009).

There are three major different types of green jobs: some completely new jobs, jobs that come to fully replace existing ones, and jobs that consist of adapting existing 'traditional' jobs to respond to changes in content and competences (Prata-Dias et al., 2009).

It is highly relevant to understand why there is such a need to invest in green jobs' specific qualifications, and that is achieved through understanding how these differ from equivalent non-green jobs. According to literature (Consoli et al., 2016), interpersonal and high-level cognitive skills are used more intensively in green jobs when compared to non-green jobs. Similarly, green jobs display higher levels of human capital in the dimensions of formal education, work experience and on-the-job training, which is in line with the evidence that occupations with verified changes in their skill content have on average higher human capital intensity. These are also, on average, less routinised and demand more analytical skills such as creativity and problem solving. Additionally, differences have been identified between types of green jobs – it seems that formal education, work experience and on-the-job training are all considered relevant for jobs undergoing change in work content, while for new emerging occupations only on-the-job training appears as a distinctive feature. The authors thus deduct that learning by doing cannot be overlooked when formulating labour policy for qualifications, as policy on education may be insufficient to ensure the sustenance of a human capital that is both "green" and able to adapt to everchanging market conditions.

2.3. *Green jobs in Portugal*

We are missing an accurate measure for green jobs in Portugal, due to the significant limitations that arise from the categories in place (activity sectors) not being enough to identify the green jobs. Nevertheless, existing studies suggest that the share of green jobs is still very small, that there is a substantial diversity in the types of institutions that can employ such personnel and that professional training in relevant areas is incipient (Prata-Dias et al., 2009).

Another common point in national studies is how central green training can be to respond to environmental challenges, especially if aimed towards businesses, fostering collaboration between the public administration for the environment, vocational training entities and the private sector (Prata-Dias et al., 2009).

And in spite of the concept of green jobs being no novelty – in fact, it has been studied for close to two decades - it has been gravely underexplored by governments and managers in national ground. In fact, most of the (numerous) measures and recommendations for the promotion and creation of green jobs put forward thus far were not implemented (Prata-Dias et al., 2009). Nevertheless, a few initiatives have been executed in Portugal in these past 2 decades.

The ISQ Group, a Portuguese private entity with over 50 years of experience in training, has come forward with a set of solutions to increase employability in the energy and gas sector, contributing to the dynamization of green jobs in Portugal (Ambiente Magazine, 2017).

The government, on its end, has had a few noteworthy financial incentives with potential to foment green job creation.

The EU co-funded initiative of the Economy Operational Programme (European Commission, s.d.), between 2000 and 2006, included a priority axis for the qualification of human resources, encompassing a total public contribution of 316 865 540 euros, from the ESF (European Social Fund), 8% of the total financing for the programme (European Commission, n.d.). Still, even having present that vocational training needs are a constraint on the competitiveness of Portuguese companies, the projects under this investment component had little participation. In addition to the difficulty of companies themselves to define their training plans (especially during the application phase) or even to recognize the training needs of human capital, many of the program calls launched did not consider training expenses eligible (AD&C, 2019).

Another noteworthy initiative was undertaken under the Portugal 2020 framework, also financed by the ESF, with the latest call ending in August 2021 (IAPMEI, 2021). Available for a few defined priority activity sectors, it was conceived to stimulate the training of entrepreneurs and managers for the reorganization and improvement of management skills, as well as of the other workers, for topics associated with innovation and change, through either autonomous or joint training projects. With a base expense coverage rate of 50%, which can go up to a maximum of 70%, there may potentially be a positive effect of this incentive on job greening.

An incentive of a different nature and that has been around since 1997 is SIFIDE, a tax incentives system for business Research and Development (R&D). It supports companies' R&D efforts by partially deducting the income tax from the respective expenses. SIFIDE II has been

in place since 2009, with the novelty of a coverage rate increase for eco-design projects (ANI, 2021).

The most recent initiative that has the potential to have a great effect on green jobs is the National Plan for Recovery and Resilience, which is being implemented over the period of 2021 to 2026, especially in the investment focused on Incentives for Adults, which introduces the strategic option of prioritizing qualification, by updating and/or converting the skills of the active population in line with the processes of digital and ecological transition (República Portuguesa, 2021).

But might we be missing the chance to truly tackle the structural national constraints? Academic training should cover the green human capital needs on basic and multidisciplinary subjects, yet the offer accessible to Portuguese students nowadays is still quite limited, as universities are responding quite slowly to this trend. Sustainability subjects are not mandatory in most degrees and there is no offer for a specialized degree in this matter. Furthermore, what is available is not accessible to the general public, as it consists in high-cost master's degrees and postgraduate or executive courses (Gomes, 2021).

But specific or sectoral training may go beyond Higher Education's reach. To respond to market demands, it is necessary to invest on advanced training for technicians and experts (Prata-Dias et al., 2009). And public institutions should be able to step in where initiative from the private sector may be lacking.

According to Article 131, 2 of Updated Labour Code (PGDL, 2021), each employee is entitled to a minimum number of 40 hours of continuous training each year, or, when hired on a fixed-term basis for a period equal to or greater than three months, to a minimum number of hours proportional to the duration of the contract.

According to figures from 2019 (Caetano, 2019), less than a fifth of national firms provide training for workers. Moreover, investment has fallen by 150 euros since 2010, with the cost of each training program now at 349 euros. And even though the percentage of companies that do training has grown in all sectors, this behaviour seems to be more in response to a legal obligation than rather an effort to improve productivity. The sectors that stand out positively are the energy and sanitation sectors, with 50% of the companies offering training, followed by the finance sector, at 30%, the manufacturing industry at 20% and agriculture, accommodation and catering, just beyond 10% each. It was also pointed out that most of the training is directed to the most qualified workers, further deepening inequalities in education, and that the annual declaration handed over to the Ministry of Labour on training provided is not subject to verification.

The dimension of businesses in the country is also a relevant limitation, as 99.9% of companies in Portugal are SME, employing less than 250 people and with an annual turnover of up to 50 million euros, and 96% are micro-enterprises, employing less than 10 people and with an annual turnover of up to 2 million euros (Andrade, 2020).

The profitability scenario, which is highly influenced by company size, also has a meaningful impact on investment choices. The average profit for Portuguese firms is 36 thousand euros, the reality being quite heterogeneous, with more than 40% of (non-financial) firms having losses in 2015, a reality with less significance for enterprises larger than micro (Aguiar, 2017).

According to a survey conducted in 2009, directed to enterprises in sectors with direct connection to the environment (Prata-Dias et al., 2009), over half of the companies do not have an environmental manager, or an Environmental Management System in place, neither present information on their environmental and sustainability performance in a formal and periodic report. The authors linked these results with the fact that most respondents are SME and therefore much farther away from applying this type of instrument than large companies due to the constraints of its smaller organizational structure, e.g. scale issues when it comes to several investments, including 'job greening'.

2.4. The R&D financial incentives as a benchmark

To be able to explore the potential of public financial incentives for 'on-the-job greening', it is highly relevant to look at the existing R&D supports that could be adapted for this scenario.

To boost business R&D investment, governments have historically used several funding instruments, either of a direct form, such as procurement, subsidies and grants, or of an indirect form, such as an allowance, exemption, deduction or credit through the tax system (Appelt et al., 2019). Less frequently, industry R&D boards are created for this same purpose, with a mix of public and private funds (Thomson & Webster, 2011).

According to estimates on the implied marginal R&D tax subsidy rate (Appelt et al., 2019), tax incentives can induce additional R&D spending but entail a crowding out effect, that is, the additional investment induced is less than the compensation received. Being tax incentives more prominently implemented as non-discretionary measures, they cannot be used to judge, however, if a company would have invested if it had not received this support. Firm size and profitability also influence this estimation greatly – a mechanism like a carry-forward provision can be used to promote R&D in not profitable firms, resulting in differences in estimations between loss and profit-making scenarios. One should consider as well that tax support can be acknowledged as an endogenous policy variable, which may entail a fiscally neutral effect in countries where tax expenditure is reactive to policy design changes. Nonetheless, past studies

that have namely accounted for country specific characteristics have deemed tax support effective in increasing R&D intensity (Bloom, Rachel, & van Reenen, 2002).

On the other hand, direct support can be considered as exogenous and can be more effective on positioning investment to ensure greater additionality, which supports the overall results that direct support may stimulate more additionality than tax relief. This later may though imply a smoother compliance when in face of competition and trade rules, and one should take into consideration the potential heavier costs of resource-allocation on a discretionary basis, as may be expected for a generic direct support scheme. Besides, literature is not unanimous on the effect of direct funding, with results ranging from a negative effect to a positive one, with the authors (Appelt et al., 2019) identifying an average neutral effect (no additionality), which may be due to potential endogeneity, the length of the observation period and other predictions that derive from the combined use of both direct and indirect support from countries.

Some trends have been identified on governments' preferences on the subject, from increasingly substituting one type of support for the other (Appelt et al., 2019), to more specifically relying more on tax support schemes for funding R&D (Thomson & Webster, 2011). Also, the inherent subsidy behind the support scheme is more frequently lower for tax-based schemes when compared to grants (Thomson & Webster, 2011). But overall, it is pointed out that a policy mix will require combining both types of instruments to be optimal (Appelt et al., 2019, Thomson & Webster, 2011), with some researchers reasoning that these cannot be regarded as substitutes (Busom, Corchuelo, & Martínez-Ros, 2017).

It is relevant as well to go beyond the financial feature of the support schemes and reflect on the impact of the remaining characteristics of these programs.

In particular, it is necessary to reflect on how receivers of a support view both monetary and non-monetary incentives and how the presence (or absence) of both affects the decision to apply and the additionality on investment. Even though non-cash incentives may be deemed either as good or inferior to cash incentives in standard economic theory, empirical experiments have exploited this assumption and concluded that, when it comes to enhancing performance, there is no significant difference in applying incentive schemes that have either only monetary incentives, only non-monetary ones or a mix of both (Sittenthaler & Mohnen, 2020). Moreover, laboratory experiments that have explored changes in effort when changing the levels of the monetary and non-monetary incentives, have observed how non-monetary incentives contribute to effort choices even without the presence of any monetary incentive. And, even though the presence of the later resulting in an increase in effort, rises in the levels of the monetary incentives do not provoke relevant changes (Erkal et al., 2018). Connecting these principles with the R&D incentives and having in mind the competitive nature of public funding schemes,

it becomes essential to ensure that both direct and indirect monetary incentives, as well as relevant non-monetary incentives, are dully represented and compared, through the inclusion of realistic and representative instruments for these three dimensions. In this context, we highlight the grant – a non-reimbursable endowment, the tax deduction – a provision that reduces taxable income, and the Seal of Excellence – widely used in R&D grant-based schemes to facilitate access to alternative funding for applications that were not financed due to budget limitations. In addition, some crucial ideas can be extrapolated from the results of a survey conducted to Australian companies regarding their experience with government R&D support (Thomson & Webster, 2011).

Firstly, there is the issue of awareness of existing R&D support schemes, a problem that is accentuated the smaller the size of the company and for programs that change often, which has been shown to harm the effectiveness of additionality on R&D investment. Respondents also commonly point out hardships with grasping the 'rules of the game' and with communication (Thomson & Webster, 2011).

Focusing on the application process for grants, firms would mostly apply for a specific grant if the criteria was aligned with the firm's project and if the financial rate support was high. Reasons to not apply would be mostly due to their projects being too small to be eligible, not fitting the criteria or not having the internal funds necessary to meet the matching co-funding requirements. This later can have the benefits of minimizing rent seeking and improving the quality of proposals, but may not be suitable for firms that are liquidity constrained, which is more frequent for smaller firms. Excessive paperwork, both for the application and the progress reports, was also mentioned on a negative note by the overall surveyed population, a view not shared by the successful applicants. Likewise, the paperwork requirements not being adjusted to the size of the grant was stated frequently (Thomson & Webster, 2011).

CHAPTER 3 - METHODOLOGY

3.1. Constructing the experimental survey

Conceptual framework

Building the framework of this experiment, the first concern was the definition of green jobs employed, which was jobs that contribute positively to environmental, social and economic sustainability. This implies that eligible expenses would cover both the training of those employees whose jobs have a direct impact on the environment - for example, training engineers to use to a specific 'greener' technology, and those that have an indirect impact – such as training the finance team to be able to do ESG (Environmental, Social, Governance) reporting under a specific standard.

Secondly, we decided to focus on incentives of financial nature. This was due to the belief that the decision-making process on what specific training meets the company's needs should be carried out by the actor that holds the most complete information on this - the company itself. Another relevant point is the presence of co-funding requirements, a common feature in government support for business R&D to better align government and candidates' motivation (Thomson & Webster, 2011). For all scenarios proposed, it is implied that firms will have to make use of own funds in order to have the benefit of the support.

Finally, the universe being considered is Portuguese SME, as they make out 99% of the Portuguese business firms and will most likely have higher financial constraints to invest in green jobs. Moreover, it is not forgotten how there are some company traits that will unavoidably influence subjects' responses: the company size (micro, small or medium), the profitability scenario, the activity sector and whether they have been exposed to any of the types of instruments being tested, namely if they have decided to apply and if their applications were successful.

The survey

To meet the research objectives, a sample of SME' representatives was exposed to generic direct and indirect funding support schemes, which are meant to finance expenses for 'on-the-job-training' for green jobs. This was done through a survey containing a Discrete Choice Experiment (DCE), an experimental method devised in the Marketing field (Maximiano, 2019) and that has been used since in various other areas, namely health, transport and environmental economics (WHO, 2012, Pérez-Troncoso, 2020).

Unlike qualitative methods, it allows for the measurement of preferences, permitting the comparison and valuation of the different factors that influence choices. This can be quite useful for policy makers that wish to study optimal packages of incentives, since we can observe the

strength of preferences and therefore have insights on how to prioritize different factors, which is quite difficult to achieve with the information obtained from qualitative surveys alone. It is also a relevant method to employ at this stage of the research problem - to estimate the effects of a policy not yet implemented and for which data on revealed preference is not available (WHO, 2012). There are other stated preference methods that could be employed, but the DCE is the multi-attribute valuation method here considered to be the most appropriate. Both to ensure respondents were exposed to more than one scenario with various attributes (simultaneously), and to minimize cognitive and strategic limitations that could derive from asking firms to actively quantify their preferences, while still having to make a choice in a such a way that alternative options are directly comparable (Merino-Castello, 2003).

A DCE consists of confronting the target population with hypothetical scenarios, which contain several attributes that take up distinct levels on each scenario, and having the subjects make a discrete choice between the alternatives presented (Maximiano, 2019). The real value of this technique is going beyond the stated preferences revealed in direct questions and the bias implied (Maximiano, 2019), and measuring the probability of take-up of specific packages of incentives, as well as trade-offs between given attributes (WHO, 2012).

Besides the DCE itself, presented second, the survey encompassed two other sections (full survey in Appendix 1), following the practices described in existing literature (Pérez-Troncoso, 2020).

Section 1: Questions on the features of the support scheme

The DCE is complemented with qualitative information, as this can still be useful for policy makers to analyse the factors that determine the choice of applying to a support scheme (WHO, 2012).

14 questions were directed to business owners to assess the qualitative aspects of the support. Respondents were asked to rate the importance, on a scale of 1 to 5, of different supporting mechanisms, as well as the importance of various application requirements and the presence of Seal of Excellence and a Certification. A Seal of Excellence is commonly used in R&D schemes to recognize eligibility of applications that were not funded due to budget limitations, and often rewards these applicants with facilitated access to alternative funding schemes with the same intent. Similarly, a Certification for funded projects can give financed firms a recognition of merit that can be used, in this context, to prove they are committed to "green" growth and care about their workforce. They were also surveyed on their considerations on 'on-the-job greening', particularly how much and for whom they would invest in for their firm – for these, windows of investment and categories were provided, to simplify decision-making. Finally, they are directly asked to assess their preferences between a tax support scheme in comparison

to a grant, which is intended to be dully compared with the quantitative results obtained in section 2. A pilot survey was conducted, in which 2 business owners filled out the initial draft of the survey and gave detailed written feedback, where suggestions on simplifying and summarizing the introduction and questions of this section were given, leading to the required corrections.

Section 2: Discrete Choice Experiment (DCE)

The DCE was applied to quantify companies' preferences regarding tax support and grants. The firm representatives were presented with hypothetical scenarios with three attributes – a tax deduction (in % of deductible expenses), a grant (in % of covered expenses), where each attribute had 2 possible levels, and the possibility of being granted a Seal of Excellence. The introduction of this section clarified the nature and limitations of the scheme's components, namely the non-refundable and competitive nature of the grant, the fact that having a profit is not required to be eligible for the tax incentive and that both incentives have a maximum support limit granted per candidate.

TABLE I

ATTRIBUTES AND LEVELS FOR THE DCE

Tax deduction	Grant	Seal of Excellence
32,5%	50%	Yes
50%	70%	No

Each respondent was confronted with 4 choice sets with 2 scenarios each, one of which consisted of a rationality / internal consistency check. The test applied was of non-satiation or dominance, where one scenario (B) is clearly superior to the other (A). The answers to this question are not included in the econometric analysis but are relevant to check if respondents are taking the exercise seriously (WHO, 2012). Naturally, responses that fail this test are left out of the DCE part of the analysis.

TABLE II

EXAMPLE OF A CHOICE SET

Scenario A	Scenario B
Tax deduction – 32,5%	Tax deduction – 50%
Grant – 50%	Grant – 70%
Seal - No	Seal - Yes

<u>Section 3: Firm characterization questions</u>

At the end of the survey, there are 4 questions to characterize the represented companies in size (European Commission, 2019), area of activity (Consultar CAE, 2022), level of profit and exposure to R&D support programs. For the later, companies were inquired on their experience with the three past and most recent public funding framework programs that took place until 2020 – Horizon 2020 (European Commission, 2013), Portugal 2020 (Portugal 2020, s.d.) and SIFIDE (ANI, 2021). The first two are European and national level programs, respectively, for which financing instruments are mostly grants, and the later corresponds to the national fiscal incentive previously described. This information not only safeguards that the respondents meet the sample criteria and allows for their characterization (Maximiano, 2019), but can also be useful to conduct sub-group estimations and comparisons, depending on the number of responses obtained (WHO, 2012).

Data collection

The data was collected between the 17th and the 31st of January of 2022, through an online self-administered survey, available in Portuguese, designed in Qualtrics. This software was chosen due to the possibility of randomizing the order of the DCE questions, which is considered to be a good practice to minimize possible bias (Weber, 2019). The survey took on average 6 minutes to complete.

3.2. Sample and model estimations for the DCE

The process of collecting responses from business owners, due to the nature of the investigation and the context under which it was pursued – limited time frame and no financial compensation available – lead to the decision of not estimating a target sample. The goal was to collect enough responses to have a valid statistical analysis – at least 30 independent observations – and thereby validate the academic research objectives.

The random utility model is behind any statistical analysis performed on data retrieved in a DCE (WHO, 2012). Under this theoretical framework, an individual n chooses between J alternative support schemes, electing the option that brings the highest satisfaction. The utility (U) of a specific scheme i is made up of two components – deterministic (V_{ni}) and random ($\mathcal{E}_{ni}$), the former being the result of observed attributes ($x_1,…,x_n$) and the later of unobserved attributes, as well as differences in taste at an individual level. U can be specified as follows:

$$(1)\ U_n = V_n + \mathcal{E}_n = \alpha_1 + \beta_1 x_{1n} + \beta_2 x_{2n} + … + \beta_m x_{mni} + \mathcal{E}_n$$

where the strength of preference for each attribute level is quantified through the corresponding coefficient β. But these cannot be estimated with precision, as the utility of a given scheme cannot be directly observed. Thus, the data from the DCE takes on a probabilistic framework – the probability (P) an individual *n* chooses scheme *i* over *j* can be estimated as:

$$(2) \ P_{ni} = \Pr[U_{ni} > U_{nj}] = \Pr[(V_{ni} + \mathcal{E}_{ni}) > (V_{nj} + \mathcal{E}_{nj})] \ , \forall i \neq j$$

This equation can only be estimated if an assumption is made concerning the distribution of the error term, $\mathcal{E}_n$. For this particular case, we decided to use the conditional logit model, which adopts a logistic distribution, under which the probability of choosing scheme *i* becomes:

$$(3) \ P_i = \frac{\exp(V_i)}{\sum_{j=1}^{N} \exp(V_j)}$$

This model was considered due to the importance of gaining some insight on observed variation, which cannot be retrieved from other models such as the mixed logit model, where heterogeneity of preferences is considered yet not identifiable, so potentially less relevant for policy makers (WHO, 2012). Also, these types of incentives are rarely differentiated between sub-groups of the target group – incentives may be different for SME and larger companies and some might be sector-specific, but it is more likely that an incentive with the intent in question, similarly to what is observed with SIFIDE for R&D incentives (ANI, 2021), would be sector-agnostic, maximizing job greening throughout the economy.

The subsequent step was to define the attributes and levels that could adequately represent the incentive scheme to be tested, minimizing possible attritions with respondents due to survey time and complexity. A Seal of Excellence was included, not only because it is a common feature in grant schemes, but also to enrich the DCE analysis through the quantification of its relevance in comparison to the financial incentives (WHO, 2012). The attributes of financial nature chosen were a tax deduction and a grant, with 3 levels each – 32,5%, 47,5%, 50% and 50%, 60%, 70%, respectively. However, as a result of the pilot survey, where it was pointed out that the DCE part was cognitively challenging due to the need to do numerical calculations, it was decided to drop one level in each, in order to avoid the possibility of respondents employing simplistic decision-making strategies, not considering all the information presented (WHO, 2012).

Existing attributes and levels were based on existing national R&D (ANI, 2021) and on-the-job training (IAPMEI, 2021) support schemes, so as to ensure that the suggested coverage rates and instrument types would be both feasible and realistic, reflecting likely governmental budgetary constraints and the existing range of instruments applied in Portugal.

This was followed by the construction of the choice sets. The number of possible scenarios corresponds to the number of levels (2) multiplied by the number of attributes (3), which is 6. In

each choice set, subjects were asked to choose between 2 different hypothetical support schemes. An opt-out option was not considered since it represents the current scenario of no financial support being available for this purpose, which would not favour firms' utility when compared to having any type of support and thereby constitute a relevant choice. This implies that there are [6*5]/2 unique choice sets, which adds up to 15. Testing all possible choices, known as full factorial design, would allow all interaction terms to be estimated. In contrast, a fractional factorial design would result in testing fewer choice sets and reducing the required number of respondents – using experimental design methods, we can ensure the detection of all preferences without having to present all options in the DCE (WHO, 2012, Hole, 2016).

To maximize the precision of the β estimates, we need to minimize the size of the variance-covariance matrix of the estimated coefficients, e.g. to minimize the estimates on standard errors so that minimum variation around the parameters estimates is achieved. This can be defined as D-efficiency and, using the software Stata, we use the module *dcreate*, which uses the modified Fedorov algorithm, a search algorithm that improves the D-efficiency of a random design by changing the alternatives' levels systematically. An efficient design with **4 choice sets** for a conditional logit model was created without compromising the three central properties of an efficient design: orthogonality – independence between levels of attributes, level balance – levels appearing in equal frequency, and minimum overlap – minimizing the appearance of a repeated attribute level within a choice set.

TABLE III

D-EFFICIENT DESIGN

	Tax deduction (%)	Grant (%)	Seal (0=No, 1=Yes)	Choice set	Alternative
1.	0.5	0.7	0	1	1
2.	0.325	0.5	1	1	2
3.	0.325	0.5	0	2	1
4.	0.5	0.7	1	2	2
5.	0.325	0.7	0	3	1
6.	0.5	0.5	1	3	2
7.	0.325	0.7	1	4	1
8.	0.5	0.5	0	4	2

CHAPTER 4 - ANALYSIS OF RESULTS

4.1. The sample

The research universe corresponds to Portuguese Small and Medium Enterprises (SME), of all activity sectors, profit levels and experience with incentive programs.

36 Portuguese SME made up the sample, 52,8% of which were micro enterprises, 25% were small and the remainder were medium enterprises. The subjects' activities covered 11 distinct activity sectors, with 33,3% of SME coming from Consulting, scientific, technical and similar activities, 16,7% from Other service activities and 11,1% from Agriculture, animal production, hunting, forestry and fishing.
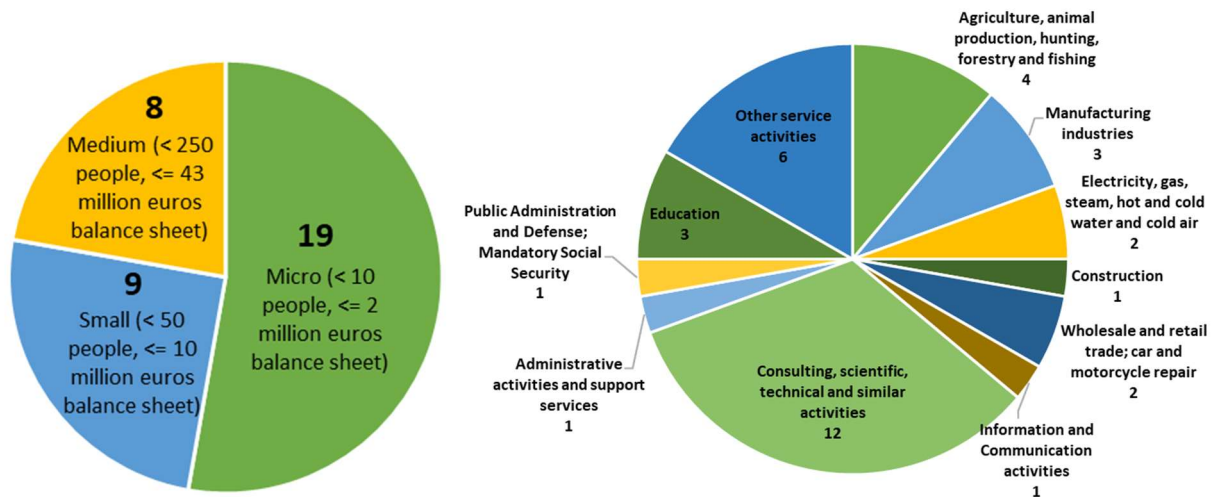
Graph 1 – **Size and sectorial distribution** of the respondents

Looking at the distribution of activity sector per firm size (see Appendix 2), both for micro (42,1%) and small enterprises (33,3%), most firms are in the Consulting area, followed by Other service activities (21,1%) for micro companies and by Agriculture and related activities for small companies (22,2%). In the case of micro companies, which make up most of the sample, the sector of Wholesale and retail trade, alongside with Education, are tied in third place, with 10,5% each.

Respondents were asked to share the **expected profit scenario for 2022**, as this can have an impact on eligibility for existing support schemes. 55,6% of firms prospected a profitable year, 38,9% expect to reach break-even and 5,6% of respondents chose not to answer.

Finally, we can characterize the sample in terms of firms' **exposure to** the benchmark **R&D incentives programs** chosen. The program that is by far less known is the fiscal incentive SIFIDE, with 30,6% of respondents declaring to be unaware of this scheme, compared with

only 5,6% for H2020 and 2,8% for PT2020. Focusing on the respondents that are aware of each scheme, 71,4% out of the 35 that knew about PT2020 have applied, 60% of which did so successfully. For the 34 aware of H2020, 41% applied successfully and 12% unsuccessfully, whilst for the 25 aware of SIFIDE, 48% applied successfully and 4% unsuccessfully. In terms of success rates amongst applicants, the highest rate is observed for SIFIDE (92,3%), followed by PT2020 (84,0%) and H2020 (77,8%), as expected, since application requirements and competitiveness of the schemes both increase in this order.
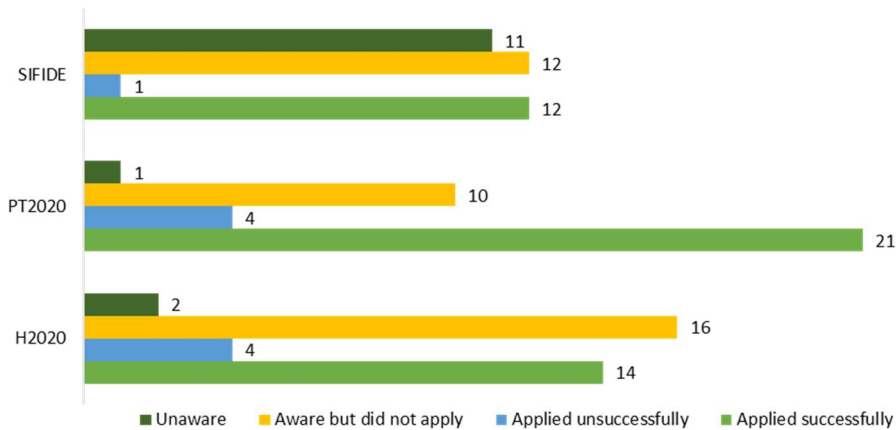
Graph 2 - Exposure to public R&D incentives

Crossing this data with firm size (see Appendix 2), for all three public support schemes, most of the sampled micro enterprises are aware of the programs but do not apply, which contrasts with what is observed for both small and medium enterprises, for which over half of sampled firms of each size have applied successfully for each of the programs.

4.2. Descriptive analysis

Section 1 of the survey, combined with firm data retrieved in Section 3, allows for the analysis of the stated preferences between a grant a tax deduction, as well as for a number of non-financial elements of the program. Inferences are made on how much enterprises value certain categories of key program aspects, and the current and prospective positioning of the subjects on green jobs' investment is described (see summary of statistics in Appendix 3).

Non-financial compensatory elements – Certification and Seal of Excellence

When asked to rate the importance of a support scheme including a Certification for successful applications, from 1 (not important) to 5 (very important), most respondents (63,9%) gave it a score of over 3, resulting in an average score of 3.86.

When asked to repeat the exercise but for the inclusion of a Seal of Excellence for eligible applications that do not receive grant funding, 63,9% of respondents gave it a score of 4 or 5,

resulting in a higher average score of 3.77. Yet, opinions regarding the importance of a Seal are slightly more scattered, illustrated in a standard deviation of 1.24, compared to 0.96 for the Certification.
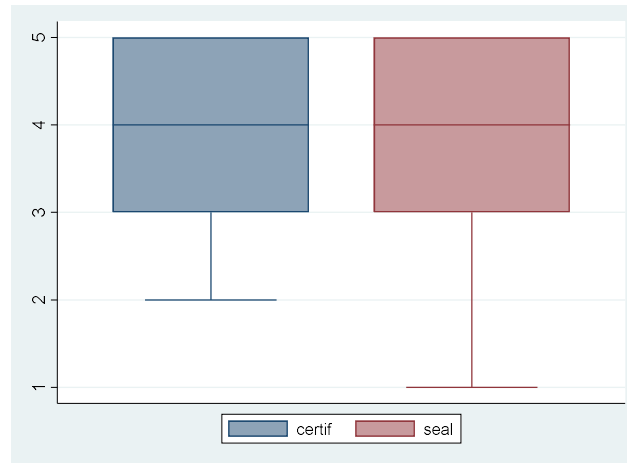
Graph 3 – Boxplot for Certification and Seal of Excellence

By company size, looking at the mean and variance of both components, it seems that medium enterprises value both components the most and that small firms value these the least, and their opinions differ more greatly.

Application support – Application Guides, Self-assessment Simulator and Assistance from supporting bodies

Subjects were also asked to rate the importance of three application support elements under the same (1 to 5) scale. Both application guidelines and the possibility to assess eligibility online through a simulator were deemed quite important factors, with 52,8% and 66,7% of respondents giving the maximum score of 5, respectively. This conjecture appears stronger in the case of the guidelines, for which no firm has rated its importance for less than 3 out of 5. In what concerns the assistance given by supporting bodies, which is done mainly be answering doubts from candidates and, sometimes, reviewing applications, answers were more dispersed. Nonetheless, the average score was 4, with 47,2% of subjects rating it with 5.
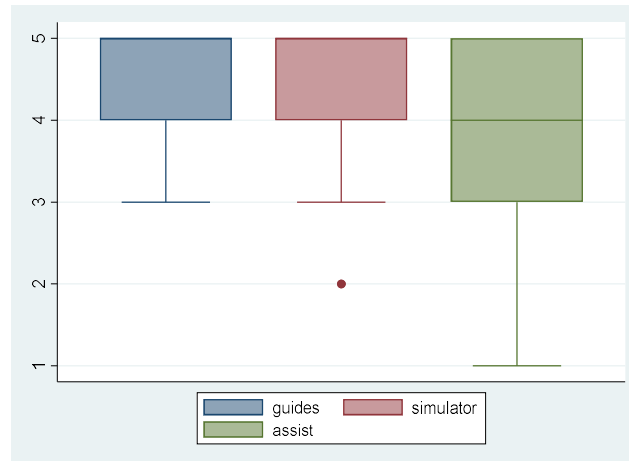
Graph 4 – Boxplot for Guides, Simulator and Assistance

Looking at each factor per company size, on average, it is micro companies that value application guides the most, whilst for the remaining factors, small companies take the lead, and this sub-group's answers are the least scattered throughout all three variables. It is relevant to denote that the larger majority of sampled small firms are rather experienced in incentive programs (see Appendix 2), surpassing the figures for both micro and medium companies, which may have an impact on how each type of support is perceived. In fact, when comparing means by firm awareness level for each program with the overall mean, the central tendency measure is above the overall average in most factors for enterprises that have applied successfully for each of the 3 benchmark programs, whilst unsuccessful applicants give the average lowest scores for assistance and simulator in most cases.

Application requirements – Paperwork and proof of Eligible Expenses

The most common obstacles for firms when applying for funds are the amount and complexity of paperwork required (with application forms, financial annexes, and so on) and, in some cases, having to prove the eligibility of financed expenses once funding is applied. Interestingly enough, simplifying the paperwork required in the application was the factor unanimously rated the highest in the scale, with 83,3% of respondents rating it 5, compared to 13,9% rating it 4 and just 2,8% rating it 3. Conversely, when asked how much having to prove eligible expenses would demotivate respondents from applying, answers were less concentrated, yet still notoriously skewed to the right side of the scale, with 44,4% of firms clamming this requirement would not affect their choice to apply, and only 2,8% stating they would not apply if faced with this obligation.
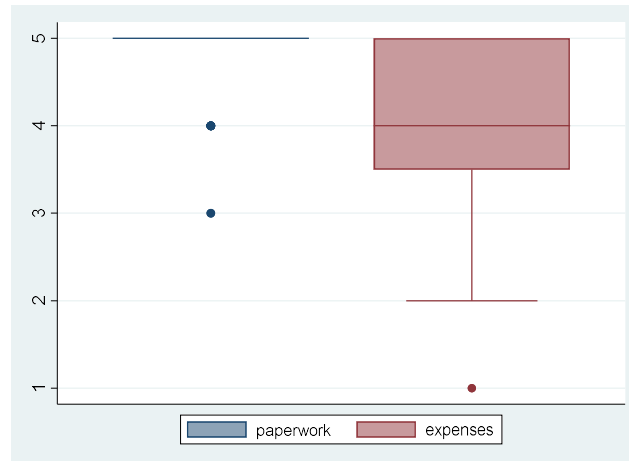
Graph 5 – Boxplot for Paperwork and Eligible Expenses

For this latter factor, the mean seems to decrease with company size, which suggests this requirement would bother micro companies more significantly than small or medium ones. Turning to the results when considering R&D application history, subjects that had unsuccessful applications for either of the 3 programs all ranked paperwork with 5, which indicates this factor might have been detrimental in their applications, even though successful applicants also value simplifying paperwork greatly, as this sub-group mean is steadily above overall averages for each of the benchmark programs.

Complementary aid – Consultancy for a 'Green Jobs Plan'

As it is expectedly harder for SME to implement changes to improve sustainability principles in their operations, subjects were asked to ponder on the relevance of being supported by external professionals on drawing up an effective plan for 'on-the-job greening'. When questioned whether they would need to resort to Consultancy to develop a 'Green Jobs Plan', 58,3% of respondents stated they would indeed have that necessity, a proportion that decreases with company size.
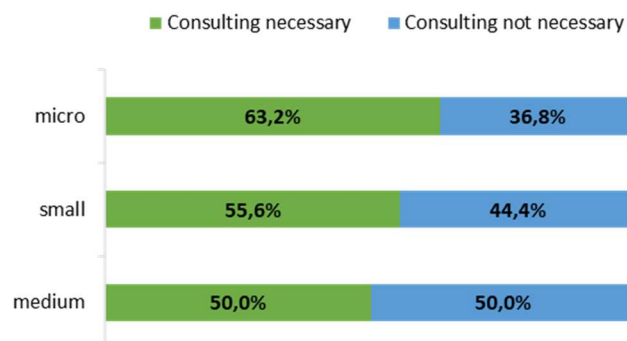
Graph 6 – Consultancy needs for a 'Green Jobs Plan' per company size

When asked to evaluate the relevance of a complementary funding scheme to cover these Consulting costs, 69,4% of respondents considered it very relevant, ranking it 4 or 5. But it is pertinent to breakdown these results according to the answers provided to the previous question.

(0=Consulting not necessary, 1=Consulting necessary)
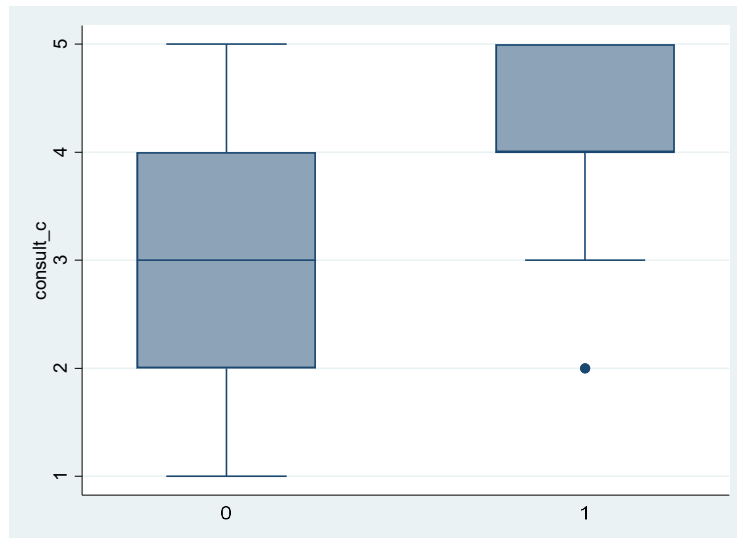
Graph 7 – Boxplot for relevance of complementary funding for Consultancy, per Diagnosis of Consultancy needs

Unsurprisingly, those that deemed consulting necessary, consider complementary funding on average much more relevant than those that did not. In addition, for those that did not consider consulting necessary, stated relevance of this extra funding is less noteworthy for those companies that expect 2022 to be profitable than for those expecting to break-even, whom all ranked relevance at 3 or more. Still, 44,4% of firms expecting profit still ranked relevance as high (rating 3 or more), which suggests that firms will always welcome extra funding to uplift their performance.

Investing in green jobs – How much?

Respondents were asked whether they were already investing in green jobs' training, to which 25% of respondents responded positively. These were mostly micro companies, from Consulting, scientific and technical activities and with an earnings forecast of profit.
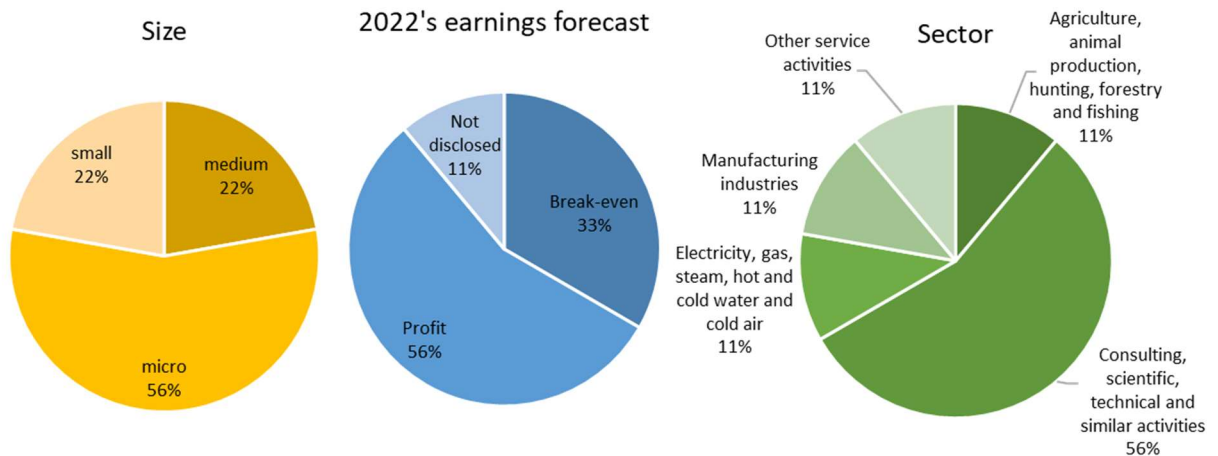
Graph 8 – Characterization of sampled firms investing in Green Jobs training

For this cohort, there was a follow up question on how much they were currently investing, for which they had to choose between 5 windows of investment. Predictably, medium companies consistently chose on average higher windows (> 5000€) than other firms, yet micro companies sampled are investing on average more than the small companies, which must be due to unobserved factors, as no patterns in profitability or activity sector are observed.
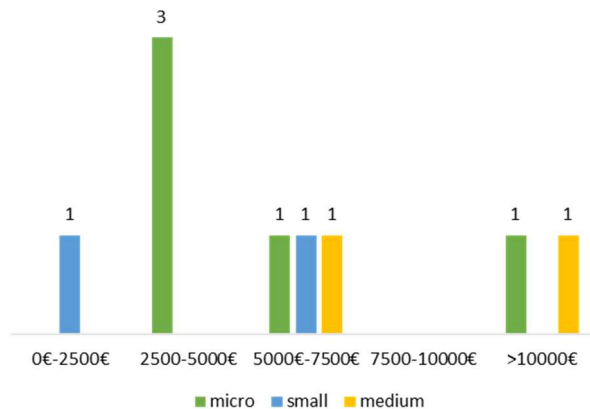
Graph 9 – Current investment in green jobs per company size

Independently of the current investment status, firms were asked to prospect how much they would invest in green jobs training, on average per year, if there were no budgetary constraints.

For those currently not investing, which corresponded to the majority (75%) of the total sample, average investment increased with company size, but both for micro and small companies, answers were rather scattered. Whilst for small firms, all those that claimed they would invest

more than 2500€ expect 2022 to be profitable, no pattern was identified in micro companies' profiles that could justify the differences observed.
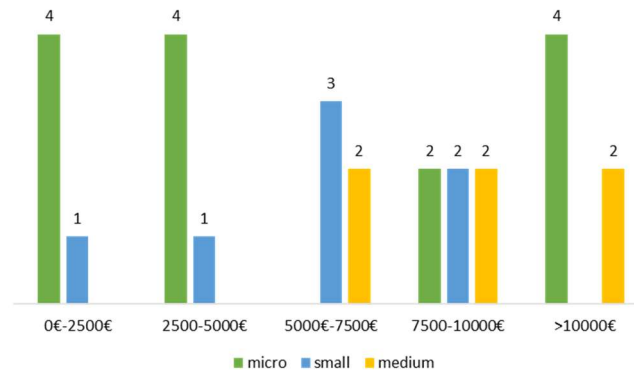
Graph 10 – Future investment in green jobs for companies not yet investing

For those currently investing, it is relevant to study how their answers compare to the previous question, namely to understand how useful a financial incentive would possibly be for those that have already made an effort to tackle this training necessity.

TABLE IV

CURRENT VS FUTURE INVESTMENT IN GREEN JOBS TRAINING

Average current investment:	Average future investment, w/o budgetary constraints:			
	0€-2500€	5000€-7500€	7500-10000€	>10000€
0€-2500€	1			
2500-5000€			1	2
5000€-7500€			1	2
>10000€		1		1

On average, investment increased for this group, jumping one class from around 5000€-7500€ to 7500€-10000€, with most respondents jumping one to two windows beyond current investment. It is interesting to denote that the 3 firms that would either maintain or reduce spending all claimed they would not need Consulting to develop a green jobs plan and two of them ranked at 4 out of 5 the relevance of complementary funding for this latter expense, which may show that on-the-job greening encompasses a strategic priority for these firms.

In effect, there is a statistically significant negative correlation[1] between stating the need for Consulting and investing already in green jobs, with 70,4% of the firms that would need consulting not investing in this type of training.

Nevertheless, for the average SME, independently of current investment level or consulting needs, it seems that the existence of financial support would stimulate investment in green jobs.

Investing in green jobs – for whom?

Firms were asked to reflect on which types of positions they would consider this type of training for, represented by five broad departments: Administrative, Finance, Human Resources, Commercial and Operations. 75% of firms would invest in green jobs for their Operations team, followed by 61,1% of firms doing so for Human Resources. Almost half (47,2%) would include Finance and Administrative in their green jobs plan and 1/3 of respondents includes Commercial.
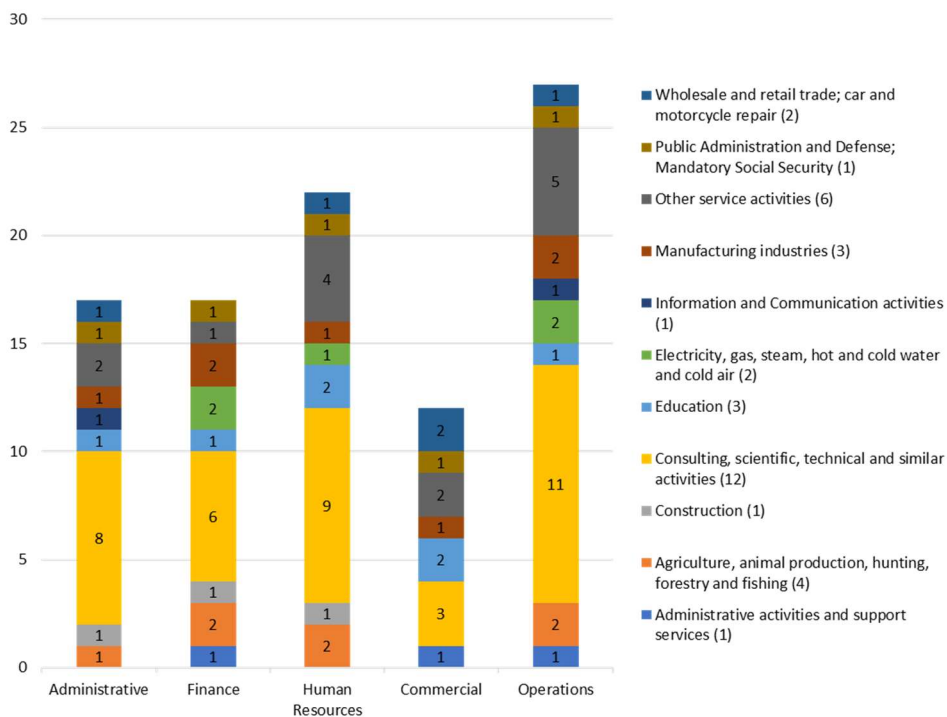
Graph 11 – Distribution of departments in which firms would invest for green jobs, depending on activity sector

To infer on the impact of this investment on the workforce in a more complete way, respondents were also asked to state approximately (in windows of %) what proportion of their employees

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[1] Pearson's correlation coefficient obtained was of -0.4462 ($|-0.4462| > {2}/{\sqrt{n}} = 0.33(3)$, for n=36).

this would cover. Answers appeared to follow almost a normal distribution, as 33,3% of respondents estimate this investment would cover over 60% of their workforce, whilst 27,8% estimate it will cover less than 20%, and 38,9% estimate it to cover between and 20% and 60% of the workforce. A slight skewness in the upper levels is observed yet can be a result of the highest class being twice as broad as each of the 3 lower classes.

Exploring the differences between activity sectors, 75% of firms working both in Agriculture and Consulting estimate to go above the 40% mark, whilst 2/3 of firms in Education and all firms in Manufacturing industries stay below that 40% mark.
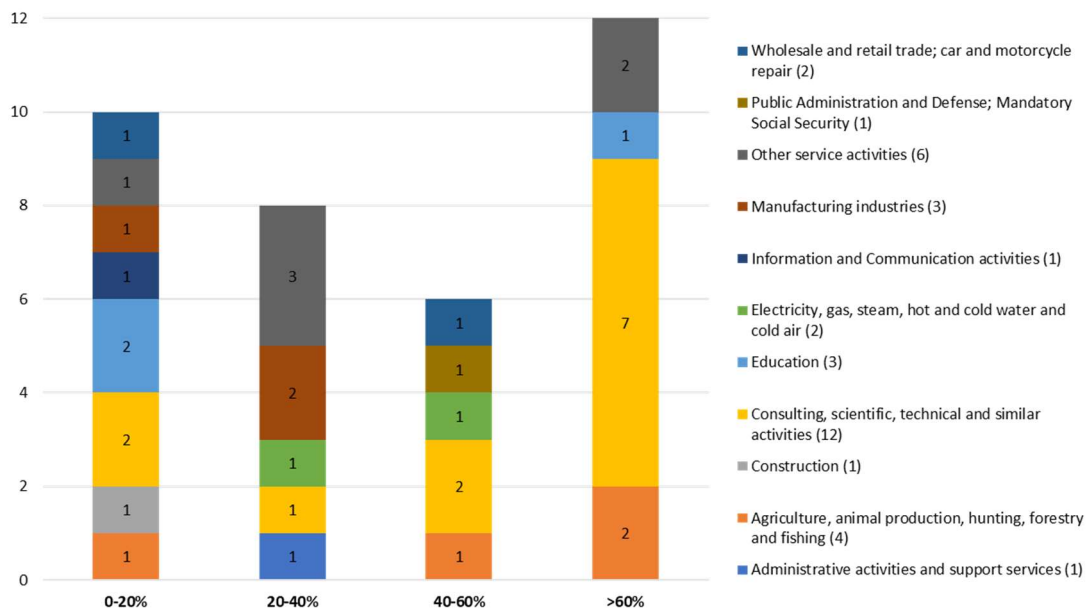
Graph 12 – Distribution of workforce % in which firms would invest for green jobs, depending on activity sector

Tax deduction vs Grant

Respondents were asked to state their preference from only having a tax deduction (1) to only having a grant (10), with the score of 5 representing indifference. With the responses obtained, points were distributed between the two instruments, between 0 and 10 for each.

58,3% of firms were more inclined to a grant only support scheme, attributing 6 or more points to this instrument, compared to 25,8% attributing those scores towards a tax deduction only scheme. That leaves 13,9% of respondents showing indifference on which instrument should prevail.

Considering tax incentive schemes (such as SIFIDE) typically require firms to have positive results, not forecasting a profit in the short term could negatively affect firms' perception of a tax-based incentive. Indeed, 64,3% of respondents expecting to break-even in 2022 were more inclined to the grant-based incentive, even though, on average, the score towards grants is of approximately 6,65 for both these firms and those forecasting a profit.

Experience with R&D tax and grant-based programs is expected to have a stronger influence on this matter, in the sense that a successful application in a grant-based program (H2020 and PT2020) or in a tax-based program (SIFIDE) would bias preferences in the direction of each instrument, the same way an unsuccessful application or a past decision to not apply could bias preferences in the opposite directions. Results show that, overall, a grant is preferred to a tax deduction regardless of these factors, with an average score of 6.56.
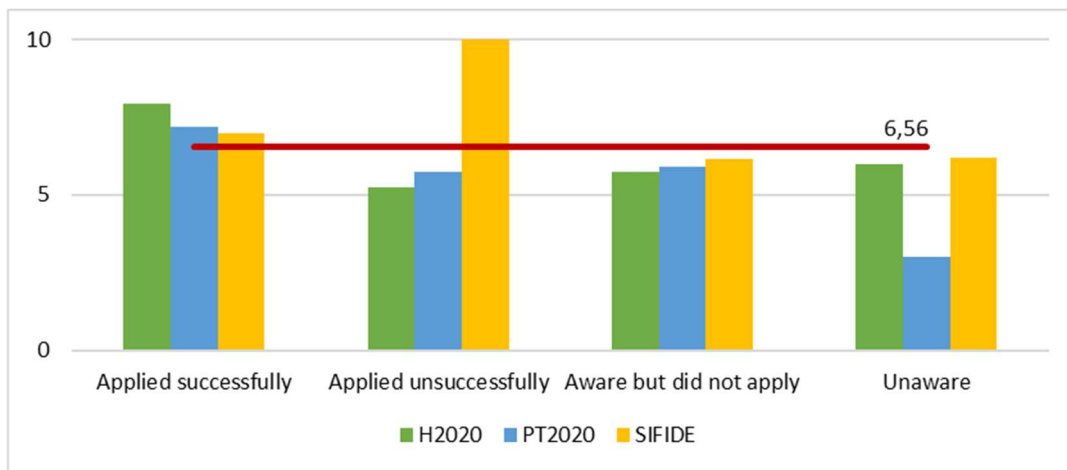
Graph 13 – Preference towards a grant when compared with a tax deduction, according to exposure to R&D incentives

4.3. Estimation of preferences over support schemes

In section 2 of the survey, the 36 respondents were each provided with the same 4 choice sets, one of which corresponded to a rationality check that is excluded from the econometric analysis. Since 6 of them failed this test, the analysis of the DCE was done for the remainder **30 firms**. With this, we have 30 subjects, each providing 3 choices between sets with 2 options each, resulting in a total of **180 observations**.

As was described in section 3.3, the probability a firm selects a specific support scheme is determined through an utility model that takes on the following form:

$$(4)\ V = \beta_1 tax + \beta_2 grant + \beta_3 seal + \varepsilon$$

V is the utility derived from a given support scheme.

ε is the error term.

tax and **grant** are the continuous variables that correspond to the levels presented in the survey for the tax deduction and grant components, respectively.

seal is the categorical variable that represents options chosen for the presence of a Seal of Excellence in the grant scheme, taking the value of 1 if present and of 0 if otherwise.

In order to properly identify the choice sets and construct the model in Stata using conditional logit, the dataset needs to be prepared in a particular way, including 5 more variables:

id – unique identifier for each respondent.

obsid – identifies each unique choice made, ranging from 1 to 90.

alt - the alternative within each choice set, taking the value of 1 for the first alternative and of 2 for the second.

cs – the choice set being observed, ranging from 1 to 3.

choice - the dependent variable that represents the choice made: choice =1 for the alternative chosen and choice = 0 for the other alternative.

Proportion of choices for each particular option in each choice set is presented here below:

TABLE V

PROPORTION OF SUBJECTS CHOOSING EACH SCHEME PER CHOICE SET

cs	alt	tax	grant	seal	% chosen
1	1	0.5	0.7	0	56,7%
1	2	0.325	0.5	1	43,3%
2	1	0.325	0.7	0	26,7%
2	2	0.5	0.5	1	73,3%
3	1	0.325	0.7	1	66,7%
3	2	0.5	0.5	0	33,3%

Using command *clogit choice tax grant seal, group(obsid),* we estimate the coefficients of the model for the attributes in consideration in firms' utility when confronted with a support scheme for green jobs:

TABLE VI

ESTIMATION OF THE COEFFICIENTS, CONDITIONAL LOGIT MODEL

Attributes	Coefficients (β)	Standard deviations
Tax deduction	**3.6568****	1.5810
Grant	**2.4036***	1.3364
Seal of Excellence	**0.8524*****	0.2830

Note: * Significance at 10%; ** Significance at 5%; *** Significance at 1%

All attributes are statistically significant and contribute, as projected, **positively to firms' utility when benefiting from a support scheme.** Each coefficient represents the marginal rate changes in the utility of a given firm caused by a change of the related attribute – a unitary increase in the tax deduction rate will increase utility by 3.66, compared to the utility gain of 2.40 with the unitary increase in the grant rate, and to the gain of 0.85 in the presence of a Seal of Excellence.

To assess the weight of each component more accurately, **marginal replacement rates (MRR)** were computed, recurring to Stata's command *wtp*. These indicate to what extent a firm would be willing to substitute attribute x_1 for attribute x_2 and is computed as follows:

$$(5) \; MRR_{x1/x2} = -\beta_1/\beta_2$$

TABLE VII

MARGINAL REPLACEMENT RATES

	MRR	Confidence intervals
Grant / Tax deduction	**-0.6573**	(-1.3334 - 0.0188)
Seal of Excellence / Grant	**-0.3546**	(-0.6926 - -0.0167)
Seal of Excellence / Tax deduction	**-0.2331**	(-0.4046 - -0.0616)

Results show that the non-financial component (Seal of Excellence) has less weight in the utility function than either of the financial components. It also appears that there is a preference for a tax deduction when compared to a grant, as the $|MRR_{grant/tax}| < 1$, yet the confidence interval also includes values >1, so this is not a clear preference.

Lastly, we can reflect on how the probability of accepting a given support scheme shifts with changes in the levels of the three attributes, commonly known as the **uptake rate**.

Considering the mathematical form of the probability of choosing a scheme *i,* as defined in section 3.3, it is possible to compute the change in the probability of accepting a support scheme due to a change in the level of attribute x_1 from *a* to *b*, holding other attributes' levels constant:

$$(6)\ P_{x1=b} - P_{x1=a} = \frac{\exp(\beta_1 * b)}{\exp(\beta_1 * a) + \exp(\beta_1 * b)} - \frac{\exp(\beta_1 * a)}{\exp(\beta_1 * a) + \exp(\beta_1 * b)} = \frac{\exp(\beta_1 * b) - \exp(\beta_1 * a)}{\exp(\beta_1 * a) + \exp(\beta_1 * b)}$$

Applying the formula above for the two levels of each attribute, it is the presence of the Seal of Excellence that provokes the most significant change in the uptake rate, followed by the tax deduction, with the grant component increase having the lowest effect.

TABLE VIII

UPTAKE RATES

	Change in probability of accepting a support scheme	Confidence intervals
If the Tax Deduction rate increases	**0.3095**	(0.0643 - 0.5546)
If the Grant rate increases	**0.2358**	(-0.0115 - 0.4832)
If there is a Seal of Excellence	**0.4021**	(0.1696 - 0.6347)

Comparing the DCE results with the answers provided by the 30 subjects in Section 1 of the survey, it is interesting to note that, even though compared to the overall sample (36 respondents), the average stated preference for a grant over a tax deduction decreases, from 6.56 to 6.43, grants are still slightly more preferred than tax deductions, which is the opposite of what is verified with the DCE. In what regards the Seal of Excellence, respondents rated its importance with 3.80 out of 5, above the indifference point of 3, which is consistent with DCE results on the importance of a support scheme having this feature.

CHAPTER 5 - CONCLUSION

5.1. Discussion

This dissertation encompassed a novel exploration on policy design to leverage Sustainability. This was achieved through a data collection method that covered three aspects - the assessment of preferences for relevant components of a support scheme for 'on-the-job greening', the measurement of actual preferences on the core financial and non-financial components, and the characterization of the target receptor – Portuguese SME.

We conceived a hypothetical sector-agnostic support scheme that would aid private investment in green jobs, so that limitations arising from size and profitability do not delay the achievement of sustainability goals. Employing a Discrete Choice Experiment, we overcame the bias implied in direct questions and measured probability of take-up of specific packages of incentives, as well as trade-offs between given attributes. Nonetheless, qualitative analysis was found useful to rank the importance of scheme components, also relevant for policy design.

5.2. Academic contributions

Starting with the financial aspects, a central research objective was to understand which financial incentive, tax deduction or grant, would be better suited to finance the expenses in question, from the perspective of the receivers of the support. Grants have been considered to have a greater potential to stimulate additionality, even though results are not unanimous (Appelt et al., 2019) and usually provide a higher coverage rate than a tax incentive. Grants are also often preferred by firms not making a profit, which may be the case for a significant portion of Portuguese SME. Tax incentives typically take a longer time to have an effect, due to lack of awareness (Appelt et al., 2019), and in fact the sampled firms were more often unaware of SIFIDE than of the grant-based schemes. However, these offer a less competitive environment and more flexibility on the implementation of the training plan, and the presence of a mechanism like a carry-forward provision would allow the participation of non-profitable firms. For the sample, declared preferences worked in the favour of a grant, whilst DCE results show the opposite tendency, with both of these methods providing average outcomes not far from indifference between the two measures. The DCE also included a Seal of Excellence, which was overall less valued than the financial components, even though it was the presence of a seal that would make a more significant difference in the uptake rate of a support scheme, in comparison to increases in the coverage rates of each financial incentive.

Ultimately, even though results are close to indifference between the two financial incentives, a stated preference for a tax-based incentive is verified. Were this to be implemented, with profitability not blocking access to the support, this instrument may in fact be more appropriate for a type of expense that is meant to leverage structural changes in the way business is done.

5.3.   Managerial contributions

Turning to the non-financial aspects that make up the support scheme, it was possible to observe, for the sample obtained, the importance given to non-financial benefits, application support and application requirements. A Seal of Excellence and a Certification were quite valued by respondents, more unanimously for the later, yet not as much as the remaining scheme components analysed. A self-assessment simulator, application guidelines and assistance from supporting bodies, in descending order of importance, are more valued by firms, an importance that is superior the smaller the company size and the higher the level of experience in incentive programs. Having to prove eligible expenses does not fall behind in relevance either, especially for smaller firms, but the most critical factor in the decision to apply is clearly the paperwork involved, regardless of previous positive or negative experience with funding schemes, contrary to the trend verified (Thomson & Webster, 2011).

Previous studies conducted in Portugal (Prata-Dias, et al., 2009) suggested that, even for firms in the environmental sector itself, effective sustainability management is deficient. Moreover, companies do not have a solid track record on defining their training plans when applying to related national funding schemes (European Commission, s.d.). Accordingly, over half of the sampled SME recognized they would need the help of consultants to construct their 'Green Jobs Plan' and 69,4% were not indifferent to receiving funding for these expenses.

In what regards firms current positioning concerning sustainability, many are already acting on the qualification of workers to respond to "green" needs, with 25% of sampled firms already investing on average 5 694€ per year on this matter. Also, if there were no budgetary constraints, subjects would invest on average 6 770€ per year, which favours the relevance of financial aid, though figures should be interpreted with caution as firms may overestimate their intentions when faced with a question of this nature. Respondents prioritize training their Operations team and estimate this investment to cover on average 45% of their workforce.

5.4.   Limitations

The results obtained encourage reflection on how the Portuguese government could support green jobs, yet, due its dimension and scope, this work is not directly actionable by policy makers. Limitations resulting from the small sample size are namely the impossibility of conducting statistically relevant sub-group analysis – such as conducting tests on equalities of means and variances for qualitative measures, or further exploring the conditional logit model with the DCE outputs.

5.5. Future research

Replicating this experiment with a larger sample would be relevant, not only to account for the limitations just mentioned, but to broaden the explanatory capacity of the results by including more factors in the analysis, that could potentially explain the interesting differences already observed. At the firm level, these would be firms' international exposure (subject or not to different fiscal regulations, weight of exports), more detailed information on firm activity, team profile and business strategy. Cultural and social specificities that come with doing business in Portugal, how education at each stage of a person's career is viewed and literacy on sustainability can also have a meaningful impact. This should ideally be followed by policy implementation, monitoring and appraisal, and ultimately assessing its impact.

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<h1 align="center">APPENDICES</h1>

<p align="center">*1. Survey of incentives for on-the-job training for green jobs*</p>

INTRODUCTION

The purpose of this survey is to **test the effects of financial incentives – a tax deduction and a grant** - on SME' investment in **green jobs**.

A green job is understood as a job with fair compensation that contributes positively to environmental, social and economic sustainability. Thus, eligible expenses would cover both the training of employees whose jobs have a direct impact on the environment - for example, for engineers to be able to use a specific 'green' technology - and of those that have an indirect impact – such as training the finance team to be able to do ESG (Environment, Social, Governance) reporting under a specific standard.

SECTION 1

This section contains 14 questions with the aim of evaluating the expected impact of the proposed support scheme on the surveyed companies and the importance given to its different components.

Rank the following components of the support scheme by level of importance: (scale that ranges from 1 – not important to 5 – very important, one answer per line)	
1.	Including a certification (successful application).
2.	Including a Seal of Excellence (eligible applications that have not received funding).
3.	The quality of application guides.
4.	Having an online simulator for self-diagnosis of eligibility.
5.	Having access to assistance from supporting bodies.
6.	Simplifying the paperwork required in the application.

7.	Presently, do you consider that you would need to resort to Consultancy to develop a 'Green Jobs Plan', that is, to diagnose training needs?
Yes	
No	

How relevant would it be to: (scale that ranges from 1 – irrelevant to 5 – very relevant)	
8.	Have access to complementary funding for Consultancy to develop a 'Green Jobs Plan'?

In the decision to apply, to what extent would you be demotivated: (scale that ranges from 1 – would not apply to 5 – would not affect choice to apply)	
9.	By having to prove eligible expenses?

10.	Are you currently investing in Green Jobs' training?
Yes*	
No	

10*.	How much do you invest on Green Jobs training, on average per year?
0€-2500€	
2500-5000€	
5000€-7500€	
7500-10000€	
>10000€	

11.	How much would you invest on green jobs training, on average per year, if you didn't have budgetary constraints?
0€-2500€	
2500-5000€	
5000€-7500€	
7500-10000€	
>10000€	

12.	For which types of positions (departments) would you consider this type of training?
Administrative	
Finance	
Human Resources	
Commercial	
Operations	

13.	For what % of your workforce would you consider this type of training?
0-20%	
20-40%	
40-60%	
>60%	

14.	If you could choose between a tax deduction and a grant:
(only tax deduction) 1 2 3 4 5 6 7 8 9 10 (only grant)	

SECTION 2

In this section it is intended that you choose between **hypothetical scenarios of incentive schemes, which include tax incentives and grants.**

The tax incentive takes the form of a tax deduction, which reduces the amount of gross taxed income by a certain percentage.

The grant, which is non-refundable, will represent a fixed percentage of eligible expenses and applicants must assume that the scheme is competitive (funding is limited).

Making a profit is not a requirement for any of the incentives - in the particular case of tax support, applicants must assume the possibility of a carry-forward provision (eligible expenses can be carried over to the following year(s) in order to benefit from support when you have positive results).

Both incentives have a maximum support limit granted per candidate.

Finally, there is the possibility that companies eligible for the competitive instrument (grant) that are not financed receive a **Seal of Excellence**.

1.	Select the scenario you prefer:
Tax deduction - 50%; Grant - 70%; Seal - No	
Tax deduction - 32.5%; Grant - 50%; Seal - Yes	

2.	Select the scenario you prefer:
Tax deduction - 32.5%; Grant - 50%; Seal - No	
Tax deduction - 50%; Grant - 70%; Seal - Yes	

3.	Select the scenario you prefer:
Tax deduction - 32.5%; Grant - 70%; Seal - No	
Tax deduction - 50%; Grant - 50%; Seal - Yes	

4.	Select the scenario you prefer:
Tax deduction - 32.5%; Grant - 70%; Seal - Yes	
Tax deduction - 50%; Grant - 50%; Seal - No	

SECTION 3

COMPANY CHARACTERIZATION

1.	Firm size:
Micro (< 10 people, <= 2 million euros balance sheet)	
Small (< 50 people, <= 10 million euros balance sheet)	
Medium (< 250 people, <= 43 million euros balance sheet)	

2.	Activity Sector:
(respondents were asked to select one of the official level 1 portuguese classification of economic activities)	

3.	What is the expected earnings scenario for 2022?
Profit	
Loss	
Break-even	

4.	What is your exposure to public R&D incentives:			
	Unaware	Aware but did not apply	Applied unsuccessfully	Applied successfully
H2020				
PT2020				
SIFIDE				

2. Sample characterization

TABLE I

DISTRIBUTION OF RESPONDENTS BY SIZE AND ACTIVITY SECTOR

	Micro (< 10 people, <= 2 million euros balance sheet)	Small (< 50 people, <= 10 million euros balance sheet)	Medium (< 250 people, <= 43 million euros balance sheet)
Agriculture, animal production, hunting, forestry and fishing	5,3%	22,2%	12,5%
Manufacturing industries	5,3%	11,1%	12,5%
Electricity, gas, steam, hot and cold water and cold air	5,3%	-	12,5%
Construction	-	-	12,5%
Wholesale and retail trade; car and motorcycle repair	10,5%	-	-
Information and Communication activities	-	11,1%	-
Consulting, scientific, technical and similar activities	42,1%	33,3%	12,5%
Administrative activities and support services	-	11,1%	-
Public Administration and Defense; Mandatory Social Security	-	-	12,5%
Education	10,5%	-	12,5%
Other service activities	21,1%	11,1%	12,5%
Total	100% (19)	100% (9)	100% (8)

TABLE II

DISTRIBUTION OF RESPONDENTS BY SIZE AND PUBLIC R&D INCENTIVES'
EXPOSURE

	Micro (< 10 people, <= 2 million euros balance sheet)	Small (< 50 people, <= 10 million euros balance sheet)	Medium (< 250 people, <= 43 million euros balance sheet)
H2020*			
Applied successfully	15,8%	77,8%	50,0%
Applied unsuccessfully	10,5%	11,1%	12,5%
Aware but did not apply	63,2%	11,1%	37,5%
Unaware	10,5%	-	-
PT2020*			
Applied successfully	42,1%	77,8%	75%
Applied unsuccessfully	10,5%	11,1%	12,5%
Aware but did not apply	47,4%	11,1%	-
Unaware	-	-	12,5%
SIFIDE*			
Applied successfully	15,8%	55,6%	50,0%
Applied unsuccessfully	-	-	12,5%
Aware but did not apply	52,6%	22,2%	-
Unaware	31,6%	22,2%	37,5%

*% of firms per firm size

3. Descriptive results

TABLE I

SUMMARY OF STATISTICS FOR QUALITATIVE VARIABLES

Component	Variable	n	Mean	Standard deviation	Min	Max
Certification	certif	36	3.86	0.96	2	5
Seal of Excellence	seal	36	3.78	1.24	1	5
Application Guides	guides	36	4.33	0.79	3	5
Self-assessment Simulator	simulator	36	4.56	0.73	2	5
Assistance from supporting bodies	assist	36	4.00	1.17	1	5
Application paperwork	paperwork	36	4.81	0.45	3	5
Proof of Eligible Expenses	expenses	36	4.01	1.09	1	5
Consultancy need	consult_d	36	0.58	0.50	0	1
Consultancy importance	consult_c	36	3.69	1.19	0	5
	if consult_d= 0	15	3.00	1.36	1	5
	if consult_d= 1	21	4.19	0.75	2	5
Investing or not in Green Jobs	nowgreen_d	36	0.25	0.44	0	1
Current investment in Green Jobs*	nowgreen_c	9	5694.44	2938.90	1250	10000
Future investment in Green Jobs*	futuregreen	36	6770.83	3278.38	1250	10000
	if nowgreen_d= 0	27	6250.00	3270.64	1250	10000
	if nowgreen_d= 1	9	8333.33	2931.51	1250	10000
Investment per department	admin	36	0.47	0.51	0	1
	finance	36	0.47	0.51	0	1
	hr	36	0.61	0.49	0	1
	comm	36	0.33	0.48	0	1
	oper	36	0.75	0.44	0	1
Proportion of workforce invested*	workforce	36	0.45	0.29	0.1	0.8
Preference for a grant compared to a tax deduction	grant	36	6.56	2.91	2	10

*classes of values represented with their midpoints, to allow for the calculation of statistical measures

TABLE II

MEANS AND STANDARD DEVIATIONS PER COMPANY SIZE

		Micro	Small	Medium
certif		3.89 (0.86)	3.56 (1.01)	4.13 (1.13)
seal		3.68 (1.34)	3.67 (1.41)	4.13 (0.83)
guides		4.37 (0.83)	4.33 (0.71)	4.25 (0.89)
simulator		4.58 (0.61)	4.78 (0.44)	4.25 (1.16)
assist		3.95 (1.31)	4.22 (0.97)	3.88 (1.13)
paperwork		4.74 (0.56)	4.89 (0.33)	4.88 (0.35)
expenses		4.21 (1.03)	3.89 (1.45)	3.88 (0.83)
consult_c	if consult_d= 0	2.86 (1.35)	3.75 (0.96)	2.50 (1.73)
	if consult_d= 1	4.00 (0.85)	4.60 (0.55)	4.25 (0.50)
	Total	3.58 (1.17)	4.22 (0.83)	3.38 (1.51)
nowgreen_c		5500 (2738.61)	3750 (3535.53)	8125 (2651.65)
futuregreen	if nowgreen_d= 0	5535.71 (3788.72)	5892.86 (2672.61)	8333.33 (1707.83)
	if nowgreen_d= 1	9750 (559.02)	5625 (6187.18)	7500 (1767.77)
	Total	6644.74 (3751.22)	5833.33 (3186.89)	8125 (1636.63)

TABLE III

MEANS AND STANDARD DEVIATIONS PER

BENCHMARK R&D SUPPORT PROGRAMS AWARENESS

		Applied successfully	Applied unsuccessfully	Aware but did not apply	Unaware
guides	H2020	4.36 (0.84)	4.25 (0.96)	4.31 (0.79)	4.5 (0.71)
	PT2020	4.29 (0.78)	4.25 (0.96)	4.6 (0.70)	3 (0.00)
	SIFIDE	3.92 (0.79)	5 (0.00)	4.5 (0.80)	4.55 (0.69)
simulator	H2020	4.57 (0.65)	4.75 (0.50)	4.44 (0.89)	5 (0.00)
	PT2020	4.62 (0.78)	4 (1.41)	4.6 (0.70)	5 (0.00)
	SIFIDE	4.42 (0.67)	2 (0.00)	4.75 (0.45)	4.73 (0.65)
assist	H2020	4.29 (0.83)	3.5 (1.91)	3.88 (1.26)	4 (1.41)
	PT2020	4.19 (1.08)	3 (0.82)	4.1 (1.37)	3 (0.00)
	SIFIDE	4.33 (0.78)	2 (0.00)	4 (1.28)	3.82 (1.33)
paperwork	H2020	4.79 (0.43)	5 (0.00)	4.81 (0.54)	4.5 (0.71)
	PT2020	4.81 (0.51)	5 (0.00)	4.8 (0.42)	4 (0.00)
	SIFIDE	4.92 (0.29)	5 (0.00)	4.75 (0.62)	4.73 (0.47)
expenses	H2020	4.14 (0.95)	4.25 (0.96)	3.81 (1.28)	5 (0.00)
	PT2020	4.14 (0.85)	3.5 (1.73)	4 (1.33)	5 (0.00)
	SIFIDE	3.92 (0.90)	5 (0.00)	3.83 (1.34)	4.36 (1.03)
grant	H2020	7.93 (2.64)	5.25 (2.63)	5.75 (2.70)	6.00 (5.66)
	PT2020	7.19 (2.99)	5.75 (3.86)	5.90 (2.23)	3.00 (0.00)
	SIFIDE	7.00 (3.02)	10.00 (0.00)	6.17 (2.69)	6.56 (3.16)

TABLE IV

MEANS AND STANDARD DEVIATIONS PER EARNINGS SCENARIO*

		Break-even	Profit
consult_c	if consult_d= 0	4.00 (1.00)	2.33 (1.22)
	if consult_d= 1	4.22 (0.67)	4.09 (0.83)
	Total	4.14 (0.77)	3.30 (1.34)
nowgreen_c		5416.67 (1443.38)	5000 (3307.19)
futuregreen	if nowgreen_d= 0	5454.55 (4002.84)	6666.67 (2700.31)
	if nowgreen_d= 1	9583.33 (721.69)	8000 (3811.99)
	Total	6339.29 (3936.52)	7000 (2963.60)
grant		6.64 (2.87)	6.65 (2.96)

*n = 34, as 2 firms did not disclose their 2022 earnings forecasts.