Companies and institutions are increasingly concerned with business ethics and social responsibility practices. One way to increase both practices is achieved through Socially Responsible Investment (SRI). In this type of investment, in addition to the usual financial requirements (maximizing profitability and minimizing risk) they are required to have a positive social impact. Thus, for example, investment funds that participate in arms companies, polluters or that violate the fundamental rights of workers will not be considered socially responsible. At times, the investor may be reticent to select such funds, since, from a utilitarian point of view, he might think that the profitability will be lower. However, this needs not to be so. In fact, for many companies to demand ethical values can generate a competitive advantage over their competitors.

If we want our teaching to prepare students to understand the society that surrounds them, concepts like SRI should be incorporated in a transversal way in the curricula of Business schools. To contribute to this idea, we present a practical activity that shows how to select an investment fund. First, the profitability of an investment in socially responsible funds is calculated; secondly, profitability is obtained in funds where social responsibility is not taken into account and; finally, the profitability of an investment is obtained where all the funds of the two characteristics are taken into account. From here, the student has to choose the one that he considers that fulfills better with their expectations.

The main objectives of this practical activity are three: that the student is able to handle the quantitative tools necessary to address real world problems, that is able to make decisions based on empirical data, that he is able to pass the arguments and the results to their classmates. In this way, the aim is to evaluate critical and self-critical capacity and increase the skill for decision making, competences of great importance in the studies of Business Administration and Management.

Keywords: Socially Responsible Investment, Critical Judgment, Evaluation Competences.

1 INTRODUCTION

Companies and institutions are increasingly concerned with business ethics and social responsibility practices. In recent years, there has been a greater interest in these issues on the part of different social agents. This has also been reflected in the change in the selection of the assets or funds in which the investments are made, choosing socially responsible companies. [1]. One way to increase this practice is achieved through Socially Responsible Investment (SRI). When referring to socially responsible investments, social, environmental and ethical issues are taken into account in addition to financial aspects. Thus, when investing, social, environmental, ethical funds or a combination of the above will be considering. [2]. In this type of investment, in addition to the usual financial requirements (maximizing returns and minimizing risk) they are required to have a positive social impact.

In the training of students of Business Management and Administration, in addition to working on the specific competences that students must acquire in each subject, the teachers wish to develop generic competences that must be acquired by the end of their degree. In this practical activity, we will focus on students’ critical and self-critical capacity, decision-making capacity and commitment to ethics and social responsibility.

In this case, a practical activity is presented that allows the teacher to assess the acquisition of the competences enunciated with the previous, along with the development of the evaluation; therefore, the evaluation method is reflected in the competences that the student wishes to develop. In addition, those that are not included in the assessment specifically will tend to be ignored. [3].

In this paper, a joint activity between the subjects of Mathematics and Statistics is presented. The objective of this practical activity is, the one hand, to develop an activity that makes student able to acquire general skills like critical and self-critical capacity, decision-making capacity and commitment to ethics and social responsibility; and, the other hand, get the students to be able to identify a
satisfactory solution to the problem using the knowledge of Mathematical Programming and Descriptive Statistics dealt with in their respective subjects. Students are also instructed in the use of functions and options data analysis tool that provides Excel ® spreadsheet, which is used to perform the calculations required for the resolution of the proposed practical and Lingo program.

The rest of the paper is organized as follows: in section 2, a problem of portfolio choice is presented and a simple example that serves to contextualize the practical activity with a real data is proposed. In section 3, we include the results to be obtained in the practical, and finally, the main conclusions are presented in section 4.

2 METHODOLOGY

2.1 Presentation of the problem: Portfolio choice

One of the classic problems of the Financial Economics is to obtain a portfolio that is beneficial for the investor. It is a matter of choosing few funds (with risk) from a set of n funds. In the simplest versions of the problem, the only information that is often told is:

- The Capital C that we are willing to invest.
- Historical performance of each fund.

From these data, we need to estimate what the return on each fund is and what is the risk taken by investing in them. There are many proposals to make these estimates, but here we explain the simplest one, based on that proposed by Markowitz [4] [5] in which, directly or indirectly, rely most models.

The investor wants to select some funds (portfolio) so that:

- All the capital is invested.
- Return is maximized.
- It minimizes the risk.

This model assumes a number of hypotheses which, though they have been widely discussed in scientific literature, we admit in this practice:

1. The expected return on the portfolio can be estimated by the average historical returns.
2. The risk of the portfolio can be estimated from the variance-covariance matrix of returns on assets.
3. An investor is supposed rationality, that is, if two assets have the same risk, he will choose the most profitable one.
4. You cannot invest more capital than you have (you cannot go into debt).

2.2 Statement of the Problem

We assume n funds, A1, A2, ..., An, whose weekly returns (k weeks) are as follow:

<table>
<thead>
<tr>
<th>Funds</th>
<th>1</th>
<th>2</th>
<th>...</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>r11</td>
<td>r12</td>
<td>...</td>
<td>r1k</td>
</tr>
<tr>
<td>A2</td>
<td>r21</td>
<td>r22</td>
<td>...</td>
<td>r2k</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An</td>
<td>rnk</td>
<td>rnk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As is usual in portfolio selection problems (Markowitz), we call xi to the proportion of capital invested in the ith fund, we estimate the return is through the average, and the risk of investment is estimated using the variance-covariance matrix (V) of the returns of assets.
The classical model [4], [5] is a quadratic mathematical programming model where return is maximized subject to a not be more than a fixed level R of risk. The mathematical formulation due to Markowitz is:

\[
\begin{align*}
\text{Min} & \quad x^T V x \\
\text{s.t.} & \quad r^T x \geq r_{\min} \\
\sum_{i=1}^{n} x_i &= 1 \\
x_i &\geq 0, \quad i = 1, ..., n
\end{align*}
\]

or its dual form

\[
\begin{align*}
\text{Max} & \quad r^T X \\
\text{s.t.} & \quad X^T V X \leq R_{\max} \\
\sum_{i=1}^{n} x_i &= 1 \\
x_i &\geq 0, \quad i = 1, ..., n
\end{align*}
\]

Notice that from the financial point of view it is fundamental that all capital is invested (hence the sum of all proportions is required to be 1) and that the investor cannot be indebted, for this reason the non-negativity condition of all variables.

2.3 Example

To understand how the practice would develop we will carry out a simple example.

We consider five socially responsible funds and the returns achieved in five weeks.

| Table 2. Returns of the five funds. |
|---------------------|--------|--------|--------|--------|--------|
| Funds   | Weeks |
| SF1     | 1     | 2      | 3      | 4      | 5      |
| SF1     | -0.13 | 2.34   | -0.52  | -0.59  | 3.00   |
| SF2     | 0.00  | 2.04   | -0.54  | -0.69  | 1.86   |
| SF3     | -0.75 | 1.81   | -0.30  | -0.65  | 1.70   |
| SF4     | -0.75 | 1.84   | 0.08   | -0.98  | 1.74   |
| SF5     | -0.57 | 1.41   | -0.12  | -0.45  | 2.60   |

With this data, the average returns calculated are:

\[
m = \begin{bmatrix} 0.82 & 0.53 & 0.36 & 0.38 & 0.58 \end{bmatrix}
\]

From the matrix of Variances Covariance (V), the risk of the investment has been obtained.

\[
V = \begin{bmatrix} 2.35 & 1.77 & 1.70 & 1.71 & 1.83 \\
1.77 & 1.39 & 1.30 & 1.32 & 1.31 \\
1.70 & 1.30 & 1.32 & 1.35 & 1.34 \\
1.71 & 1.32 & 1.35 & 1.44 & 1.37 \\
1.83 & 1.31 & 1.34 & 1.37 & 1.52 
\end{bmatrix}
\]

Solving the mathematical programming model (1), considering a minimum return \( r = 0.5 \), the solution is \( x_1=0, \) \( x_2=0.545, \) \( x_3=0.239, \) \( x_4=0, \) \( x_5=0.215, \) and the optimal value of 1.34% risk. Note that the return constraint is saturated, that is, the value 0.5 is reached with equality.

Once the calculations for socially responsible funds were selected, the process would be repeated with the financial funds, obtaining the results for these funds and we would do the same if we analyzed all together.

3 DEVELOPMENT OF THE EXPERIENCE

3.1 Data and issues to be resolved

Here we consider weekly value of American fund from 2007 to 2010. In particular, 25 Large Cap Social responsible fund and 25 Large Cap conventional fund.
An investment fund is a savings instrument formed by the contributions of several investors in order to achieve a return. Each investor owns a set of shares. The fund gathers the capital contributed by the participants and invests it collectively, which allows for greater investment opportunities, improved management and a reduction in management costs.

From these data, answer the following questions:

1. To calculate the returns of an investment in socially responsible funds.
2. To determine the returns in funds where social responsibility is not taken into account.
3. To obtain the profitability of an investment where all the funds of the two characteristics are taken into account.
4. To take a decision and choose the one that considers that it fulfills better with his expectations. Argue briefly why.

To be able to get some practice, the student must apply the knowledge of statistics and mathematics learned in the second semester of the first year. They should apply to the real case what has been exposed in the example of the previous section.

The aim, presented the practical activity, has been to provide the necessary computational tools to solve it. To do this, at least two classes of the Excel spreadsheet are taught which addresses, among other things, how to obtain the mean vector and variance-covariance matrix from a dataset. On the other hand, students need to know the Lingo program, to make the calculation of the returns and the risk of a portfolio.

Another session, after having explained the fundamental concepts to make this practical activity, the students are put into pairs to begin to work on the resolution of the practice whose delivery is made, on a pre-determined period, through the Virtual Classroom platform.

The practical activity is delivered and corrected within the time set, a feedback session is organized for students to explain what criterion they chose and why. At the end, the results are presented by students to the rest of their classmates and the decision chosen in each case is explained.

3.2 Responsibility Investment versus Classical Financial Investment

Once each group exposed the results, we want to underline that, despite what it might initially think, you will not always get a higher return on financial investments. There is a multitude of literature dealing with these issues. If at the beginning, Classic financial theory had in mind an only decision criterion, maximizing the benefit of the investor, over the years, progress has been made in how to invest in socially responsible funds, so that financial criteria (profitability and risk) combine with ethical issues. In addition, after the financial crisis of 2008, more and more companies are incorporating their social and environmental policies. This is why it is not surprising that sometimes socially responsible investments provide the same returns as financial investments do. [6].

At the end of the practical activity, students are explained the ethical importance of SRI. The type of company is explained to them and it is emphasized that these types of companies can make a sustainable consumption of energy and natural resources, protect the environment, can worry about social issues and on ethical issues, such as protection of Human rights, can avoid producing or distributing weapons, etc.

In this way, in addition to learning contents of the subjects referred to throughout the work, students incorporate into their training ethical issues of great importance both for their personal as well as their professional development.

4 CONCLUSIONS

In the joint practical activity that has been presented, students, from a set of funds data, must choose a combination with an acceptable return and risk. To carry out the practical activity, students must apply knowledge of Mathematical Programming and Descriptive Statistics they have acquired throughout the semester in the subjects of Mathematics and Statistics.

The practical classes of these subjects are carried out in classroom of PC room, which allows to use a computer and analyze real data. For this reason, the calculations needed to find at the solution are performed with the Excel spreadsheet and Lingo.
We consider the experience to be very positive. Firstly, the student connects acquired knowledge in different subjects; secondly, he begins to become aware of concepts such as SRI, and finally, it allows teachers to assess critical and self-critical capacity and to help develop students’ the skill for decision making, competences of great importance in the studies of Business Administration and Management.

REFERENCES


