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CLIENT RISK PROFILE – THE PORTUGUESE CASE
EFFECT OF WEALTH AND HEALTH FACTORS ON THE INVESTORS' RISK PROFILE

José Carlos Valls Arenas – 48501

Work project carried out under the supervision of:

Daniele d'Arienzo

Adérito João Oliveira

Tomás Neves Silva

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Abstract

This consulting project, Client risk profile – the Portuguese case - Effect of wealth and health factors on the investors' risk profile, commissioned by BPI Asset Management, investigates the most relevant factors that determine the risk aversion of Portuguese investors. Using qualitative and quantitative research methods, we demonstrate why the average Portuguese citizen tends to be excessively risk-averse compared to their European peers. The quantitative analysis was based on our survey's results. A multiple linear regression using various factor variables allowed us to analyze the effect of each factor on the Portuguese investor's risk aversion and the correlation between them. Next, individual portfolios were designed for the different risk profiles, maximizing return while respecting the maximum drawdown desired by the investors and calculating the VaR. The individual component focuses on a deeper way on the effect of wealth and health on the investor's risk profile and analyses the different existing types of wealth and health and the ones that are more impactful.

Keywords: Wealth, Health, Age, Education, Financial Literacy, Gender, Income, Housing, Risk Profile, Risk Aversion, Investing, Risky assets, Psychology

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Introduction

In light of historic inflation rates and fears of recession, global investors are puzzled considering their portfolio's allocation to counterbalance rises in interest rates across the US and the EU. These impactful events arguably question the current lifecycle investment choices of investors globally. Academic research has dedicated major efforts since the fundamental proposal of Modigliani and Brumberg (Modigliani und Richard 1954) to understand the choices of investors in their lifecycle investment strategies. In line with this, academic research has identified various factors that affect the decision-making process of investors, most notably the effects of wealth, income, age, gender, education, financial literacy, and health have been widely confirmed. These factors influence on one hand the investor's risk aversion, the willingness to accept additional risk in the expectation of additional return, and simultaneously, the investor's ability to undertake major investments in the accumulation of housing wealth. The lifecycle theory outlines that while income grows non-linearly until the age of 40, investments primarily follow the purpose of wealth accumulation, while after this threshold, investors will refocus on the financial consequences of retirement (Attanasio and Guglielmo 2010). The urgency of pension wealth accumulation will depend on public and private pension plans, which are country-specific and depend on each country's social security systems. The lower pension income will increase the propensity for investors to consume the financial wealth they accumulated over the years, as saving rates tend to decrease with retirement (Browning and Crossley 2001).

Academic literature indicates that the allocation of financial wealth across one's lifecycle is heavily equity biased until the structure of households shifts, human capital starts to depreciate, and individuals start to consider provision for retirement (Jagannathan und Kocherlakota 1996). Recent academics have suggested that the latter is not justified as the argument for a continuous positive linear relationship between age and risk aversion is not

given, as the portfolio can be shifted at any point which dismantles the investment horizon argument, and because human capital still generating almost riskless returns upon retirement, the bond allocation should be minimal until retirement where interest payments serve as an income substitute (Vandenbroucke, The Role of Age in Determining Stock-Bond Investment Mix 2018). Given the portfolio size effect, it can be argued that individuals have accumulated their largest wealth upon retirement, meaning that reallocating toward equities can generate the largest relative return (Kitces 2016). Across this paper, we will examine the effect of Portuguese investor risk profiles on the various equity-bond mixed portfolios.

This project will focus on the Portuguese investor and the components of its risk aversion that will determine the country-specific mechanics that will alter the Lifecycle Hypothesis (LCH) established assumption. Our partner, BPI Asset Management, has outlined the following objectives:

- To understand the Portuguese investor profiles and investigate risk components.
- To develop a risk-dynamic asset allocation given the shifting risk profile.

Throughout our findings, outlined in this project, we attempted to confirm our hypothesis that the Portuguese investor is more risk-averse than its European peers and has a conservative investment approach. At the same time, we explored the possibility that Portuguese risk aversion can be justified. For that, we studied the most relevant factors and tested Portuguese results in comparison to other EU countries. To visualize the effects of our risk profile assessment, we identified seven different portfolio allocations based on our regression analysis, conducted based on our survey-based dataset. Enhanced through a monthly VaR analysis using standard MA and EWMA volatility, this project offers our partner, BPI Asset Management, a conclusive argument that the Portuguese investor, on

aggregated terms, it is excessively risk averse. The observed above-average risk aversion of Portuguese investors could be addressed by BPI offering technology-enhanced solutions that adapt better to their client's desires and concerns. One example of this could be to offer a financial product that addresses the client's needs for health insurance, while investing the remainder in one of BPI's funds, fulfilling the client's desire to buy a house or prepare for retirement.

We have decided to divide our work project into two parts. The first part the fundamentals of the LCH, the concept of risk aversion, and focuses on the comparative analysis of factors between Portugal and other European countries leading to a conclusion about Portuguese risk aversion. Across the second part, we will dive deeper into each factor to gain an extensive understanding of the factor mechanics and its impact on each investor's risk profile

Characterization of the Portuguese population

As our study focuses on the Portuguese population, we deem it indispensable to provide a demographic snapshot of the former. According to the CMVM study conducted in 2021, 82% of the population is 18 years or older of which 53% are women and 47% are men. The geographic distribution is as follows: North (35%), Centre (22%), and Lisbon (26%). These percentages reflect the regional asymmetries and the concentration of the population along the country's coastline. The population is characterized by having an old population given that 19% of the population is more than sixty-five years old while 14,9% of the population has less than fourteen years old as can be seen in Figures 3 and 4. Over a third of the population resides in cities with less than 2,000 people. 58% of the population is employed, whereas the European average is 73%. Portuguese people with Tertiary education account for 28% of the population while the EU average is 39%.

Risk Aversion

Prior to analyzing the identified risk factors, it is fundamental to understand the role of risk aversion in individual investment decision-making and its relevance for investment firms.

The term risk aversion refers to the tendency of an individual to prioritize certainty over uncertainty. In that sense, the higher the individual's degree of risk aversion, the lower will be the level of risk that the individual will want to engage in when deciding on an uncertain outcome. This affects among others the choice of financial instruments that the individual will invest in. Given this, a risk-averse investor will be only willing to invest in very predictable instruments (Lajksjö and Enander 2013). As John W. Atkinson noted: "The tendency for anxious people to set either extremely high or very low aspirations has been noticeable over and over again in the literature on the level of aspiration" (Atkinson 1957).

For investment companies, and investors alike, risk aversion will be the major determinant to be considered to offer the most accurate products for their clients. In that context, the KYC and onboarding process is elementary for investment firms as it grants investment professionals a precise initial assessment of their client's level of risk aversion. If risk tolerance is determined imprecisely, an investor might have engaged in an inappropriate investment strategy that may lead to the investor selling the position and dissolving its client relationship with financial management firms to the likes of our partner BPI AM. The concept of risk aversion implies the urgency of investors understanding their return expectation to the level of risk they like to take.

Risk Factors in Life Cycle Allocation

By investigating the Portuguese risk aversion profile, we have individually analyzed six risk factors to evaluate the determinants of their risk profile. To test the factors effectively we

have isolated each factor and set it in contrast with the overall risk profile. This should lead us to the conclusion if Portuguese investors are excessive, in line, or less risk averse in relative terms to other European and US investors, concerning each factor. The studied factors are:

Wealth: It is one of the elements that most influences investment choices and risk appetite (K. J. Arrow 1984). When accounting for the wealth factor, homeownership will be an important determinant that contributes to the factor's weight in risk aversion determination.

Age: As individuals make financial decisions throughout their life and get older and gain knowledge as well as experience, age is an important factor to identify risk aversion for a given risk profile. (Brooks 2018)

Gender: Given the different gender-based socialization effects, gender will deeply impact the risk profile of an individual. (Marinelli, Mazzoli und Palmucci 2016)

Education: The effect of an individual's education level on their propensity to invest is highly significant (CMVM 2009). To account for the differentiation between education in non-financial matters and education in financial matters, the Financial Literacy factor will also be taken into consideration, measuring the financial knowledge of an individual.

Income: The existing literature generally agrees that an individual's risk profile may be heavily affected by the individual's income across its lifecycle. The various income levels of individuals will therefore impact their risk aversion as individuals that earn more are typically less risk-averse than individuals that earn less (Shaw 1996).

Health: It is considered the core driver of human capital. Unanticipated shocks in health can deeply alter individual risk aversion, herby shaping investment behavior, making the person more risk averse, or affecting their risk tolerance (Atella, Brunetti and Maestas 2012).

Wealth Factor

When studying for wealth, there are two important drivers to consider: the individual's wealth, and the country's wealth. According to Schneider, et al. (2017), the cushion hypothesis discusses that it could be possible that with the same wealth in relative terms, a person's risk aversion may change depending on the state protection the individual can get access to. They concluded that weaker social security makes investors more risk-sensitive. Moreover, households with more discretionary income are more prepared to accept financial risks. (Schneider, Fehrenbacher and Weber 2017).

To prove Schneider, Fehrenbacher, and Weber's points and see if they apply to Portugal, we decided to analyze the European GDP, Social Security Ranking, and Household net adjusted annual disposable income by country. We also included the evolution of Real GDP per capita from 2000 to 2021, Debt to GDP by country, and Gross debt-to-income ratio of households by country. According to the ECB, the last three data sets also greatly influence people's risk aversion and investment profiles.

There is numerous research on the impact of wealth on an investor's risk profile, and the majority of them agree that everything being equal, the wealthier the individual, the more willing is to take risks. This concept is known as CRRA (decreasing absolute risk aversion) (Courbage, Montoliu-Montes and Rey 2018).

From Figure 5, the countries with higher GDP per capita are Luxembourg (134.535$), Ireland (100.1239$), Denmark (68.202$), and the US (61.280$). The countries with the lowest GDP are Bulgaria (11.746$), Romania (14.795$), Croatia (17.454$), and Poland (17.946$). Portugal (24.296$) is below the European average (39.999$). Following the CRRA effect, the wealthier the country's individuals, the more financial risk their inhabitants are willing to

take. Following Figure 5 results, Portuguese people would have a higher risk aversion than the EU average.

Moving to the next point introduced by Schneider, Fehrenbacher, and Weber, we will analyze how Social Security in Europe is and how countries rank according to it. The importance of analyzing it is to see and understand how much state protection an individual can get depending on the country is coming from.

From Figure 6, the countries with better social security are France (1), The Netherlands (2), Slovakia (3), and Belgium (4). On the other end of the ranking are Denmark (40), Switzerland (39), Ireland (38), and the United States (37). Portugal is in place (19). From the social security standpoint, Portuguese people should be in line with average European risk aversion.

To finish analyzing the cushion hypothesis, the next step is to study the current disposable income per household. From Figure 7, the top countries are the US (47.763$), Luxembourg (47.140$), Switzerland (41.560$), and Germany (40.700$), and the bottom ones, Hungary (20.760$), Latvia (20.850$), Greece (21.390$), and Turkey (22.020$). Portugal (27.930$) is below the European average (31.023$).

Analyzing the 2 main drivers for the wealth factor introduced at the beginning (individual and country wealth), and taking the cushioning hypothesis into account, keeping everything equal, Portuguese investors' risk aversion should be slightly higher that the European average. To compare the analyzed data with the current risk aversion, we will use Figure 8.

The European Central Bank conducted a study in 2019 - "Financial literacy for investors in the securities market in Portugal"- where they analyzed the ownership of risky assets and mean risk aversion between European countries and the US. Analyzing Figure 8, the countries with the highest percentage of the population holding risky assets are the United States (50%),

Finland (39%), Malta (35%), and Belgium (30%). Countries holding less risky assets are Latvia (1%), Greece (3%), Slovakia (5%), and Estonia (6%). For Portugal is (9%), below the average of the sample (20%). For the levels of risk aversion in the figure, the countries with lower risk aversion are the US (3.2), Italy (3.4), Austria (3.5), and Malta (3.5), on the other hand, countries with higher risk aversion are Portugal (3.9), Spain (3.85), Latvia (3.85) and Cyprus (3.8). From Figure 8, we observe that Portugal is the country with the highest risk-averse investors. It is possible to see that risk aversion and the percentage of holdings of risky assets are inversely correlated to each other. There are some outliers like Finland and Cyprus, where they hold more risky assets than suggested by their risk aversion, and Latvia and Greece which hold less risky assets than they should, following their risk aversion levels.

After analyzing Figures 5, 6, and 7, Portuguese investors' risk aversion should be close to the European average in terms of risk aversion (3.6) and risky asset holdings (20%). However, the study from the ECB shows something completely different. Portugal is the most risk-averse country (3.9), and holdings of risky assets are considerably below the average (9%).

From Figure 8, it is also noticeable the results for US investors. After analyzing the prior figures, we would expect the US to be somewhere on the top of the less risk-averse countries, and holding more risky assets than the average, closer to countries like Luxembourg, Denmark, and Finland, but in this case, the US investors are relatively much less risk averse and hold more risky assets than those countries mentioned above. Thus, Portugal and the US are two examples where the results have strongly deviated from our assumptions, on both edges of the risk aversion spectrum. Our study is focused on the Portuguese investor, however, mentioning the US case can lead to an interesting comparison. The latter is especially relevant when observing the factors of the wealth analysis, or patterns that lead to one country being more risk-averse and the other less risk-averse than previously deduced.

Group Part

In the case of a more conservative investors country like Portugal, does the fact that when controlling for Wealth, Portuguese investors are more risk averse than they should be? that the Wealth factor is not as relevant as the literature indicates? Or is the wealth factor less indicative of investors' risk aversion compared to others? To further our knowledge of the wealth factor and its impact on the Portuguese population, we analyze 3 more graphs. The first one is the evolution of the historical GDP from 2000 to 2021. The ECB suggests that there is a direct correlation between the amount of debt people can get access to and their risk profile, therefore, we will also look at the Government debt to GDP and the Gross debt-to-income ratio of households in Europe.

In Figure 9, we compare the Historical GDP evolution of Portugal, the USA, Greece, Spain, Italy, Hungary, and Poland, to Europe from 2000 to 2021. The reason behind including other Southern countries is to compare the evolution of countries with similar cultures. On the other hand, including Eastern European countries (Poland and Hungary) is to analyze the evolution of countries with current lower GDPs than Portugal, and with bigger cultural differences than the Southern countries.

From Figure 9, the main two changes during the time sample are the exponential GDP evolution of the USA, and Italy going below the average European GDP during that period.

To have a deeper understanding of the historical evolution from Figure 9, we compare each country’s GDP to the European GDP in 2000 and 2021 in Figure 10. In this case, it is possible to find 2 important patterns. For all the Southern countries, their GDP to the European average in 2021 considerably worsen compared to 2000. Portugal went from 0.71 to 0.62, Spain from 0.93 to 0.80, Italy from 1.19 to 0.91, and Greece from 0.76 to 0.60. On the opposite side, Eastern countries, currently having lower GDP than the latter, their GDP

evolution to Europe has increased. Hungary went from 0.34 to 0.47 and Poland from 0.28 to 0.47. In the case of the USA, they have increased their GDP to Europe, from 1.58 to 2.37.

These findings stand out because, in terms of current GDP, Poland and Hungary ought to hold less risky assets and be more risk-averse than Portugal, but going back to the ECB research, neither of them is more risk averse, and in terms of holding risky assets, Hungarian investors have a higher allocation to them, and Polish are very close to Portugal.

Looking at debt, we will analyze individual and country debt.

From Figure 11, we can see that the countries that have more Debt to GDP are Greece (193), Italy (151), Portugal (127), and the US (126). Countries with lower Debt to GDP are Estonia (18.1), Bulgaria (22.2), Luxembourg (24.4), and Moldova (32.1). Portugal is well above the European average (88).

From Figure 12, where the gross debt-to-income ratio of households is analyzed, the countries on the top are Denmark (207), Norway (201), The Netherlands (184), and Luxembourg (180) and on the opposite side, Latvia (29), Hungary (35), Lithuania (38), and Slovenia (42). Portugal (94) is below the European average (95). There are several observations from Figures 11 and 12. The first one is countries with higher GDP, and people tend to have a higher debt-to-income ratio. Second, in those countries where the state has high government debt, people do not raise as much debt themselves, which could be a cultural factor.

After analyzing the data from Figures 5 to 12, it is possible to conclude that the wealth factor is important to explain risk aversion. However, in the case of Portuguese people, the risk aversion shown by its investors, and the low holdings in risky assets cannot be explained solely by looking at the wealth variable, as they are excessively risk averse in relative terms when only controlling for wealth. An interesting finding during our analysis of wealth is the

evolution of historical GDP, where countries like Hungary and Poland which have a lower current GDP, show a higher willingness to take risks than Portugal and other Southern countries. A possible explanation could be that comparing each country's GDP to the average European GDP in 2000 and 2021, Hungary and Poland have a positive evolution (they are currently wealthier than 21 years ago). Portugal, Spain, Greece, and Italy have considerably worsened in terms of relative GDP in the last two decades, which might be a possible reason for having a more conservative mindset population.

A final comment on the US case, and why in Figure 8 there is a big gap between the US and the rest of the countries' risk aversion and holdings of risky assets. The main driver according to Schneider, Fehrenbacher, and Weber is the individualism factor of each country's population and the findings from (Mandel 2003), who discovered that the more materialist an individual is, with the need for success and self-comparison to other individuals, the more that drive investors to take higher risk in financial decisions. Mandel and Schneider's findings can be better understood when comparing Europe and the US where the latter exhibits higher levels of financial liberalization and has historically benefited from large structural advantages (access to capital markets).

Homeownership as a Wealth Factor

Having examined extensively the macro comparatives between Portugal and its European peers, we deem it necessary to dive deeper into the nature of wealth and its composites in Portugal and its peers. To conduct this analysis, we will proceed with examining the theoretical difference between housing and financial wealth, before transcending towards comparing Portuguese and European countries in their respective housing and homeownership data. This section aims at concluding that Portuguese investors have a large

preference for owning their dwelling and that being a homeowner can impact the individual's risk aversion.

Before going into depth on the Portuguese homeownership structure, it is important to quickly emphasize the demographic distribution of the Portuguese population across its territory. The latter is important to better understand where the population lives (urban vs. rural) and in what type of housing (owned vs. rented) they reside. All of these components will affect the share of homeowners and their impact on wealth. According to the survey conducted by KMPG in 2020, 38% of the population (>18 years old) lives in cities of less than two thousand inhabitants while around 79% of the population lives in cities below 50 thousand inhabitants. This underlines the rural structure of the Portuguese population and indicates that a propensity for households to live in one-household dwellings might be given. Given the World Bank's data, in 2021 33% of the Portuguese population live in rural areas, which is a significant improvement compared to the 52% registered in 1990. However, given the latter European context, the World Bank reports that Portugal is among the median of European countries, but has a significantly more rural population concentration than the EU and Euro Zone averages of 24.8% and 22.3%, respectively. Its Southern European peers, Italy and Spain have rural population rates of 28.6% and 18.9%, respectively, which contrasts with Germany's 22.4% and the Netherlands' 7.4% (World Bank 2022).

The differences between both sources of wealth are fundamental, although both types of wealth can appreciate over time, financial wealth is more liquid, while the propensity of households to consume out of their housing equity is lower than financial wealth (stock market equity) as transactions costs might arise through refinancing, while households might regard changes in wealth as more temporary and uncertain. Thaler (1990) suggests that households might also consider their wealth in different "mental accounts", while Juster et al.

(2006) state that housing wealth serves as both a saving instrument and a consumption good. Piazessi and Schneider (2004) go further and argue that housing wealth provides consumption insurance and that in case of income shocks enables households to keep consumption patterns. These academic papers draw the picture that housing wealth can indicate an investor's asset preference, which indicates a higher level of risk aversion.

Now when it comes to homeownership data, there is a variety of data points to consider. According to the European Commission, 77.3% of the Portuguese population in 2020 owned their home (Eurostat 2021). This comes in line with the assumption that a more rural population tends to live in individual dwelling units, that are most likely owned by the individuals themselves. The EU Commission data sets Italy and Spain right behind Portugal, with 75.1% (both) of the population owning their homes. Comparing the Southern European countries with the Netherlands Germany or Austria indicates that there might be a structural difference between the countries. In the Netherlands, despite its mostly urban population, 69.1% of the population lives in homes they own, which contrasts with 'renting' cultures in Austria and Germany, where the share of the population renting is 44.7% and 49.5%, respectively.

The Household Finance and Consumption Survey published for the second time in 2014 gathered comparative Euro Zone-wide microdata on households, which research teams used to analyze wealth inequalities (Kaas, Kocharkov und Preugschat 2019) or drivers of household wealth (Mathä, Ziegelmeyer und Porpiglia 2014). Both, in their respective contexts, underline that households owning their home statistically hold more wealth than those renting their home. Mathä (et al., 2014) give various explanations for the latter but present the consideration that under perfect market conditions the wealth of households should be the same no matter if the household owns its home or rents it. Mathä (et al., 2014) argue that the amount invested in the household's main residence net of mortgages for owners

is offset by the increase in financial wealth of home renters, which means that both households, irrespective of their homeownership should hold the same wealth. Unfortunately, the data suggests that homeownership is a considerable indicator of wealth as homeowners across all observed Eurozone countries have higher mean and median wealth than non-owners. When it comes to contributions to net wealth, results vary across the Eurozone, with Portugal at the lower spectrum where the non-inherited and non-gifted homeownership contributed on average to 42% of net wealth, while the percentage was set at 32% and 31% for Austria and Germany, respectively, and 51% and 61% for Spain and Italy, respectively. Including inherited and gifted homes, meaning examining the mean contribution of the household's main residence to total net wealth, deeply impact only Austria and Germany where the contribution is alleviated to 42% and 38%, respectively. This emphasizes the weight of intergenerational wealth transfers in both countries and that the respective homes are substantial factors of wealth that evenly account for family heritage and might hold additional symbolic value.

These results might also be driven by the composition of the dataset as Portugal revealed a 71% homeownership rate, while Austrian, German, Dutch, Italian, and Spanish rates lay at 44%, 48%, 57%, 69%, and 83%, respectively. By comparing these rates with the data from 2020, we see significant differences in the Netherlands and minor differences in the Southern European countries. These might arise, among others, from the 5-year interval between both publication differences in household composition as Eurostat considers the entire population, while the ECB restricted itself to the sample of household data.

Both studies using the ECB's dataset, have concluded that homeownership is a substantial driver for differences in wealth among European households. Mathä argues that the higher net wealth of homeowners must be linked to behavioral and institutional factors that lead to

different consumption and saving behavior of homeowners. As an example, Germany's yearly net saving rate of tenants sat at a mean and median of 8% and 3% respectively. However, homeowners with mortgages depict a different picture, with a mean and median of 22% and 21%, respectively, while homeowners without mortgages have average and median saving rates of 13% and 7%, respectively. These rates are comparable as the rent as well as the debt repayment plus interest are included in consumption and therefore the savings rate, in theory, should be the same if both components were netted. The rates do not include the tax deductibility of interest payments, but the behavioral effect of homeowners seems more significant. Some of the results of Mathä's studies must be regarded with a grain of salt, as wealth is largely skewed among a smaller percentage of the sample, meaning that the richest households are homeowners. However, when looking at the middle part of the distribution, homeownership, and the residential housing market effect (capital gains on asset appreciation) are better in explaining the wealth differences between Germany and Portugal than the tails. In that sense, it can be argued that the factor of individuals owning their homes is an indispensable factor for wealth and risk behavior (i.e. saving preferences). This underlines that homeownership indicates a presence and preference for housing wealth, which affects the individual's risk profiling.

Kaas (et al., 2019) on the other hand observe that across both household surveys the average distribution of net wealth differs a lot among Eurozone countries. Understanding each household as a holder of a given portfolio the averages for a set of components are organized as follows: net own housing wealth, net financial wealth, net real wealth, and net business wealth.

The first component refers to "the value of the house that is owned by the household and used as a primary residence minus the amount of mortgage debt for that house". The second

component refers to “all financial wealth minus all debt that is not in the form of mortgages”. The third one refers to “items such as cars and valuables and other real estate assets nets of mortgage debt” while the fourth component” is the net value of a (self-employment) business”. Through this table (Figure 13), we can conclude that own housing wealth is on average 48% of overall net wealth, which depicts the same picture as in Mathä’s research. Interestingly enough is that Portugal’s share of net real wealth is among the highest observed, and far above the average, while net own housing is lower than the average, which might be due to high mortgage debt or as Mathä suggests due to households holding multiple real estate’s assets (high net worth concentration).

In that sense, homeownership is an important factor when it comes to explaining wealth and giving indications about national housing and investment preferences across the Eurozone, especially the place of Portugal among the latter.

In line with the topic of homeownership, it is important to note when covering the Portuguese and European house ownership structure, that most homeowners finance their investment through mortgages and a given percentage of financial assets as down payments. In that sense homeowners in their desire to own their dwelling must have a given level of liquidity to pay the down payment, income security to pay back the loan, and willingness to smooth consumption to repay the interest on the loan. Diaz-Serrano (2005) argues, based on his conducted research, that wealth constraints for homeownership are far more relevant than income constraints, meaning that households have larger difficulties making the down payment than having the income to pay back the loan.

Some countries in Europe offer various incentives for homebuyers to the extent of tax breaks for interest payments. Overall are mortgage rates strongly correlated with government rates and spreads are less transparent in Europe than in the US, which makes the comparison of

mortgage access across the Eurozone more complicated than in the US. We, therefore, use the 10y government rates as proxies for mortgage rates.

When looking at Eurozone 10-year bond rates, in Figure 14 we can say the following. Firstly, the latter strongly converged across the Euro Zone in the early 2000s with Portuguese rates declining strongly towards the end of the period. Figure 15, based on ECB data, depicts that the introduction of the Euro emphasized the alignment between European systematic risk factors. This is especially true for a country like Portugal where the spread between Portuguese and German government debt was squeezed from over 3% at the end of 2001 to less than 1% a year later, as depicted in Figure 14. During the Financial crisis and the Euro crisis that followed, the aforementioned spread sparked again as worries about the economic sanity and the elevated debt burdens of these countries emerged. Low mortgage rates incentivize homeownership as investors have easier access to financing their home acquisition. Looking at overall interest rates in the Eurozone, rates have dropped severally between the start of the century and the year 2021, when the ECB announced rate hikes and recession worries hampered the European economies. It could therefore be argued that the drop in government cost of debt enabled easier access to mortgages for households (De Castro 2007). This is in line with the aforementioned topic, that homeownership is an even more important factor of wealth depending on the ease of access to financing, which leads to the assumption that when rates are high households are lower access to homeownership, with the opposite effect valid as well. In that sense, when tackling homeownership, it is important to know when the house was acquired by the household. This would be very relevant to understand in what way the factor homeownership impacted the accrued capital gains in the household wealth composition and if the consumption out of the asset can be smooth over the lifecycle. So given the Portuguese rate environment, the effect of Euro convergence was the

largest among Southern European countries, which underlines that financing was available at unprecedented rates and further incentivized homeownership.

Age Factor

Going on further with the next factors having an impact on the investment decision of the private person, we believe Age and Gender are crucial elements.

Figure 8 in the Wealth Factor section indicates decisively that Portuguese investor is one of the most risk-averse countries in Europe. According to the wider consensus, risk aversion has a positive correlation with age, meaning that with increasing age, the individual will exhibit higher levels of risk aversion (Brooks 2018). Some researchers, however, argue that risk aversion declines with age, despite the negative effect diminishing over time. Brooks (2018) adds that as risk aversion increases until reaching a certain age, whereafter risk aversion decreases again, assuming that a senior individual having accumulated sufficient wealth over their lifetime, can invest in riskier assets. Once the individual has reached retirement age, the risk of private bankruptcy has been averted and the need for financial stability has been fulfilled, the opportunity of assembling more wealth appears more attractive than sustaining these levels of wealth (Jr. und Chow 1992).

Looking at Figure 27 we can deduce that in 2021, Italy had the largest share of the European elderly population, more precisely, 23.5% of the total population was aged 65 years and older, followed by Finland, Greece, and Portugal, taking the fourth spot. On the other side of the distribution, Luxembourg and Turkey registered the lowest percentage of elderly people with 14.6% and 9.5%, respectively. (Figure 27)

When looking at Figures 16 and 19 we can see a similarity in the age structure of Italian and Portuguese citizens. The percentage of up to 14-year-olds has experienced a downfall of around 2%, whereas the most senior age group, citizens who are aged 65 and older, has risen,

indicating a remarkably high share of the elderly population. Meanwhile, we can also identify a decline in the middle age group, 15- to 64-year-olds.

Comparing these two Southern European countries with Germany, we can recognize significant differences. One major point is that in contrast to the other two countries the percentage of the youngest age group is rising in Germany. Another point is that the age group of citizens aged 65 and above has only risen by 1% and is still lower than the senior age group in Portugal and Italy. This goes along with the higher fertility rate in Germany, with a rate of 1.53. (Figure 25) When exploring the fertility rate in Europe, Monaco is leading with a high rate of 2.09 followed by Turkey, Moldavia, and France. An important reason why Germany has a higher rate of the middle-aged group can be attributed to the higher German immigration rate, which was the second highest in Europe in 2021.

While the difference in fertility rate between Luxembourg and Portugal does not vary significantly, 1.39 and 1.37 respectively, the reason for the “younger” society in Luxembourg is the high share of ex-pats working in Luxembourg, given the higher minimum wage and lower tax brackets, making the country very attractive for location-flexible professionals.

An interesting fact is that the Portuguese population makes up the largest foreign community in Luxembourg with 14.50%. (Luxembourg Public 2022) The reason for the latter dates to the 1960s, when the Grand Duchy welcomed Portuguese citizens, who had fled the country’s dictatorship. Ten years later a bilateral agreement of employment was signed to avoid illegal immigration and incentivize employment (Luxembourg Public 2022). According to statistics, Luxembourg is the country with the highest share of workers with foreign nationalities in the EU at 47.29%, followed by Austria at 16.51% and Estonia at 15.01%. Portugal is below the European average of 8.1% with 5.73%. (O'Neill 2022) As a more prosperous country, Luxembourg allows Portuguese professionals to accumulate wealth before returning to their

home country Luxembourg has an almost 4x higher GDP with above 120.000 € compared to Portugal with approximately 25.000€, as illustrated in Figure 5. This explains, to a limited degree, the decline in the middle-aged group within our demographic age structure and the higher share of 65+ old individuals. It can be argued that these citizens return once having reached a sufficient level of wealth to retire.

Taking the US as an outside example, we can identify several differences in comparison to European countries. Looking at Figure 21 we can see that people in the US connect that the riskier the asset is the higher their expected return will be. US citizens are perceived as more risk tolerant compared to Europeans. To investigate this assumption, we will explore the U.S. age structure.

First, the US is composed of a lower senior age group compared to Europe with an average of 17.04%, in contrast to the average European share of 21.13%. Both, however, register a decline in the youngest age bracket, while in the U.S. the percentage is still significantly higher. By 2011 almost 5% more younger inhabitants were in the U.S. than in Europe. The medium age bracket, inhabitants between 15 and 64 years, is as well declining but the gap between both cases is low.

Taking into account the Age factor, we have a better understanding of the results depicted in Figure 8. The US is seen as a very risk-tolerant country which can be explained by the lower senior age bracket and the higher medium age bracket. Portugal, however, as aforementioned, is an aging society which indicates an explanation for its high-risk aversion indicated in Figure 8 on the very right side of the graph. While researchers have not reached an agreement on the relationship between risk aversion and age, it can generally be said that older investors are more risk-averse. Concluding, we can state that age indeed is a key factor to understand the risk aversion of a country and we can understand a positive correlation between age and risk behavior.

Gender Factor

Additionally, gender plays an important role in studying financial risk behavior and is seen as more risk tolerant than women. (Marinelli, Mazzoli und Palmucci 2016) In this part, we will explore why Portugal is a risk-averse country regarding to gender.

Based on a variety of academic literature, it can be assumed that women are more risk-averse than men (Sapienza, Zingales and Maestripieri 2009) Hence when it comes to investment decisions, we can expect behavior in line with overall research. According to Marinelli, Mazzoli, and Palmucci men are less risk-averse than women. (Marinelli, Mazzoli und Palmucci 2016) For this study, data from over 2300 clients of an Italian bank have been gathered to analyze the gender factor. The survey assembled and evaluated data about investment behaviors, and economic and financial states joined by socio-demographic variables.

When describing stereotypical men, adjectives such as autonomous, aggressive, self-informed, self-confident, and speculation-driven are used. Women tend to ask for professional advice when it comes to financial questions, are less confident, and are less aggressive. This study also shows that men hold riskier assets in their portfolios, trade more frequently and choose single stocks over a well-diversified portfolio in comparison to women. (Marinelli, Mazzoli und Palmucci 2016)

The graph in Figure 22 illustrates the development of the share of males and females over the last 150 years in Portugal. The female population's share has always been larger, while around the 1960s the gap starts widening, resulting in an even larger gap as we enter the 21st century. Luxembourg demonstrates, unlike Portugal, a higher share of the male population, indicating a possibly more risk-tolerant population. While Germany reports a similar

development as in Portugal, with a higher share of the female population, the gap is not as wide.

Looking at Figure 28, we can notice that in most European countries the share of the female population is larger. Portugal is third in line, after Latvia and Lithuania with 112 women per 100 men. There are only a few countries where this is not the case, such as Malta, Slovenia, or Luxembourg.

The research conducted by Gusio, Sapienza, and Zingales in 2018, which investigated the impact of the financial crisis on Italian investors through the analysis of Italian banking client data, offers us further insights into the gender factor. (Guiso, Sapienza und Zingales 2018) The survey collected data from 1686 Italian customers of banks given a specific set of criteria, such as having at least 10,000 € in their bank account by the end of 2006. The financial crisis as argued had a strong impact on the decision-making process of investors by evoking traumatic memory building. Those particularly affected had to face various socio-economic difficulties during that time and are now more cautious when it comes to investing. Especially lower socioeconomic groups have endured challenging times and therefore are turned to be more risk averse.

Taking the previously mentioned arguments into account, gender has an enormous effect on a person’s investment behavior. As seen in Figure 8, Portugal is assumed as a highly risk-averse country. Researchers claim women are more risk averse due to several elements, such as having weaker characteristics on average, being described as less aggressive and less confident, and being rather dependent on experts' advice. (Marinelli, Mazzoli und Palmucci 2016) By looking into the women-men ratio, we can identify Portugal as a Country with more females. Hence, an indicator as to why the country is assumed to be a more risk-averse one.

Education Factor

Given the list of factors analyzed above, we will proceed to the factor of the individual's level of education. There is a considerable amount of research examining the effect that education has on risk aversion, of which different conclusions are reached.

Jung (2015) evaluates the effect of the 1973 education reform on the British population, concluding that the relationship between risk aversion and education changes depending on age. In the early years of education, the relationship is positive, whereas an extra year of education makes an investor more risk-averse. In more adult education the relationship is negative, where an extra year of education comes associated with a decrease in risk aversion (Jung 2015).

E. Black, et al. (2015) finds a negative correlation between risk aversion and education for Swedish men. This conclusion is reached by looking at the impact of the Swedish compulsory education reform in the 50s and 60s (E. Black, et al. 2015).

Hryshko et al. (2011) analyzed the US population through the Panel Study of Income Dynamics data and pinpointed a negative relationship between an investor's parents' education and risk aversion. Following Hryshko et al (2011), an extra year of parents' education leads to lower risk aversion for the investor (Hryshko, Luengo-Prado and E. Sørensen 2011).

Finally, "O Perfil do Investidor Português", conducted by CMVM (2009), focuses on the Portuguese population. CMVM finds that education has a positive impact on one's propensity to invest. Therefore, having a negative relationship with one's risk aversion, i.e., the more educated, the less risk averse. The study also claims that education increases one's tendency to invest in more risky and complex products (CMVM 2009).

Group Part

Let us now focus on the percentage of the population with primary education, the lowest education level attainable, as the highest education level by country. As exposed in Figure 29, Portugal is ranked first (44.6%), followed by Italy (37.43%) and Spain (37.13%). The Czech Republic ranked last (5.95%), Lithuania second to last (6.36%) and Poland third to last (6.76%). The US ranked fifth to last (8.27%) and the OECD average (19.56%) is in the upper half of the countries in the data set.

Following the past literature exposed, we can fairly assume a negative correlation between education and risk aversion (CMVM 2009). So, looking at the share of a country's population that has primary education as its highest educational level, Portugal should have a significantly higher level of risk aversion, when compared with the OECD member countries and their education levels.

Moving further to the same statistic, but regarding secondary education, as exposed in Figure 30, the Czech Republic ranked first (69.2%), followed by Slovakia (65.68%) Poland (60.37%), and Hungary (58.37%). On the bottom of the figure, Luxembourg ranked last (22.84%), Spain ranked second to last (23.18%), Portugal ranked third to last (27.23%) and the UK ranked fourth to last (32.26%). The US and the OECD average percentages are ranked in the bottom 50% of the exposed countries with 41.67% and 41.42%, respectively.

Having into account this latter comparison, and considering secondary education a low level of education, Portugal should be above the OECD average when looking at the expected risk aversion level.

Let us now take a look at the same country comparison, but focusing on tertiary education, the highest education attainable, as exposed in Figure 31. On the top, there is Luxembourg (51.31%), the US (50.06%), Ireland (49.94%), and the UK (49.39%). On the bottom of the

percentages, there is Italy ranked last (19.99%), the Czech Republic second to last (24.85%), Slovakia third to last (26.77%) and Hungary fourth to last (27.2%). Portugal comes in fifth to last with 28.16% of the population with tertiary education as the highest education attained. The OECD average is 39.02%.

After analyzing tertiary education levels in the US and the European OECD countries, following the CMVM (2009) study, Portugal is expected to have an above OECD risk aversion average.

When summarizing the findings of cross-country comparisons, Portugal should be situated on the upper tail of the distribution of its peers in terms of risk aversion. When looking at Figure 8, Portugal is ranked as the highest risk-averse country, which cannot be fully justified by its education levels when compared to the other countries in the figure, but potentially indicates the weight of education on the registered high levels of risk aversion.

Financial Literacy Factor

Let us focus now on financial literacy. As a very brief summary, past literature tends to find the same conclusion. An increase in financial literacy is a decrease in risk aversion (Mudzingiri 2021) (Maya Damayanti and Wicaksana 2021) (Awais, et al. 2016) (Stoian, et al. 2021) (Gustafsson and Omark 2015).

The coherence between findings gains a larger relevance given the variety of samples used for the studies. In Europe, Gustafsson and Omark (2015) conducted their research using a Swedish student sample, while Stoian, et al. (2021) conducted their research on young adults in Romania. Outside of Europe, Mudzingiri (2021), Maya Damayanti and Wicaksana (2021), and Awais, et al. (2016) conducted their studies in South Africa, Indonesia, and Pakistan,

respectively. All found the same negative relationship between financial literacy and risk aversion.

Let us take a look at the level of financial knowledge of the general public by euro area country in Figure 32. As a brief explanation of the figure, financial literacy is quantified through questions evaluating simple comprehension in financial decision-making, regarding concepts such as interest compounding, inflation, interest rates, and risk diversification. The values presented are the percentage of respondents who knew the answer to three or more questions out of the five inquired.

When analyzing the figure, Germany is ranked in first place, followed by the Netherlands, with percentages between 60% and 70%. Right after, Finland is ranked in third place with a percentage still above 60%. Looking at the opposite side of the data, Portugal is ranked in last place. Portugal is the only country with a value below 30%. Above Portugal is Cyprus, Italy and then Lithuania, all three with a percentage between 30% and 40%. All the other euro area Member States have a percentage between 40% and 60%.

The “Financial Literacy for Investors in the Securities Market in Portugal” study conducted by the European Commission in 2021 offers further insights into the financial knowledge of the Portuguese population. (EU 2021) The survey covered various topics such as inflation and interest rates, their effect on people’s spending power and savings accounts, and the concept of compounded interest, among others. The percentage of correct answers reflects the significantly low level of financial literacy among the Portuguese population. In fact, 30% of the respondents who said that did not invest at all justified it with the answer “I do not have enough knowledge on the topic”.

When looking at the cross-country data, taking into account previous findings, Portugal should be ranked in a high position regarding its risk aversion level. When accounting solely for the factor of financial literacy and looking solely at the Portuguese position, the latter underlines the results from Figure 8. However, other countries that perform similarly to Portugal in financial literacy have less risk-averse profiles. In conclusion, the Portuguese risk aversion profile is supported by its financial literacy level, but not fully justified as there is no full coherence between the two figures, which might be explained with the help of other factors or Portugal-specific cultural structures.

Income Factor

Following the financial literacy factor, it will now be analyzed the impact of income on the risk aversion of Portuguese investors. It can be argued that the risk aversion of each individual is deeply affected by the low level of salaries in Portugal when compared with its European peers (Hartog, Pereira T. and Vieira C. A. 2002). The comparison of Portuguese and European wages emphasizes two aspects of interest: first, the influence of low labor costs on Portuguese manufacturing competitiveness, and second, the effects of pay disparities due to the present migrant influx. These issues are, in reality, very important components of the current and, most importantly, upcoming economic and social issues in Portugal (Hartog, Pereira T. and Vieira C. A. 2002).

The ongoing economic integration in Europe and the gradual removal of trade barriers like tariffs and other trade restrictions between members of the Common Market and EFTA, along with rising wage pressure in most industrialized nations gave international wage comparisons a very particular acuity when viewed in the context of relative production costs. The parallels made from this point of view have been the most common ones, especially considering this reality (Pintado 1967). Because the cost of labor is related to the task completed during that

working hour or dependent on labor productivity, it cannot be determined in absolute terms by the basic compensation given for the provision of an hour of work. The organization of tasks within the production unit, or the rationalization of work, the equipment per worker or level of mechanization of production, and the competence or professional qualification of the worker are the elements that have the greatest impact on labor productivity. It is well known that Portugal's low salaries are correlated with much lower production levels per worker (Pintado 1967). Labor-intensive industries have the advantage of providing a significant number of new employments, which helps to secure the workforce exiting the primary sector or annual increases to the workforce and keeps them from seeking outlets in emigration. As a shift occurs from a stage of growth where production techniques with a reduced capital intensity predominate to more intensive production techniques occur, it is required to ensure the subsequent expansion of industries with a greater intensity of capital The national industry must ensure that the wages it pays are high enough to offset the benefits of emigration after accounting for cost-of-living variations, travel expenses, and the costs of expatriation (Pintado 1967).

According to the above information, it will be analyzed the median and mean income in Portugal compared to other European countries. Additionally, it will also be analyzed the wage quintile share proportion, the Gini coefficient, the discretionary wage, the median disposable wage accounting for social transfers, and the median disposable income accounting for social transfers without accounting for pensions. The median and mean data are provided by a study developed by Eurostat named “Living conditions in Europe – income distribution and income inequality” in 2022. The financial data for the article is presented using purchasing power standards (PPS). Purchasing power standards is a metric that accounts for regional variations in pricing levels. Additionally, averages of national statistics

for EU country members weighted by population are used to derive data for the EU (Living conditions in Europe - income distribution and income inequality 2022).

From Figure 33, Romania has the lowest median annual income (PPS 7724 per person) while Luxembourg has the highest (PPS 28675 per person) and it varies greatly among the EU Member States. European's annual disposable income median in 2020 was PPS 17871 according to Figure 33 and Portugal presented a number lower than this average with a value of PPS 12589. EU members from the west and north, including those from EFTA, recorded the highest levels of median annual disposable income. At least one-third of the entire income went to the wealthy.

To have a better understanding of the income distribution between countries, we will analyze the income distribution within each country using quintiles, not only that, but we will also look at the disparity between ages. To further show the economic disparities between countries it is calculated the income quintile share ratio, which is computed as the ratio between the share of income received by the top quintile and the share of income obtained by the bottom quintile. High values for this ratio indicate that there is a significant asymmetry in the income distribution between upper- and lower-income groups.

Taking into account Figure 34, in almost all EU Member States, the top or fifth quintile, which comprises 20% of the population, is responsible for at least one-third of total income. Contrarily, the 20% of the population with the lowest income (the bottom or first quintile) accounts for less than a tenth of the total income in the vast majority of EU Member States.

The main observations from this data can be that the EU countries from the Nordics and the western such as Luxembourg, Germany, and Austria have a median disposable income higher

than average. In contrast, most of the southern and eastern Member States had lower median disposable incomes which include Portugal.

Linking the above information with risk aversion, Portugal should have a higher risk aversion than the average European.

According to Figure 37, the EU's revenue quintile distribution ratio stood at 4.9 in 2020. This illustrates that 20% of people with the highest incomes received nearly five times as much money as the bottom 20% of earners in terms of average income. The income quintile share ratio varied widely between EU Member States, from a low of 3.0% in Slovakia to a high of 8.0% in Bulgaria. Based on the same metric, older individuals in the EU (those 65 years and over) had less income disparity than the overall population, with a 4.2% income quintile share ratio in 2020. In comparison to the general population, older people saw a more equitable distribution of income across most EU Member States. The only exceptions were Hungary (4.2% and 4.9% for the entire population and older population, respectively), Portugal (5.0%), and Croatia (4.6%), with the same proportions for the two of them, the total population and older population.

The Gini coefficient reveals how far a country is from a state of evenly distributed incomes. A Gini value of 0 means that the population's income is distributed equally, while a Gini value of 100% indicates that only one individual in the nation receives all the nation's income. The Gini coefficient is referred to as income disparity in the following analysis. Given Figure 36, it is possible to analyze that the countries with less evenly distributed income in the EU in 2020 are Lithuania (35.1%) and Bulgaria (40.0%). In contrast, Slovakia (20.9%) and Slovenia (23.5%) had the most evenly distributed income. According to the Gini coefficient, Portugal in this case presented a Gini coefficient of 32.8%, greater than the average in Europe (30%).

Group Part

The Gini coefficient displayed in Figure 38 is the equivalized disposable income per resident taking into account social transfers as well, which cover assistance provided by federal, state, or local institutional bodies and include pensions, unemployment benefits, sickness and invalidity payments, housing allowances, social aid, and tax breaks. Social payments decreased economic disparity among EU citizens in 2020. In this case, Portugal has a Gini coefficient including pensions of 53%, which remains above the European average of 50.5%.

How welfare systems, including pensions and other social transfers, affect income inequality can be demonstrated by comparing Gini coefficients before and after social transfers to provide a quantitative assessment of their redistributive effects. The Gini coefficient for median equivalized disposable income in the EU in 2020 was 50.5% before all social transfers, but it fell to 30.0% after social transfers. The impact of pensions and other social transfers on income inequality was particularly notable in Germany, Portugal, France, and Luxembourg, where the Gini coefficient decreased by between 23.2 and 28.4 percentage points, as well as in Sweden, where the coefficient decreased by 29.1 percentage points as it can be seen on Figure 38. The fact that the Gini coefficient decreases so much after taking into account social transfers is good given that it states a more evenly distribution of income throughout the population in a specific country. Latvia registered among EU Member States the lowest effect of pensions and other social transfers on income inequality, 12.3 percentage points.

Comparing Figures 36 and 38 it can be stated that Portugal is greater than the European Gini coefficient average which means that in comparison with other European countries, Portuguese income is less evenly distributed.

It is important to differentiate between annual income and discretionary income given that the second one is relativity income that is left over after taxes, social security fees, and the cost of

subsistence have been deducted. Looking at Figure 34 is possible to highlight that the countries where equivalized disposable income is best distributed are: Slovakia (31.2%), Czechia (34.5%), and Slovenia (33.6%). While the countries where it is worst distributed are Bulgaria (48%), Lithuania (45%), and Portugal (42%). Portugal's distribution is worse than that of its European counterparts when compared to the EU since, in Portugal, the top 20% of earners collected 42% of disposable income in 2020 compared to 38.1% in the EU as a whole.

For the bottom quintile, the countries that are better distributed are Iceland, Finland, and Slovakia all around 9.6%, while the worst distributed are Bulgaria, Romania, and Latvia with shares below 7%. Portugal in this case is in line with European values of 8%

Is important to look into median disposable income taking into account social transfers because this represents a significant source of income, particularly to those individuals at the bottom end of the income spectrum. The contribution of social transfers to the median equivalized disposable income is depicted in Figure 35. As a result, it is feasible to emphasize that each resident's median disposable income in the EU was PPS 4983. Distinctions between transfers for pensions and other social transfers—such as social security benefits and social assistance—that aim to reduce or lessen the risk of poverty are created in this figure. In 2020, social transfers other than pensions raised median disposable income in the EU by PPS 1382 per resident and all social payments, including pensions, by PPS 4983 per resident. In 2020, social transfers' proportion to the median disposable income varied greatly between EU Member States. The largest transfers were observed in Luxembourg, where social benefits (including pensions) raised the average resident's median disposable income by PPS 10167. Additionally, Austria was also a top performer with a value of PPS 6702. On the opposite side, we have Bulgaria with approximately PPS 2100 and Romania with approximately PPS

2200. Portugal is below the EU average given that with all social transfers including pensions, a value of approximately PPS 3500 was obtained.

Considering Figure 35, if pensions are taken out of the analysis, in 2020, a slightly different trend emerged, with social benefits other than pensions contributing more to the median disposable income in Luxembourg (PPS 2691) and Belgium than PPS 2000 per person (PPS 2541). Comparing the amount of money for social payments between EU Member States, social payments with pensions included in 2020 was only around 1.7 times as large in Estonia as social transfers without pensions. However, in Portugal and Greece, the ratio exhibited high levels, where transfers that included pensions were 8.3 and 5.7 times higher than transfers that did not. Because it does not take into account the distribution of income within the population and thus does not adequately reflect economic inequality, median disposable income still falls short of giving a complete picture, even after accounting for the potential distortion of aggregate metrics like GDP per capita.

According to a study developed by Eurostat in 2022 named “Out now: First 2022 data on minimum wages in the EU” by the start of 2022, 21 of the 27 EU member states besides Denmark, Italy, Cyprus, Austria, Finland, and Sweden have national minimum salaries. As it is possible to analyze in Figure 39, before taxes and social security contributions are taken into account, the minimum wages in 13 EU member states in the east and south were less than €1000 per month in January 2022: The worst ones being Bulgaria (€332), Latvia (€500) and Romania (€515). Portugal can also be found within this group with a minimum wage of €823. The minimum wage was higher than €1500 per month in the remaining six EU countries: France ($1603), Germany ($1621), Belgium ($1 658), the Netherlands ($1725), Ireland ($1775), and Luxembourg ($2257). In Slovenia, the minimum monthly wage was €1074,

while in Spain, it was €1126. In contrast, the federal minimum wage in the United States was €1110 in January 2022.

The highest minimum wage among the 21 Member States analyzed was over 7 times greater than the lowest. However, when accounting for price level variations, the variances are far lower. Minimum salaries in the Member States with lower price levels appreciate and gain in competitiveness relative to those in the Member States with higher price levels when expressed in purchasing power standards (PPS). The lowest minimum wage was 604 PPS per month in Bulgaria, and the highest ranged from 1707 PPS per month in Luxembourg after accounting for price differences. Given this, two main groups can be distinguished, as it is possible to highlight according to Figure 40: Group 1's national minimum salary is over PPS 1000, whereas group 2's is less than PPS 1000. Group 1 includes Luxembourg and the other nations: Germany, the Netherlands, Belgium, France, Ireland, Slovenia, Spain, Poland, and Lithuania. Group 2 consists of Bulgaria, Czechia, Estonia, Latvia, Portugal, Malta, Greece, Croatia, and Hungary. Portugal’s value is roughly PPS 910, to be more precise. The national minimum earnings for this group varied from PPS 604 in Bulgaria to PPS 949 in Romania. For purposes of comparison, the United States falls into group 4 with a PPS of 920.

Comparing Figures 39 and 40, before taxes and social security contributions are considered and when accounting for price level variations, respectively, it is possible to draw some conclusions. Regarding Figure 39, Portugal displays a minimum wage lower than its European peers, and this goes in line with the theory that, the lower the income level, the higher the risk aversion of an individual. The same trend is followed when price variations are examined given that Portugal is also below the average. Even though Portugal is below average on these two parameters, some of its European peers present even lower numbers.

Therefore, according to this, even though Portugal should present a high-risk aversion than average, it should not be the most risk-averse as was analyzed in Figure 8.

Having in mind Figure 41 from a study developed by Eurostat in 2022 named Mean and median income by age and sex – EU-SILC and ECHP surveys, it is possible to highlight that income in Portugal for the year 2021 has a value of €13113, which is low in comparison to countries such as Ireland (€31832) and Spain (€18103), (Mean and median income by age and sex - EU-SILC and ECHP surveys 2022). Concerning risk aversion, it is possible to highlight that Portugal presents the highest level of risk aversion in comparison to other European peers. Even though countries such as Poland present an average salary inferior to Portugal of €9161, this country still presents a lower level of risk aversion, as can be seen in Figure 8. According to the theory, the higher the income, the lower is going to be individual's risk aversion (Shaw L. 1996). This is not proved when we compare the mean income of countries such as Portugal and Poland.

After analyzing the annual income, the income quintile share proportion, the Gini coefficient, the discretionary wage, the median disposable wage accounting for social transfers, and the median disposable income accounting for social transfers without accounting for pensions, it was possible to reach a connection between Portuguese individuals' risk aversion and income. The conclusion driven is that, according to this distinct income analysis, Portugal is close to the EU average for most of the income data sets. On some parameters Portugal can be placed slightly above or below the mean, however, in all those data sets, many countries present worst values. Consequently, followed by this and the findings presented by Shaw L. (1996), the Portuguese's risk aversion should be higher than the European average and close to it, but that is not the case when we look at Figure 8 since the Portuguese risk aversion presented is 3.9 while it should be around 3.6 as it was mentioned previously on the wealth factor. The

The discrepancy can be possibly explained by an unreasonable Portuguese individuals' attitude towards risk aversion, which makes them more risk averse than their European peers. To understand better all the factors described up to this point, a regression will be developed in this consulting project.

Health Factor

Understanding the impact that health can have on the human capital and the risk aversion of an investor, we decided to compare Portuguese health with other European countries. We will examine its weight on the Portuguese risk aversion. The data that it will be compared is the life expectancy, the % of adults who report being in good health, and how much % of the GDP the government of each country spends on health.

Figure 43 depicts the perception of each country's population in the following scenario: if a person is healthy but judges himself/herself as not healthy or believes will have health issues in the future despite good health conditions. The results of the latter might reveal a component that assists in explaining an unreasonable risk aversion. Thus, the observed population is more likely to have a more conservative mindset that leads to cautious saving behavior, where financial wealth is set aside to counterbalance potential health-related expenses. As these events arise under great uncertainty and timing appears difficult, the conservative individual will hold the financial wealth under the most liquid format, the bank account, and will not undertake the investment in financial markets.

The intention of Figure 44 is to see how much each country invests in health. If the country's government supports the national healthcare system and the country has an efficient and reliable healthcare service, the individual's propensity to save for future medical expenses is lowered, as the individual is assured that no additional expenses might arise. On the other hand, if the government does not support the countries' healthcare program to a sufficient

extent, each investor will tend to be more risk averse as their propensity to save for future healthcare expenses rises as they will need to go to private consultations and/or buy the drugs with their financial assets. The second scenario will lead to the development of individuals with an amplified saving mentality and higher risk aversion.

According to Figure 42, the countries with longer life expectancy are Norway (83.2), Switzerland (83.1), Iceland (83), and Malta (82.6). The countries with lower life expectancy are Georgia (73.1), Bulgaria (73.6), and Azerbaijan (73.12). Portugal (81) is in the upper middle.

Following Chudasama's study (2020), it is possible to correlate good health with longevity, so the longer people live the less risk-averse they should be (Chudasama, et al. 2020).

Figure 43, contains the self-reported health condition of European people by countries and low/high-income population, conducted by the European Union Statistics. The countries with a population that reported feeling healthier are Greece (78), Italy (71), Ireland (70), and Spain (70). The countries that report feeling less healthy are Portugal (38), Estonia (37), Lithuania (24), and Latvia (23). Determinants for the individual perception of good health are healthy habits, a healthy diet, and in general good health (bringing in the last point the direct correlation between longevity and good health). The perception individuals have about their health in Portugal is one of the worst in the EU. When looking at Figure 43, Portuguese investors should be one of the most risk-averse investors, still having some countries with higher risk aversion than them, such as Latvia, but that is not the case as seen in Figure 8.

Figure 44 is somehow related to the cushion hypothesis introduced in the Wealth factor section, where the expenditure on health to GDP is represented. The countries with the highest ratio are the United States (15.9 %), Germany (10.9%), and France (10.3%), the

countries with the lowest ratio are Turkey (3.6%), Poland (4.7%), and Latvia (4.7%). Portugal spends (6.8%) just slightly below the European average (7.3%). The main conclusion and most valuable information from Figure 44 are to know if people can feel supported by the State if they get sick. We can conclude that expenditure on health to GDP is not a determinant factor for Portuguese risk aversion.

The conclusion on the health factor is that longevity is correlated with good health. The longer the life expectancy of a country the better its population's health should be. In the Portuguese case, the most relevant factor related to health is the self-perception of health, which is directly correlated with the risk aversion of the investors. Portuguese tend to have a low self-health perception, which inclines them to be more risk-averse.

Regression Analysis

Regression

Risk propensity will be analyzed by considering factors such as gender, age, monthly income, education, financial literacy, and wealth. To do the regression, data was collected through a survey to understand the risk profile of Portuguese investors. These surveys were distributed among the population through online platforms, word of mouth, and personal interviews on the street. Its results help depict a clearer perspective on how Portuguese individuals think about investments. The regression aims to estimate the level of risk propensity that interviewed individuals have, based on the information gathered and the different factors that are examined in the survey that were described in detail above. However, it is required to keep in mind that it is not possible to explain Portuguese individuals' risk propensity to invest only based on the factors presented given that they are only indicators. Hereby, this information enables us to have a better understanding regarding which factors affect the most

the Portuguese individuals when they decide whether to allocate a larger share in equities or not to invest at all and where we need to place our emphasis to improve the Portuguese people's risk propensity.

Finding if variables influence a specific topic of interest can be done using regression analysis. It is possible to establish which factors are most important, which ones can be ignored, and how these factors interact when a regression is performed. When the term regression analysis is mentioned, it is also required to mention the terms dependent and independent variables and it is necessary to understand those to comprehend the impact of a regression analysis. The dependent variable can be described as the primary element that is being attempted to comprehend or anticipate. Furthermore, the variables that are assumed to affect the dependent variable are known as independent variables. In this thesis-specific case, an individual's risk propensity is our dependent variable, while gender, age, monthly income, education, wealth, and financial literacy are our independent ones.

Regarding how to proceed when doing a regression analysis, it is required to specify a dependent variable that is believed to be influenced by one or more independent factors. Only after this step is it possible to start thinking about conducting a regression analysis. The next stage of the analysis is to create an extensive data set to work with. A great technique to create this dataset is to send surveys to a target audience. That is what we did by elaborating a questionnaire with twenty-three questions on an online form builder, the platform Tally. In this questionnaire, questions covering each of the independent variables were included. The main aim of the study was to evaluate the risk propensity of Portuguese individuals when investing as well as any information about the independent variables that is conceivable. For example, if the main focus was to see if age is connected with risk propensity, data points would have to start being plotted on a chart to investigate whether or not there is a link

between these two variables. The first step to determine whether the independent and dependent variables are correlated is to plot the data. The y-axis should represent the dependent variable (in this case, risk propensity), and the x-axis should represent the independent variable, age, as we can see in Figure 45. After plotting the data, is possible to see if there is a correlation between the two variables.

Also, it is important to analyze the extent to which risk propensity is influenced by age. For that, a line has to be drawn through the center of each of the chart's data points to start addressing this question. A common tool for data analysis like Excel was the one used in this thesis to execute the regression and it can also be used to calculate this line, which is known as the regression line. This line displays the relationship between the dependent variable and the independent variable as can be seen in the blue line in Figure 45.

Since independent variables are assumed not to be perfectly accurate predictors of dependent variables, regression lines always take an error term into account. This makes sense when considering how age affects risk propensity; there are other factors besides age that promote a shift in risk propensity. The regression line is only an educated guess based on the data collected. Then, the less confident the regression line is, the greater must be the error term.

To determine the extent to which specific independent variables are impacting dependent variables, regression analysis is a useful statistical technique that is used in many studies. There are countless circumstances in which a regression analysis could be used to produce beneficial insights, and this is the reason why we chose to use this tool in our thesis to understand what makes an individual more or less prone to be exposed to risk. This tool allows us to affirm or not if gender, age, gross monthly income, education, wealth, and financial literacy affect Portuguese individuals' risk propensity, which was our primary assumption when we began to write this paper.

Group Part

Survey

A questionnaire was elaborated to have data for this regression, which was named "Questionário Tese Final – Perfil Investidor Português", which translates to the final thesis questionnaire - profile of the Portuguese investor. Overall, the questionnaire had twenty-three questions, of which interviewed individuals had to reply to multiple choice questions, checkboxes, and small answer questions. Not all the questions were linked with the variables used in the regression given that we want to be able to describe the Portuguese investor and how this one thinks and acts when it comes to investing. Furthermore, five questions were linked with the independent variables chosen for this regression. Concerning gender, the individuals interviewed were facing a multiple-choice question, when it comes to age, individuals could enter a specific number. Moreover, regarding income, Portuguese people had to choose from six options such as <706, 707-1100, 1101-1400, 1401-1800, 1801-2200, and >2201 according to the gross monthly income that they receive. These six options have been organized having in mind that the minimum wage in Portugal is 705, therefore, five other ranges were included to analyze further the disparities in salaries in Portugal. Concerning education, respondents had the option to choose from six options which were primary education (fourth grade), basic education (ninth grade), secondary education (twelfth grade), bachelor's degree, master's degree, and doctoral degree. As regards financial literacy, a question was made to the respondents linked with the type of investments that they knew from a list composed of nine different types of investments. These types of investments were stocks, bonds, real estate, cryptocurrencies, sustainable securities funds, ETFs, investment funds, savings, and retirement plans, and bank deposits. An assumption was made in the analysis of this questionnaire where individuals are expected to be able to know how to use these types of investments from the moment they affirm that they know it. A question was also made to distinguish between the different levels of our dependent variable, risk

propensity. The interviewees were asked how they feel when it comes to completing risky investments according to a level of 0 to 5 where 0 corresponded to not confident and 5 corresponded to perfectly confident.

Besides the questions linked with the variables, the questionnaire also had questions that allowed us to understand better the profile of Portuguese investors. These questions included themes such as if the respondent have ever invested and if not, what was the reason of this choice; what was the main source of information when it comes to investments; what would make the interviewee invest more; if the interviewee was an investor, at what age did he started investing and what factors made him start to invest; if in case the interviewee was an investor, there was a change in its aversion to risk since he started investing; if there was a change in the investment strategy used by the respondent in case he was an investor; what type of investments the respondent concluded from a list of nine options and which type of investment was his favorite; how much was the maximum that the respondent was willing to lose in an investment in case he invested; in case the interviewee was an investor, if the strategy was based on national, international or both markets; if the respondent had ever inherited money and if he would consider to give this heritage to his kids, save it, invest it or use it to pay his mortgage; in case the respondent was an investor, how did he accomplish his investments, if throughout his lifecycle he would prefer to start investing more on securities with more or less risk.

Organization of the data

In terms of the organization of the data, as explained before, individuals had to choose if they were female or male, therefore, a dummy variable was created where 1 represented a male and 0 represented a female. Additionally, in the age variable, respondents had to insert a specific number given that it was desired to have a better understanding regarding the specific change in risk propensity that resulted from an increase of one year in age. Concerning gross

monthly income, we categorized it according to different levels. Level one corresponds to a wage lower than 706; level two corresponds to an income between 707-1100; level three is linked with a wage from 1101 to1400; level 4 is correlated with a salary from 1401 to 1800; level 5 corresponds to a wage from 1801 to 2200 and level 6 is linked with an income higher than 2201. It is equally important to refer that the education variable followed the same pattern, given that six levels were attributed according to the level of education of each respondent. More precisely, level one was attributed to a primary degree of education, level two to a basic degree, level three to a secondary degree, level four to a bachelor's degree, level five to a master's degree, and level 6 to a doctoral degree. Moreover, the financial knowledge variable was calculated as a percentage (ratio) of how many financial instruments each interviewee knew and understood from a list composed of nine different types of instruments, as referred to previously. The variable wealth was turned into a dummy variable where a level of one was attributed if the individual was wealthy and a level of 0 was attributed when the individual was not considered wealthy. An individual was considered wealthy having in mind distinct measures such as if his age was between eighteen and twenty-one and he presented a gross monthly income superior to 1401 if his age was between twenty-two and twenty-nine and his salary was superior to 1801 and if his age was higher than thirty and his income was greater than 2201.

The Sample and Limitations

To characterize the sample of the questionnaire, multiple factors need to be mentioned. Overall, the questionnaire had 262 submissions and 49% of the respondents were female while 51% were male. Regarding age, the sample was wide given that respondents' age ranged from 18 to 92. Although the range is ample, the interviewee's ages were concentrated between 18 and 22 with a representation of 32%. 22% of respondents present a secondary level of education and 46% present a bachelor's level, and only 3% present a primary degree

of education. According to Figure 46, it is also possible to highlight that the age sample distribution is left-skewed, given that the first quartile is 22 and the median of the sample is 24. These values are not an accurate representation of the Portuguese population given that the median ages in Portugal are 46.2 years[1]. It is possible to assume that education levels are biased given that there is a significant concentration of answers on the bachelor's degree, representing almost half of the sample, which is not representative of the true population statistics, as was mentioned previously in this thesis. Concerning Figure 46, the distribution of the sample is right skewed given that the first quartile corresponds to level 4 and the median of the sample also corresponds to the same level. In addition to this, 39% of the respondents had an income lower than 706, which shows the reality in Portugal where most individuals receive lower salaries in comparison to a smaller percentage of the population that receives higher salaries, which our sample illustrates given that only 17% of the respondents of the survey had a salary higher than 2201 (Lusa 2021) In geographic terms, it was hard to capture a wide sample given that most of the respondents were from the Algarve and Lisbon regions, where the monthly gross income is either too low or too high, respectively, compared to the country, therefore, it can be highlighted that it brought biases to our sample (Barlavento 2022).

The questionnaire was distributed through online platforms and word of mouth in different locations such as Marquês de Pombal in Lisbon, to make sure that the sample was the most accurate and less biased possible. Unfortunately, it is hard to have a sample that is 100% accurate, therefore, we consider that the survey presents limitations on fields such as the overall distribution of the population, more specifically in education and age. It is also important to refer that, since the questionnaire was distributed on online platforms, it might be

[1] Source: https://www.worldometers.info/world-population/portugal-population/

possible that some answers are not 100% accurate because the interviewee was not able to interpret the question correctly, for example.

Regression Output Analysis

The results of the model are presented in Figures 1 and 2. The explained variable is risk propensity, the level of risk-seeking, and varies in values from 0 to 5. Looking at the results, there is a significant number of relevant insights to withdraw from the regression.

At the same time, a comparison between our findings and CMVM findings will be made. As referred before, CMVM conducted a study regarding the probability of a Portuguese individual being an investor. In their model, the explained variable is the probability itself, while the explanatory variables are different factors, some of which are common to the ones of our model. Only in the common factors will we conduct the comparison. Regarding this study, it is very important to point out that the output is not risk propensity, so there is a significant assumption being made for the comparison to be useful. The probability of investing has a negative relationship with risk aversion. The CMVM study produced four different regression models. The one used for comparison is the first one, where the study evaluated if an investor holds at least one of the following securities: Fixed-Term Bank Deposits, Public Debt Certificates, Treasury Bills, Stocks, Savings and Retirement Funds or Plans, Bonds, Participation Units in Investment Funds, Participation Titles, Structured Products or Other Derivatives. Finally, all the used betas for comparison coming from the CMVM study are statistically significant when using any of the conventional significance levels: 1%, 2%, 5%, or 10%.

Before the analysis, it is important to bring back the expected outcome of each factor. Trusting past literature, gender, monthly income, education, financial literacy and wealth should have a positive coefficient. Only age is expected to have a negative coefficient.

Group Part

Figure 1: Regression Output

Risk Propensity

Factor	Coefficient	P-value	*Lower 95%*	*Upper 95%*
Intercept	1,460	0,0026	0,52	2,40
M / F	0,687	0,0002	0,34	1,04
Age	-0,018	0,0028	-0,03	-0,01
Income	0,031	0,6144	-0,09	0,15
Education	0,007	0,9431	-0,19	0,21
Financial Literacy	0,844	0,0158	0,16	1,53
Wealth	0,497	0,3952	-0,65	1,65

R Squared	0,1726

Figure 2: Factors' correlation

Factors' Correlation Matrix

Factor	M / F	Age	Income	Education	Financial Literacy	Wealth
M / F	1					
Age	-0,113	1				
Income	-0,065	0,561	1			
Education	-0,104	-0,166	0,169	1		
Financial Literacy	0,194	-0,044	0,138	0,262	1	
Wealth	-0,005	-0,104	0,227	0,087	0,080	1

Let us look at each of the factors. Regarding the respondent's gender, as explained before, the variable will take the value of 1 if the respondent is male and 0 if female. The coefficient found in the regression is 0.687, meaning that if the respondent is male, their risk propensity level is expected to increase by 0.687 units, on average, ceteris paribus. On the other hand, if the respondent is female, there is no increase in the risk propensity, on average, keeping everything else constant. The results point out that men, on average, ceteris paribus, have an extra 0.687 units of risk propensity when compared to women. This factor is extremely relevant as it is statistically significant at any significant level. With a p-value of approximately 0.02%, one can be 99.98% confident that the null hypothesis that the factor does not correlate with the dependent variable is false. Here, the probability of rejecting the null hypothesis when it is true is very close to zero. The 95% confidence interval just corroborates the conclusions so far, as both the lower and upper bound are positive, being

0.34 and 1.04, respectively. This is the second-largest beta found. The fact that the beta is so large shows how relevant gender is when it comes to understanding risk propensity.

After all the research made on the past literature and analysis data for countries' comparison, the expected correlation between gender and risk propensity was positive. With a very strong confidence level, the findings from the regression are in line with the expectations, as the regressed beta is positive as well. The CMVM research reveals the same results. According to their model, men are 9.6 percentage points more probable to be investors, so, more risk propensity, than women.

It is also relevant to point out that this factor only has a positive correlation with the financial literacy factor, meaning that men are expected to have higher financial literacy than women. With all the other factors the correlation is negative and smaller in absolute terms.

Before analyzing the coefficient of age that was achieved, let us recall that the factor variable varies in units of the year. The beta found in the regression is -0.018, meaning an increase of one year in age will lead to a decrease of 0.018 units in one's expected risk propensity, on average, ceteris paribus. Again, the factor is extremely relevant as it is statistically significant at any significance level. Just as in the gender factor, with a p-value of approximately 0.28%, one can be 99.72% confident that the null hypothesis that the factor does not correlate with the dependent variable is false. Here, the probability of rejecting the null hypothesis when it is true is, again, very close to zero. The 95% confidence interval corroborates the small p-value, as all the values in the interval are below zero. It is important to interpret this beta with care. In absolute terms, the age coefficient is the factor that affects risk propensity the least. At the same time, age is also the variable with the widest range of possible values. While gender, for example, varies only between 0 and 1, age varies from 18 to 92, in the used sample. This allows one to understand how the effect of age on risk propensity is just as relevant as any

other statistically significant factor. An increase of 56 years in one's age, ceteris paribus, is expected to lead to a decrease of around 1 unit in one's risk propensity, on average.

Just as before, all the research made on the past literature and data for the country's comparison made us expect a correlation between age and risk propensity that is negative. With a very strong confidence level, the findings from the regression are in line with the expectations, as the regressed beta is negative as well. CMVM's finding corroborates our findings, although not strictly. They split the age into four levels. Ignoring the first one, the older a person is, the less probable the person is to invest, meaning the more risk-averse the person is. Still, there is a positive jump in probability from the first group, ages 25 to 44, to the second group, ages 45 to 64.

Age has a negative correlation with all the other factors except income. Interestingly, this correlation is very significant, 0.561, meaning an increase in age comes associated with an increase in monthly income as well, on average, ceteris paribus. It is also relevant to see how the positive correlation between age and monthly income does not mean a positive coefficient for age, even knowing monthly income has a positive coefficient. Monthly income increases with age, monthly income increases risk propensity, but age does not increase risk propensity. Let us take a look at the income factor to better understand this effect.

Regarding the sample distribution, the sample is left skewed towards low age. The median by itself is representative of this issue, with a value of 24 years old. Although not affecting the age coefficient p-value, this distribution is important to understand the findings in other factors.

Regarding the income factor, it is important to recall that income is measured on levels from 1 to 6 and not in monetary units. The coefficient discovered from the sample is 0.031, meaning

that an increase in income from one level to the other will bring an extra 0.031 units of risk propensity, on average, ceteris paribus. On any of the conventional significance levels, 1%, 2%, 5%, or even 10%, the regressed beta is not statistically significant. With a p-value of 61.44%, the results tell us that only with a confidence level of 38.56% would we be able to assume this beta to speak for the Portuguese population. Thinking of the 95% confidence level interval for the coefficient value, it is very interesting to see how the sign of the beta changes, as the lower and upper bounds of this interval, are -0.09 and 0.15, respectively. It is not wise to reject the null hypothesis, which assumes no correlation between the factor and the dependent variable for the population in the study. Still, it is interesting to see that, with the referred 38.56% confidence level, the risk propensity of the Portuguese is expected to grow 0.031 units when its monthly income increases from a level onto the next one, on average, ceteris paribus.

After all the research done on the past literature and data for the country's comparison, the expected correlation between monthly income and risk propensity was positive. Although with a very weak confidence level, the findings from the regression are in line with the expectations, as the regressed beta is positive as well. The CMVM study puts in comparison four different intervals of monthly income, with the output being which one is the more probable of investing, and so, more risk propense. People with monthly incomes between €1,000 and €2,000 are less probable to invest when compared with people with monthly incomes between €2,000 and €3,000. The latter is less probable to invest when compared with people with a monthly income between €3,000 and €4,000. These findings go in line with the model presented. Only when the monthly income grows bigger than €4,000 does CMVM say that the probability of investing starts decreasing, but only slightly.

Group Part

There are two interesting findings to point out from the correlation matrix regarding income. First, income and gender have a negative correlation, meaning women have a higher monthly income than men, from our sample, ceteris paribus and on average. This is already significantly alarming as it is not representative of the Portuguese population, as explained before. Second, as said before, income and age have a very high positive correlation, which will also affect the trustworthiness of the coefficient found.

If we take a look at the sample distribution in Figure 46 (distribution), focusing on income, the distribution is left-skewed towards low income. Not having a fully normally distributed sample regarding a specific factor will affect the trustworthiness of the p-value achieved.

The next factor under analysis is education. It is again important to remember the scale of the factor, where the values vary from 1, primary education, to 6, doctoral degree or above. The coefficient found is 0.007, meaning that an increase in the education level will bring risk propensity up by 0.007 units, on average, keeping everything else constant. However, the coefficient found is not statistically significant at all. With a p-value of 94.31%, we can only estimate the true population parameter as being the same as the regression's coefficient with 5.69% confidence. It is not safe at all to reject the null hypothesis that the true beta is zero. With 95% confidence, one cannot even state that the true parameter is positive, as the lower bound is negative 0.19. Regardless of the statistical significance, it is interesting that education increases risk propensity, from the sample used findings.

After all the research made on the past literature and data for the country's comparison, the expected correlation between education and risk propensity was positive. At the same time, results from the CMVM study also indicate a positive relationship between education and risk propensity. While looking at the probability of one being an investor, CMVM divided

education into four possible levels. The probability of one being an investor always increases as the education level increases.

When looking at Figure 46, it is possible to understand that the sample is very right skewed towards higher education. This helps us understand the high p-value achieved. There is a non-representative high concentration of education answers in the sample. 22% of the respondents have completed secondary education, 46% have a bachelor s's degree, but only 3% have primary education as a higher education level achieved. While the minimum value of education in the sample is 1, the first quartile is already at level 4. Just as shown in the education factor chapter, these numbers are not representative of the Portuguese population. As mentioned before, 44.6% of Portuguese have primary education as a higher education level, 27.2% have secondary education and 28.2% have tertiary education as the highest education level.

The most relevant education factor correlation to point out should be the positive 0.262 value with the financial literacy factor. When education increases, ceteris paribus and on average, financial literacy is expected to increase as well. At the same time, there is a negative correlation between education and age. A highly concentrated sample on education comes associated with the fact the sample is also left skewed towards younger ages.

Regarding financial literacy, let us remember that the financial literacy level varies in 11 levels, from 0 to 10, but the factor variable varies from 0 to 1, as a percentage. The coefficient found is 0.844, meaning that an increase of one level in financial literacy will lead to an increase of 0.844 units in risk propensity, on average, ceteris paribus. The p-value of the coefficient discussed is 1.58%, meaning that the confidence level that the true parameter of the population is the same as the coefficient is 98.42%. Only with a significance level of 1.58% or lower would we not reject the null hypothesis, otherwise we can be confident that

there is a correlation between the factor and risk propensity. The 95% confidence interval corroborates how safe it is to assume a positive correlation between the factor and risk propensity, as both the upper and lower bound of the interval are positive values, 1.53 and 0.16, respectively. Even though not with 100% confidence, it is very interesting to see the assurance of a positive effect of financial literacy on risk propensity.

After all the research done on the past literature and data for the country's comparison, the expected correlation between financial literacy and risk propensity was positive. The findings from the regression are in line with expectations, with a strong confidence level. The regressed beta is also positive.

Financial literacy has a positive correlation with all the factors but age. An increase in age comes associated with a decrease in financial literacy, ceteris paribus, on average. At the same time, it is relevant to point out that the larger correlation in absolute values is with education, as mentioned before.

For the wealth factor. Knowing the factor variable is a dummy variable, where 0 is for respondents considered non-wealthy and 1 considered wealthy. The beta of wealth from our sample is 0.497, meaning that if an individual is considered wealthy, its risk propensity is expected to increase by 0.497 units, on average, keeping everything else constant. The p-value of the coefficient is 39.52%. Only with a confidence level of 60.48% can we reject the null hypothesis that there is no correlation between wealth and risk propensity, so it is not rejected. Under all the conventional significance levels, the null hypothesis is not rejected. As before, the 95% confidence interval is very alarming as it varies from negative to positive values, with the lower and upper bound being -0.65 and 1.65, respectively.

Group Part

After all the research made on the past literature and data for country comparison, the expected correlation between wealth and risk propensity was positive, which corroborates our findings, even though with such an abnormal p-value.

Trusting the literature review regarding the factor, something within our model must have gone wrong, so that such a p-value can be justified. Measuring wealth is a very difficult task, especially when using survey data, as individuals are more likely to understate their wealth. Just as explained before, the method used to measure wealth was the one assumed to be the best, it was a relationship between the respondents' age and monthly income. Still, there is a lot more to know to understand someone's financial wealth, than simply comparing someone's monthly income and age. The value achieved is also justified by the left-skewed distribution of the wealth values. The median and the mode are 0 and the average is 0.03.

The most significant correlation of wealth is with income, 0.227. So, an increase in wealth comes associated with an increase in income, on average, ceteris paribus.

Looking at the intercept value, the coefficient found is 1.46. The intercept value allows for specifically interesting interpretations. The expected risk propensity for an 18-year-old, not wealthy female, with the smallest value of income, education, and financial literacy is 1.46, on average, ceteris paribus. This value is alarming, as the standard risk propensity of the Portuguese is very low. The p-value of the intercept is 0.26%, meaning one can reject the null hypothesis of no intercept with 99.74% confidence. Also, both the lower and upper bound are positive, 0.52 and 2.40, respectively, meaning that one can be 95% confident that the true parameter of the population lies in this interval. It is very interesting to see that, on a scale of 0 to 5, there is a standard 1.46 risk propensity value for the Portuguese population.

Finally, it makes sense to take a look at the R-squared statistic. Let us bring back that the R squared varies from 0 to 1. It shows how well the developed model fits the data and how well does the different independent variables explain the dependent one, where 1 means the dependent variable is as well explained as possible and 0 the exact opposite. The R-squared of the developed regression is 0.1726. This means that the changes in risk propensity are 17.3% explained by the changes in the different factors.

An R-squared value of 0.1726 is low, but when it comes to analyzing and quantifying social behaviors it is not easy to achieve a higher value. A change in risk propensity is not very well explained by changes in the chosen factors. As explained before, the model used to explain risk propensity has flaws. Not only the sample is not perfect, but also there are surely more factors to be explored that correlate with risk propensity. Still, when looking at the CMVM study, the 17.3% value found is very interesting. In their regression, the R-squared value achieved was 0.107, meaning a change in their explained variable is only 10.7% explained by changes in their explanatory variables. It is quite surprising how CMVM did not take into account the financial literacy factor, as it turned out to be one of the most significant ones and with a very large coefficient. This lacuna might have had an impact on CMVM's R-squared achieved. This comparison puts in perspective and gives credit to the model we regressed.

Regression Limitations and Conclusion

In conclusion, it would first be important to bring back the used sample limitations. The main focus should be on age and education factors. The answers' distribution regarding the first is left-skewed, but when it comes to the latter, the limitation is the exact opposite as the sample is right-skewed. Both limitations are directly observed in the sample distribution statistics

Looking at the regression limitations, the most relevant issue comes from the measurement of the factor variable of wealth. As explained, it is a hard variable to measure and the mechanism used, a relationship between age and monthly income, is not perfect.

From the regression itself, there are some very relevant findings to bring out. Men are expected to be more risk propense than women, an increase in age means a decrease in risk propensity and an increase in financial literacy also makes an individual more risk propense. All these findings are statistically significant at all the conventional significance levels, and they all go in line with previous findings. Income, education, and wealth coefficients are all positive, which also goes in line with previous findings, but these betas are not statistically significant at any of the conventional significance levels.

The r-squared achieved is high knowing the model tries to explain social behavior.

Portfolio Allocation by Risk

Introduction

After going through all the factors individually, understanding the implication of each of them, and conducting the survey where we only surveyed Portuguese citizens, we gathered all the information needed to see what the ideal allocation of assets by changes in risk profile would be. We have divided the portfolio allocation into 7 different levels, which go from 1 to 5 first, with 1 being the less risk-averse investor and 5 the most risk-averse investor that is willing to invest. This last nuance is very important as there is a big difference between those that are very risk averse (level 5). We observed that for risk aversion 5, there are very risk-averse people, but still willing to invest, and those that are so risk-averse that they do not want to invest even in the less risky, less volatile asset. For this reason, we have also created a portfolio with a risk level of 0, where we consider that they will not invest at all. It has been

analyzed as one more portfolio strategy for those investors whose priority is to maximize returns without taking into consideration the potential losses, and who are willing to leverage the portfolio. This last one is the portfolio identified as risk 1 (leveraged)

Portfolio Allocation

Before starting to analyze the data and explaining the procedure we have followed to get the ideal portfolio allocation by changes in risk, there is one step prior that we consider being key. Understanding why portfolio allocation is important. According to Baird Asset Management, the importance of portfolio allocation lies in 2 main points, the first one is from a portfolio design position because each asset class by itself can be very volatile but when properly diversified, volatility is considerably reduced, and it is possible to achieve a more stable return over time. The second reason is to keep investors' long-term perspective and avoid any unexpected behavior and difficult times for the investor. With a proper portfolio allocation, the investor knows what to expect in the long run, and the firm knows what to offer to the client that adapts the best to each investor (Baird 2014).

Steps Followed

In this section, we will explain which indices we used to build the ideal portfolio allocation depending on risk, why we chose those indices, and how we structured our calculations and analyzed the main differences between portfolios.

Our calculations that calibrated the portfolio allocation are structured in 7 different parts. The first one was to choose the indices we should use to do the calculations; the second part is based on the results from our survey where we asked what the maximum losses each investor is willing to have. We used those answers to calculate the ideal portfolio allocation by risk and maximum desired losses. The third part is the indices analysis, especially the monthly and yearly return and volatility. The fourth part is the calculation of the portfolio allocation using

index expectations, and maximum losses by risk aversion. For this part, we used the solver in excel, which we will explain step by step further in this section. The fifth part of the excel is the allocation by risk and comparison of return and allocation between strategies. The sixth contains all the indices and portfolio allocation analysis, where we analyze more than just allocation and return, and finally a summary of the strategies.

Indices used

To calculate the ideal portfolio allocation by risk we have used 3 different indices, split into Equities, Corporate bonds, and Government bonds. For equities, we chose the STOXX index, for corporate bonds we used IEAC.L (iShares Core € Corp Bond UCITS ETF EUR), and for government bonds SEGA.MI (iShares Core € Govt Bond UCITS ETF EUR). The three of them are diversified in different geographies over Europe, industries, and in the case of bonds different maturities and durations.

The reasoning behind choosing these indices/ETFs lies in the easiness, accessibility, diversification, and low fees required to engage in these portfolios. To this point, we will refer to the index and ETFs as indices.

For all the reasons mentioned above, we believe the indices we analyzed can be a good proxy for how the portfolio allocation should look for the Portuguese investor depending on the individual risk aversion.

The data gathered for each index goes from 2010 to 2022 (the latest available when the study was conducted) monthly. Our data was extracted from Bloomberg.

The first step was to calculate the monthly price changes, which allows us to calculate the index return by month. This enabled us to get the expected return, volatility by index, and variance between them. Backtesting for 12 years allows us to understand the behavior of each

index. During the period analyzed, there have been different bull and bear markets, the most remarkable crisis being, the credit crisis in 2010, Covid-19 in 2020, and 2022 with the Russian war, high inflation, and monetary policies.

Maximum Drawdown

To determine the maximum desired drawdown by risk, we used the information gathered in our survey. To know what to ask in the survey, we first examined how other asset management firms ask their clients how much they are willing to lose. Some use percentage ranges, others the goals they have with investing (e.g.: I prioritize not losing money over earnings or I am willing to have high losses if that increases potential returns). Before sending the survey, we checked what was the maximum loss for each index and the minimum maximum loss of the three indices was -5.2% for SEGA.MI. In our survey, we asked: What are the maximum losses you are willing to have? People had 6 different options: 1) No losses at all, 2) minimum possible, 3) No more than 6%, 4) No more than 10%, 5) No more than 15% and 6) No more than 25%. After analyzing the data, the lower the risk aversion is for the investor (which in the survey is concluded by asking how comfortable they feel investing on a scale from 0 to 5), the more the investor in general is willing to lose at a given point if that enhances returns in the future. The higher the risk acceptance is, the portfolio can suffer greater losses.

Indices Return and Volatility

For the following data points refer to Figures 47, 48, 49, and 50. The step prior to calculating the ideal portfolio allocation by risk and maximum drawdown for the Portuguese people was to analyze the behavior of each of the indices we used in our study. The index-tracking equities are the ones with higher monthly and yearly volatility, being 4.03% and 13.95% respectively, with an expected yearly return of 4.53% annually. On the bonds side, the

calculations show that the government bond index has higher volatility and return than the corporate bonds. The result for the government bonds is 5.08% volatility and 0.41% return yearly. For corporate bonds, volatility is 4.80% and a return expected yearly of -0.03%.

Calculation of Portfolio Allocation by Risk

Once the expected returns per index and the maximum drawdown per risk are calculated, it is possible to calculate the ideal portfolio allocation for each type of Portuguese investor. For that, the function solver in excel has been used.

Use of solver: to get the portfolio allocation, we have set the objective of maximizing the allocation to equities by changing the percentage of each portfolio. The constraint used for the levels of risk between 1 to 5 is that the allocation to the indices has to be higher or equal to 0 (so a result where no money is invested in any of the indices is avoided), the sum of the weights has to be 1 (or 100%), so all the capital is invested, and depending of the risk level, we have limited the maximum loss each portfolio must have.

There are two exceptions, the investors with risk 0, which are the ones that are not willing to invest so they have 0% capital invested in any of the indices, and Risk 1 leveraged. We observed that with 100% of the capital invested in equities gives a maximum loss of 16%, which is below the 25% some investors are willing to lose if that maximizes returns according to the survey. We decided to study what would be the allocation if the investor was willing to have 50% of losses at a given point, and how much the portfolio should be leveraged. For this scenario, the only change in solver assumptions was to delete the constraint of weights limited to 100% and set the maximum loss to 50%.

Portfolio Allocation by Risk Results

After calculating the portfolio allocation by risk taking into consideration all the constraints and requirements mentioned above, the results are as followed:

As can be observed in Figure 51, from risk aversion 1 to 5, the total weight is limited to 100% between the sum of all the indices' allocation and for the leveraged strategy, the weight is above 300%. A risk tolerance of 0, meaning not willing to invest, is not represented in the graph as they would not invest in any instrument.

Only looking at allocation and returns in Figure 51, the riskier the investor the less they invest in equities, also noticeable is that except for risk 5 where they seek the minimum risk possible, for any other risk tolerance they should hold equities. Additionally, the percentage of equities allocation rises quite fast, going from 7% in risk 4 to 44% in risk 3, 91% in risk 2, and 100% in risk 1. Also, for risk 1, the maximum allowed drawdown is not achieved, which would give the portfolio manager more flexibility to invest in more volatile indices/individual stocks. As we saw that investing 100% in equities only had a drawdown of 16%, we wanted to study how much leverage would be necessary to achieve a drawdown of 50%. The result is that it would be needed to allocate 312% in equities to achieve a maximum loss of 50%. Referring to Figure 8: Share of households holding risky assets and mean risk aversion, initially mentioned in the wealth section, after the study of the factors for the Portuguese investors, we saw that they tend to invest less in equities than they should and be mostly focused on fixed income instruments. What we can see from our study is that up to risk level 2 there is a bonds component in all the strategies, however, the bond allocation is not as high as Figure 1 shows, or looking at it differently, allocation to equities should be higher.

On the returns side, when focusing on the long term, the more the investor allocates to equities the higher the potential returns are. In short-term investing, this can vary due to the

volatility of equities, that is why long-term investing is important, as results are more predictable, and more stable performance can be achieved.

In our study, the expected returns yearly go from 0.41% for a risk aversion of 5, increasing to 2.21% for a risk of 3, where the allocation is still higher for bonds than equities (56% - 44%), and expected annual return of 4.14% for risk aversion of 2, where the allocation to equities is 91%. The most noticeable difference is between risk aversion of 3 and 4, where the willingness to increase the maximum drawdown by just 4% more translates into a difference of potential return annually of 1.5%, which in the long term would have a great impact. To challenge the last comment, in Figure 52 can be observed the difference that an initial investment of 1.000€ has between allocating the money in the strategy for risk aversion 3 and 4. After 11 years, there is a total difference of 173€ per 1.000€ of the initial investment. This reflects how small changes can have a big impact in the long term.

Indices and Portfolio Allocation Analysis and Comparison

In this section, we will analyze the main information for both the indices and the strategies based on those indices. The main data covered in the analysis will be the average annual return, standard deviation, info Sharpe ratio, positive months percentage during the whole sample period, the monthly skew and kurtosis, and the maximum and minimum return in a given month. The summary of all the information can be found in Figure 53 in the appendix.

The first data that will be analyzed is the Sharpe Ratio obtained. The higher the Sharpe ratio the more efficient the strategy is, ideally being closer to 1. Sharpe ratio for STOXX: 0.32, IEAC: -0.01, SEGA: 0.08, Risk 1 leveraged: 0.34, Risk 1: 0.33, Risk 2: 0.31, Risk 3: 0.22, Risk 4: 0.11, Risk 5: 0.08. None of the strategies are close to 1, but there is a considerable difference between the portfolios' Sharpe ratios. It is possible to observe how inefficient the indices tracking the bonds are, being the corporate index negative. Sharpe ratios obtained

from the strategies go from 0.34 for the leveraged portfolio to 0.08 for the risk 5 portfolios. Increasing equity allocation helps to quickly improve the strategy's Sharpe Ratio. For each € invested in the different portfolios, adjusting for risk, portfolios with more bonds have a higher ratio of risk to return.

As discussed in many of the literature about portfolio allocation and asset management, one of the main advantages of diversification is the reduction of volatility (Ang 2014). Annual volatility for STOXX: 13.95%, IEAC: 4.80%, SEGA: 5.08%, Risk 1 leverages: 43.45%, Risk 1: 13.93%, Risk 2: 13.37%, Risk 3: 10%, Risk 4: 6.13%, Risk 5: 5.07%. Comparing the results obtained, for the portfolios with levels 1 and 3, where the first one only has equities, while the second one is split almost 50/50 between equities and government bonds when analyzing the annual volatility for both, the first one is 13.93% and the second one is 10%, a difference of 3.93% annual volatility. It is possible to see the diversification effect introduced by Ang (2014). The most volatile portfolio is the leveraged one, with 43.45% annual volatility, following the strategy for risk aversion of 1 with 13.93%, and the lowest portfolio for risk aversion of 5 with 5.07% annual volatility.

Positive months and Monthly skewness are similar between all the strategies and indices. Positive months for STOXX: 58%, IEAC: 54%, SEGA: 56%, Risk 1 leveraged: 57%, Risk 1: 57%, Risk 2: 57%, Risk 3: 57%, Risk 4: 53%, Risk 5: 54%. The portfolios with a higher allocation to equities have a higher percentage of positive months. Monthly skew for STOXX: -0.61, IEAC: -1, SEGA: -0.5, Risk 1 leveraged: -0.61, Risk 1: -0.61, Risk 2: -0.61, Risk 3: -0.55, Risk 4: -0.49, Risk 5: -0.50. For the sample, all the portfolios have negative skewness, showing that all of them have frequent small gains and a few large losses.

Monthly Kurtosis for STOXX: 1.66, IEAC: 4.41, SEGA: 0.69, Risk 1 leveraged: 1.75, Risk 1: 1.75, Risk 2: 1.75, Risk 3: 1.56, Risk 4: 0.79, Risk 5: 0.79. For the monthly kurtosis, all the

strategies and indices have kurtosis lower than 3 (Platykurtic, Kurtosis <3) except IEAC.L. This type of kurtosis has short tails, and their extreme values are less than that of the normal distribution. The interesting part for investors is that their return distribution is stable and predictable, on the other hand, the index for corporate bonds is over 4 (Mesokurtic, Kurtosis > 3), which has longer tales and has more occasional extreme outliers, making it more difficult for the investors to predict its behavior.

To conclude with the analysis of the portfolios we look at the maximum, and minimum returns in a given month. Maximum return for STOXX: 12.86%, IEAC: 4.85%, SEGA: 3.79%, Risk 1 leveraged: 40.14%, Risk 1: 12.86%, Risk 2: 11.79%, Risk 3: 6.20%, Risk 4: 3.14%, Risk 5: 3.79%. Minimum return for STOXX: -16.01%, IEAC: -6.44%, SEGA: -5.24%, Risk 1 leveraged: -49.97%, Risk 1: -16.01%, Risk 2: -14.53%, Risk 3: -6.78%, Risk 4: -5.35%, Risk 5: -5.24%. The biggest difference between the maximum and minimum returns is presented by the leveraged strategy with a 90% gap. The maximum achieved in the portfolio for risk aversion of 5 is higher than for risk aversion of 4, in all other cases, the maximum and minimum returns achieved are larger the more equity allocation there is.

Conclusion

Following the results from the survey and using the indices described during the analysis, we were able to construct an efficient portfolio for each risk level. We observed the higher the risk aversion the lower the allocation to bonds. Referring again to Figure 1 in the wealth factor, there is something clear: Portuguese investors are under-invested in risky assets in absolute and relative terms, having a huge impact on the potential return they could have. Another observation is that the allocation to equities raises quite fast from portfolio to portfolio, indicating that a willingness to have a higher loss, would allow the investor to allocate more into equities, improving the potential return they could get.

Value at Risk

Definition of Value at Risk

After creating a set of portfolio allocations for each risk profile, we introduced the value at risk statistic to determine the potential for loss. This measure is widely popular amongst investment and commercial banks to assess the scope and likelihood of potential losses in their institutional portfolios, as the Value at Risk applies to a variety of assets, such as bonds, stocks, derivates, currencies, and many more.

The concept of Value at Risk allows us to understand the potential loss of a risky asset over a specific time for a given confidence interval, and measure and regulate the risk exposure (Duffie and Pan 1997). Value at risk has three key factors that are used: evaluation of the amount of potential loss, the likelihood of occurrence for the amount of loss, and the timeframe.

Computing the Value at Risk

There are three ways to calculate the Value at Risk. The first one is by looking into historical data and finding out the greatest losses and the greatest gains. Another possibility is the variance-covariance method, also known as the parametric method, where it is assumed that the losses and gains are normally distributed and, hence, the potential losses can be expressed in terms of a standard deviation occurrence from the average. Lastly, the Value at Risk can be computed via a Monte Carlo simulation by calculating projected returns over thousands of iterations by observing the distribution of the potential paths.

The calculation of Value at Risk for a portfolio requires one to calculate the risk and return of each asset individually first and further to compute the correlations as well between them. Consequently, the more diversified the portfolio is and the more assets are taken into account,

the more challenging it is to calculate the Value at Risk. The most common way, however, is the historical simulation (Duffie and Pan 1997).

First, we calculated the log return of each of our indices separately and went further with the 12-month standard volatility moving average and the 12-month EWMA (Expected Weighted Moving Average) volatility. Afterward, we computed the VaR standard volatility as well as the monthly VaR volatility for each index. Moving on next, as mentioned above, before we can calculate the Value at Risk for each Risk profile we need to calculate for each month and each stock the Value at Risk starting from March 2011 until the last month of our data set.

For assessing the Value at Risk, we make use of a monthly data set since for each risk profile we have computed the portfolio allocation every month. As we have a monthly data set for our Value at Risk, a lambda of 0.97 has been used in the EWMA volatility model according to Bernhard Bollen, it is a more proper approach than 0.95 that is used for a daily data set. Bollen argues, the ideal value of lambda is a time variable and should be dependent on recent historical data. (Bollen 2014). While a daily data set would give us a more precise answer by having a higher number of observations, we decided to proceed with the monthly data set, as we wanted to cover a longer period.

Results

We can see in our different risk profiles that the fluctuation is higher in the first three profiles, as for these the weight in STOXX is much higher than in IECA and SEGA. Starting with Figure 55, for the Risk Profile 1 Leveraged we can see a higher shift than in the other Risk Profiles, with price changes between 10€ and 41€. This high swing is understandable as the investors intend to maximize their returns. This Portfolio they have the highest annual volatility (43.45%) and expected annual return (14.76%). The reason for this outcome is the weight of equity. For Risk Profile 1 (Figure 56), we identify lower price fluctuation in the

range from 3,5€ to 12,8€. The second highest weight on equity is in this Risk profile indicating that the investor's motivation is to achieve a high return while having a limit to volatility and losses. A significant drop in annual volatility can be seen from 43.45% to 13.93%. The least price changes we can notice are for our most risk-averse portfolios. Risk Profile 5 (Figure 60) is shifting from 1,12€ to 5,92€. The low oscillating price changes can be described because of high-risk aversion and the weight of the corporate bond SEGA.MI. In this portfolio, the highest asset weight is the Government Bond, indicating a more secure approach and less possibility of losses but lower expected returns. Looking at the expected annual return of this portfolio, we can see a value of solely 0.41% with a volatility of around 5%. Investors with this portfolio are emphasizing loss control rather than maximizing gains.

From risk profiles 2 to 4 (Figure 57-59), we understand the little similarity and lower fluctuations for the potential gains and losses over the time frame. With a mix of equity and government bonds. Profiles 1 and 2 have high similarity, with annual returns of around 4% and a volatility of around 13-14%. Furthermore, a significant drop is between Risk profile 3 and 4 in the annual volatility from 10% to 6.13% for Profile 4. This effect can be explained by the decrease in equity weight and increase in government bonds to have a more stable portfolio with lower volatility for the higher level of risk aversion.

Conclusion

In this part, we perceived the effect of emphasizing gain maximization on the risk profile. Investors with this intention achieve an almost 3x higher return while also being exposed to 3x higher volatility compared to investors with a high-risk tolerance but who focus as well on loss control, i.e. Risk profile 1 Leveraged and Risk profile 1. An important takeaway here is that allowing a higher weight in equity bonds will help the investor yield more return while minimizing their annual volatility as well.

Final Conclusion

After identifying crucial elements that affect risk behavior, we analyzed each of the factors separately: Wealth, Age, Gender, Education, Financial Literacy, Income, and Health. We conducted a survey with over 260 participants to test our assumptions and created a regression to exhibit the correlation between the factors and risk propensity. Next, we created different portfolios for each risk profile, “less risk averse” = 1 to “most risk-averse” = 5, by choosing a set of different securities, from equities to corporate bonds and government bonds. Also calculating the Value at Risk for each portfolio to understand their potential loss.

The risk propensity regression corroborates our findings in the qualitative part, as all the factors’ coefficients have the expected effect on risk propensity. However, there are some limitations to the regression findings’ trustworthiness, as the distribution of the sample is not equal to the true distribution of the Portuguese population. Nevertheless, confidently, we can conclude that Gender, Age and Financial Literacy have an impact on risk aversion. This can be seen both in the coefficients and in the low p-values. The Financial Literacy result corroborates the conducted survey from KPMG, where 30% of the Portuguese population mentioned low financial literacy as the main reason they do not invest. (EU 2021) Although sometimes with a low confidence level, our quantitative research is indeed coherent with the qualitative research and aligns with our initial assumption that Portugal is a risk-averse country compared to many other European countries, as seen in Figure 8.

Focusing on the portfolios, it is very interesting to see that, for the different risk aversion levels and availability to losses, every portfolio’s return is maximized the higher the equity allocation. Also, it is noticeable to see how quickly the percentage of allocation to equities rises from one risk level to the next one. Regardless of the factors’ background, all risk aversion profiles except for the most risk-averse (risk level of 5) should hold equities.

Effect of Wealth and Health factors on the investors' risk profile

Introduction

Investing is a successful strategy to make money work for oneself to generate wealth. Although they are regarded as safe practices, holding cash, and storing it in bank savings accounts are inefficient ways to create wealth. Due to the compounding effect and long-term growth, investing money in stocks and other instruments makes it possible for its worth to evolve. The goal of investing is to generate future revenue, grow value and equity, and create wealth, regardless of if the money is put into futures, stocks, precious metals, mutual funds, options, bonds, small companies, or real estate. (SEC 2017). Investing can have further benefits, achieving: (i) Financial Security, (ii) Financial Independence, and (iii) Attaining one's goals (Reserve Bank Of Fiji 2016).

If investing has so many benefits, why does not everybody own stocks? Risk aversion and aversion to losses seem to be the answer to this question (J. Arrow 1996). Different people have different utility functions related to risk aversion. The utility function is impacted by a variety of variables that vary from person to person. Wealth and health are two such elements. These two constituents are frequently combined for analysis in studies (Courbage, Montoliu-Montes and Rey 2018). One of the reasons lies in the fact that often wealthy individuals are healthier as they have access to better resources (Dr Thomas 2022). There is an increasing interest in researchers to further understand the combined effect of these two. In the group part of this consulting project for BPI AM, where we determined that Portuguese investors are excessively risk averse, we saw how wealth and health have an important impact on the Portuguese risk aversion, especially the self-perception of health condition, where Portuguese rank themselves lower than statistics suggest. In this report, we will explain deeper each factor, and explain in a theoretical way the importance of each of them.

José Carlos Valls Arenas

Risk profiling and diversification

Risk profiling for asset managers and investment firms is key to adapting the products/portfolios to each customer’s needs and behavior. Knowing which are the most important factors that affect the risk profile of the investor is crucial.

In addition to improving returns and boosting wealth over time, investing in a variety of assets has the risk-spreading benefit of diversification. Concentration risk is a danger for those investors who solely invest in fixed income. Furthermore, bond investors can suffer concentration risk while also limiting their upside gains.

An investor's risk profile may alter over time for several causes, including modifications in income, wealth, health, home ownership, parenthood, and marital status. Because of this, risk tolerance should be tested periodically, and the investor's portfolio should be updated to reflect the most recent test results. In this report, we will focus on how—or whether—changes in wealth and health can impact an investor's risk profile.

The reason why we analyzed wealth, and health together, was mainly due to the cross-CRRA effect introduced by Malevergne and Rey (2009), which is based on the CRRA effect (decreasing absolute risk aversion) Arrow (1970). Cross-CRRA studies how a factor is affected by other factors and how those combined have an overall effect on risk aversion (Malevergne and Rey 2009). This motivated us to investigate if changes in health can affect an individual’s human capital, lowering his or her overall wealth and possibly altering his or her risk profile.

José Carlos Valls Arenas

Psychology of investment

The psychology of investment is a concept that deserves an entire research for itself, however, before starting to explain the Wealth and Health factors, we deem it necessary to introduce this concept briefly. It will allow the reader to have a deeper understanding of the content of this report and why it might have an influence on Portuguese risk aversion.

Why does not everybody do it if investing can be so beneficial? And why, if gains are accessible to everyone, do only 5% of investors profit from the market? (Dhama 2020).

Investor's Psychology is about the behavior of investors; what they believe, how they act, and what they do. Given the occasionally inefficient nature of the market, behavior finance is a theory of finance that seeks to explain investor actions by assuming that they are rational agents acting in their own best interests (Daniel, Hirshleifer and Teoh 2001). Some of the main psychological factors are overconfidence, fear, self-attribution, selective memory, self-handicapping, and herding (Hall 2019).

The phycology factors mentioned above influence investment returns and can only be controlled with effort and self-awareness as well as investing knowledge. Investing can be as simple as buying a stock and holding it for decades, which according to investors like Warren Buffet is what people should do. Instead, the average holding period is 5.5 months (Lu 2021), making it more about timing the market than really investing. Because the holding period is so short, not many people can generate profits, which has created the myth that investing in stocks is risky. Might this unfortunate view be the key to Portuguese people being so risk-averse?

José Carlos Valls Arenas

Wealth Factor

Wealth is frequently equated with net worth. Mostly measured by survey questions that calculate the overall value of family assets, the total amount of debt, and the difference between the two quantities to determine a person's net worth. Marketable wealth, financial wealth, and increased wealth are all categorized differently by Wolff (2019). Marketable wealth less equity in a primary residence is the definition of financial wealth. It serves as a gauge for liquid assets. Financial wealth is then a reflection of the resources that are immediately available for investment and consumption. (Wolff 2019).

We chose to research wealth and examine how it affected Portuguese people since, according to Arrow (1984), it is one of the factors that significantly influences risk tolerance and investing decisions the most (K. J. Arrow 1984).

The definition of wealth has previously been provided. Now we will discuss the distinction between human capital and financial capital, which many experts and studies believe may account for why the tendency of senior citizens to be more risk-averse or, at the very least, one of the reasons they increase their holdings in fixed-income as they age. The logic behind this is that while stocks are more likely to outperform bonds over the long term, their volatility can cause larger short-term losses that take longer to recover from, therefore, elder people are attracted to hold less-volatile instruments (Vandenbroucke, Federal Reserve Bank of ST. Louis 2018).

The descriptions provided by Wolff fail to account for Human capital. This is an estimate of a person's potential earning ability, which for an investor translates into the present worth of all future salaries. It often reaches its maximum when one begins working and it is minimum when one retires. It is probably the biggest asset a young person has. As opposed to having

much remaining human capital, an elderly person who has amassed financial riches through the years has a lot of financial wealth, but low human capital. Additionally, human capital is seen as the best defense against inflation (Beers 2022).

Human capital and financial capital tend to balance in the mid-40s to -50s, after that, human capital starts to decline and financial capital overpass human capital, that is why the classical literature suggests investing in defensive assets after capital wealth surpasses human wealth, to protect the accumulated wealth (Fisher 2012).

After reading conclusions such as the one from Arrow (1984), where he states that risk aversion decreases with wealth, two questions arise at this point: how is wealth created, and how does wealth affect risk aversion?

The long-term ownership of a growing business produces wealth. Simply earning more money (e.g., a salary increase) will not bring wealth to one's life. One must invest money to create a second source of income. The process of creating wealth involves using savings to increase one's future affluence through the selection of assets that are in line with personal financial objectives.

If an investor wants to make enough money, they must not only choose the right investment but also give it time to flourish. To fully benefit from compounding, investing has to begin as early in life as feasible. Early investors have the opportunity to hold their investments for longer, making it easier for them to achieve a variety of financial goals (Kalra 2022).

Separating the process of wealth creation from the aim of making money is also crucial. To many, they might look the same. They could not be more different. Making money generally ignores time's role; wealth develops over time. As a result, making money in the real world

can at best be a zero-sum game, and often the total of these actions is less than zero, while wealth is a compounding effect (James 2019).

The effect of wealth on risk aversion has been extensively studied over the years. Following Brunnermeier and Nagel's (2004) research, liquid wealth is the aspect of wealth that most affects an investor's risk aversion and ideal portfolio allocation. There is evidence that as liquid wealth rises, the optimal percentage of riskier assets does as well and vice versa.

Another kind of wealth is human capital, which is highly reliant on future cashflows, namely those produced by one's employment. For the same amount of human capital in a given period, if the job or profession is regarded as dangerous, or volatile in terms of stability, turnover, and/or ease of finding a new placement, the worker with a more stable job will be more risk-seeking as his or her future is more predictable (Brunnermeier and Nagel 2004). Therefore, when financial wealth and human capital are predictable and abundant, encourages the investor to be more risk seeker, whereas, on the opposite side, when the financial wealth and human capital are not stable or they are not expected to be abundant, creates investors with a conservative mentality.

It has been regarded how wealth is created, however, there is another key factor to take into consideration. Preserving wealth can be as important if not more than creating it. Being able to maintain one's wealth brings stability to the investor and future generations. Stability is important for investors when risky decisions need to be taken, as future uncertainty tends to punish the risk tolerance of the investors. Wealth can be protected through life insurance, critical illness coverage, income protection insurance, creating a will, tax inheritance, and property protection (Pinnacle 2021).

In support of Arrows' research, and the theory behind the wealth factor, we will complement it with our findings from our survey. The analysis shows that wealth was the third factor that had the greatest impact on Portuguese investors' risk tolerance and propensity to invest, being that wealth is positively correlated with risk tolerance. Also from our survey, women are slightly wealthier than men. On the other hand, most likely due to our survey concentration, limitations, bias, and small sample, we cannot conclude that the older the individual the more financial capital has accumulated over the years, being the median of the wealthiest individuals, the same as the median of our sample (23).

Health Factor

Health traditionally has been described as the absence or presence of disease or risk factors in an individual as judged by a doctor. Today, the term "health" encompasses a broader spectrum such as complete mental, social, and physical well-being as opposed to just the absence of infirmity or disease. The interaction between a person's lifestyle, heredity, and environment can be reflected in their level of health. (WHO 1946).

The health factor is included in our research as it might be regarded as the main force behind human capital. Unexpected health shocks can significantly change a person's risk aversion, which can then affect their investing choices and increase their risk aversion or decrease their risk tolerance (Atella 2011).

Health factors can be so influential that according to Edwards (2008) there are solid grounds for anticipating that childhood health endowment will influence financial decisions in maturity (Edwards 2008). For instance, variations in temporal preferences could result from ill health (i.e., the arrangement between future and present superfluous expenses). As a result, those in poor health are probably more pessimistic about the future.

Chronic health issues might reduce planning time and cause people to steer clear of risky financial decisions. This is due in large part to the possibility that bad health increases risk aversion (Schmitz and Decker 2016). This is a crucial aspect to take into consideration when deciding whether to invest in risky assets (Merton 1969). Consequently, individuals who have had bad health since childhood may participate in the stock market at significantly lower levels preferring highly predictable outcomes. In particular, a recent work by Previtero et al. (2016) has determined how birth weight and exposure to prenatal testosterone affect the choice of an investment portfolio. They show that infants with larger birth weights are more inclined to trade stocks in later life. Low weight in recently born babies can be a sign of a low health condition or premature born baby, which can be linked with future health disorders (Previtero, et al. 2016).

The fact that wealth and health factors are frequently studied together is not by accident. According to Malevergne and Rey (2009) who studied the cross-CRRA effect, wealth impacts health, and health also has an impact on wealth, particularly on the human capital side. Together can affect and predict the prospects of an individual on whether he or she has higher chances of getting wealthy.

Malevergne and Rey (2009) had two important findings. The first is the link between good health and higher human capital, which shows that individuals with good health tend to be more successful in the workforce. The second one, which looked at the connection between health shocks and drastic changes in risk aversion, indicated that people who experienced unforeseen critical illnesses or accidents displayed an abrupt and lasting change in their risk profile.

Contrary to wealth, one's health can both be bettered immediately and benefit in the long run. An individual may be shielded from significant health issues like obesity and diabetes by

forming new, healthier behaviors. Developing new routines, such as a balanced diet and regular exercise, can help someone control their weight and feel more energized. If people maintain these modifications over time, they can become a regular part of everyone's routine. (Niddk 2020).

Risk profiling is significantly impacted by an individual's assessment of their health, as was discovered during the group component of this consulting project. Financial knowledge is the factor that affects the most Portuguese investors, but, self-perception, has a great impact on the risk an individual is willing to take. We studied self-perception for the health factor, although it can be interpolated to any other factor, such as education, knowledge, and well-being, where Portuguese people tend to rank lower than in theory they should, therefore, limiting their capability of taking well-measured risks. The fact that they tend to value their health lower than they should is very impactful and explanatory of the conclusion achieved in the group part. As health is an important driver of risk tolerance, then, if the self-perspective is not as it should be, they are taking less risk than someone with the same conditions in a different country would take with the right self-perception. Professionals recommend changing life habits and practicing self-awareness to improve introspection (Crowell, Schmeichel and Finley 2018).

If someone practices healthy habits, it can significantly alter how they feel about themselves. An investor's risk aversion may change if they feel better physically and/or emotionally. They may also become more optimistic about the future and be willing to take more risks (Ferrer and Klein 2016).

As discussed for wealth, keeping in good health is as important as achieving it. Some recommendations from the World Health Organization to stay in good health are: have a healthy diet, reduce salt and sugar consumption, avoid harmful fats, do not smoke and reduce

alcohol intake, be active, practice safe sex, get vaccinated, get periodically tested, and share your emotions.

Conclusion

Wealth and health are crucial variables to consider when establishing an investor's risk profile. Change in health has a more profound and long-standing effect on an individual, while a positive change in wealth might only have a temporary effect on the investor’s risk profile. The effect of a negative wealth event can be reversed if wealth is recovered, however, negative health impacts can be permanent. While wealth can vary over time, there are some set-up conditions related to the health of newborn babies that shape the risk tendency of an individual in adulthood. Wealth and health are interconnected; affluent people tend to be healthier because they have access to better resources, and healthy people tend to be more successful. Enhancing wealth and health is just as crucial as maintaining them. Health involves both a long-term and short-term perspective, a change in habits can immediately affect someone's well-being, whereas wealth is a long-term vision that necessitates consistency and long-term preparation.

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Appendix

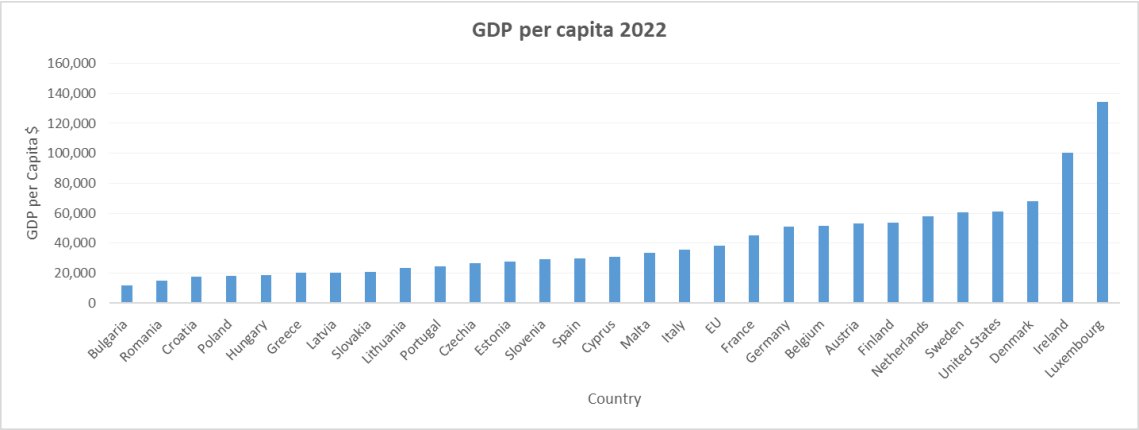
Figure 3: Demographic situation in Portugal

City size	Total	
Up to 1 999 inhabitants	3262893	38%
From 2 000 to 4 999 inhabitants	793470	9%
From 5 000 to 9 999 inhabitants	760856	
From 10 000 to 19 999 inhabitants	1012699	12%
From 20 000 to 49 999 inhabitants	1000872	12%
From 50 000 to 99 999 inhabitants	426036	
From 100 000 to 199 999 inhabitants	587393	7%
From 200 000 to 499 999 inhabitants	202388	2%
From 500 000 to 999 999 inhabitants	462845	
Non-resident population, diplomatic corps	147788	2%
Total	8657240	100%
Employment	Total	
Active	5012040	58%
Not active	3645200	42%
Total	8657240	
Education*	Total	%
Without education	1999754	19%
Basic education	5817858	
Secondary education	1411801	13%
Post-secondary education	88023	1%
Bachelor	168468	
Licenciatura	935515	9%
Masters	114518	1%
Doctorate	26241	
Total	10562178	100%
*Concerning the whole Portuguese population		

Figure 4: Demographic figures of Portugal

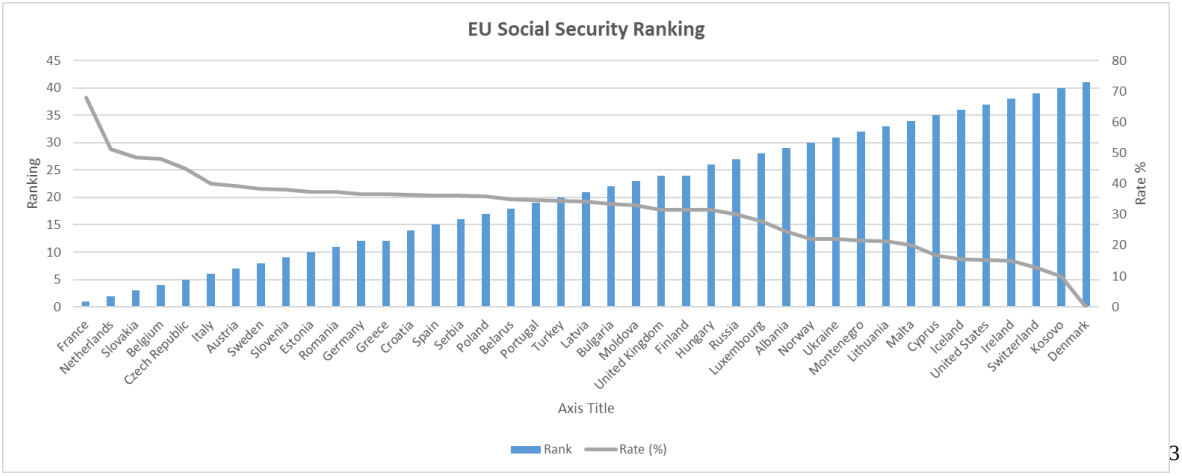
Age - Gender	Total	%	Male	%	Female	%
18-24 years	814706	9%	411069	10%	403637	9%
25-29 years	656076	8%	324848	8%	331228	7%
30-34 years	773567	9%	378734	9%	394833	9%
35-39 years	824683	10%	402307	10%	422376	9%
40-44 years	773098	9%	374962	9%	398136	9%
45-49 years	770294	9%	370989	9%	399305	9%
50-54 years	722360	8%	346248	9%	376112	8%
55-59 years	677651	8%	322095	8%	355556	8%
60-64 years	634741	7%	298546	7%	336195	7%
65-69 years	551701	6%	253004	6%	298697	7%
70-74 years	496438	6%	220461	5%	275977	6%
75-79 years	429706	5%	180131	4%	249575	5%
80-84 years	297888	3%	113325	3%	184563	4%
85-89 years	164356	2%	55635	1%	108721	2%
90 years or more	69975	1%	19768	0.5%	50207	1%
Total	8657240	100%	4072122	100%	4585118	100%

Figure 5: GDP per Capita EU Countries



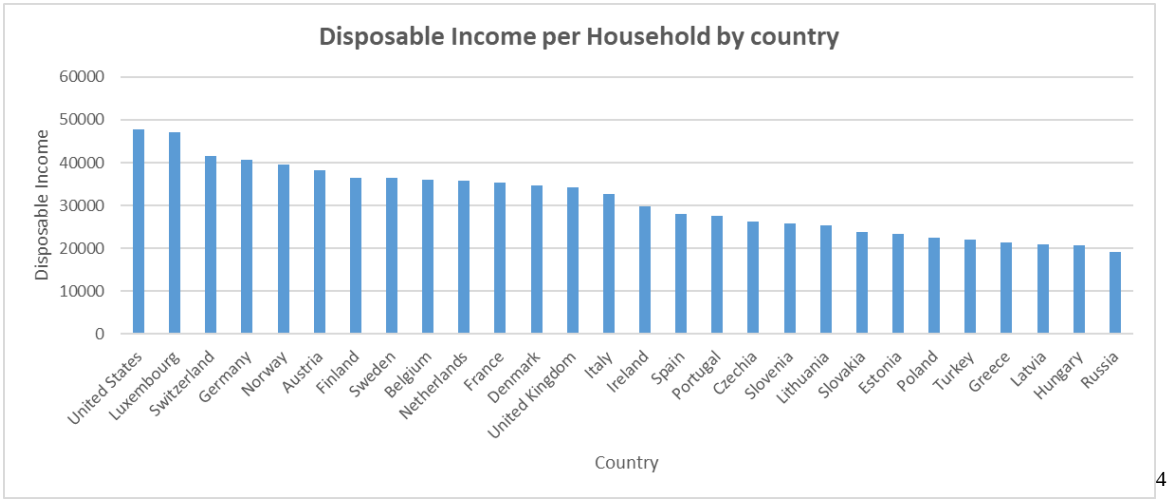
[2]

Figure 6: Social Security Ranking for EU Countries



[3]

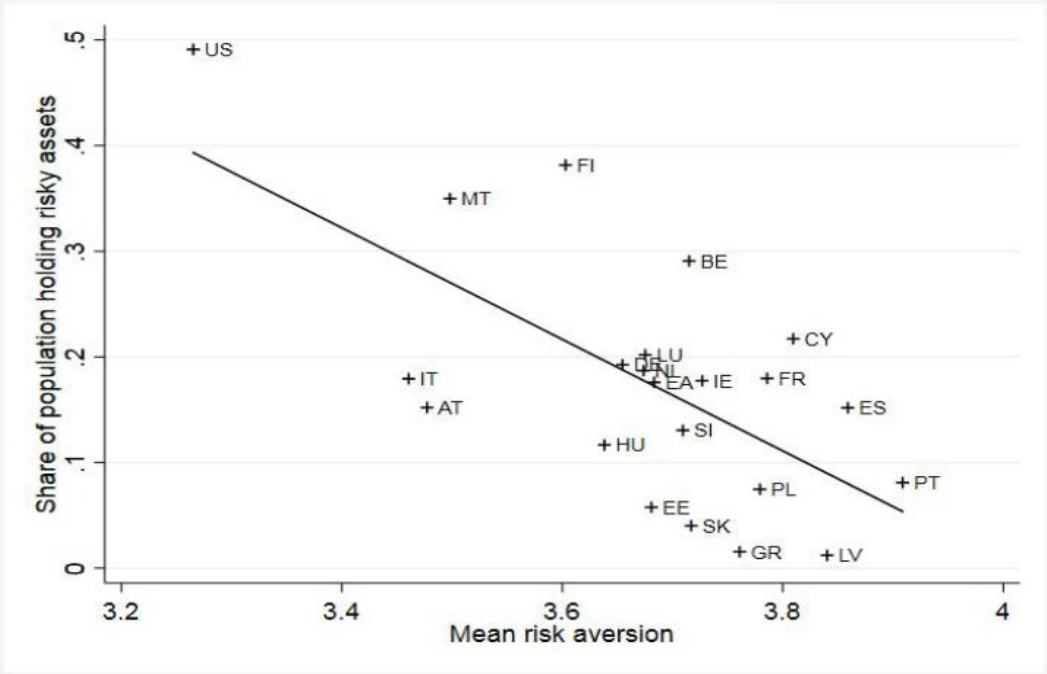
Figure 7: Household net adjusted annual disposable income by country



[4]

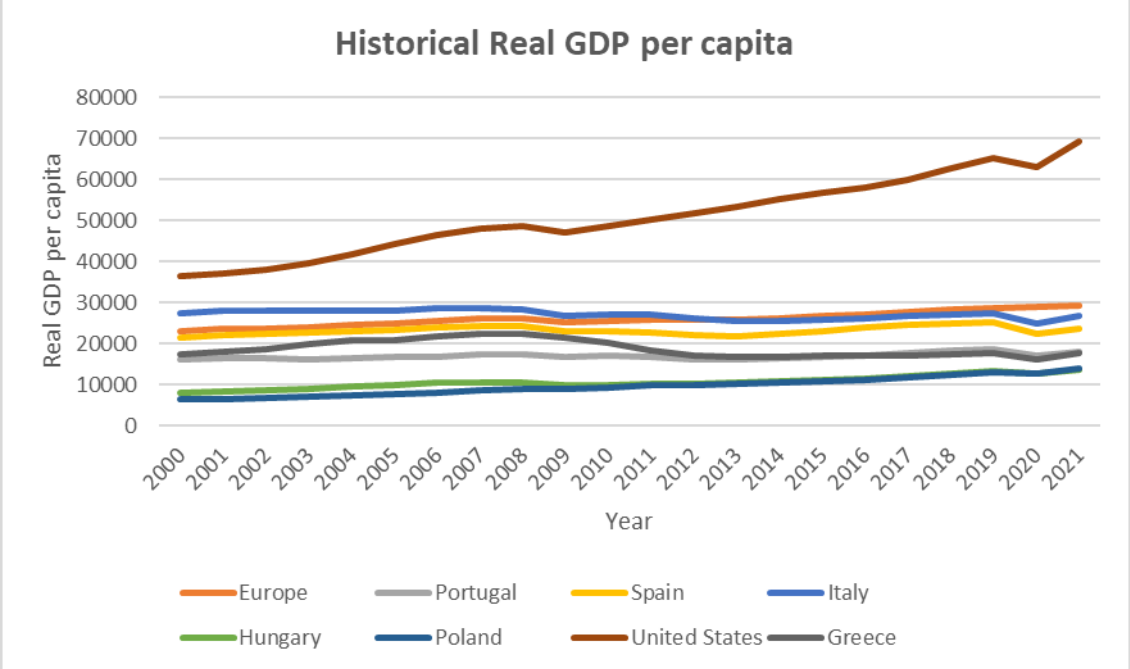
[2] Source: https://countryeconomy.com/countries/groups/european-union
[3] Source: https://tradingeconomics.com/country-list/social-security-rate?continent=europe

Figure 8: Share of households holding risky assets and mean risk aversion



[5]

Figure 9: Historical Real GDP per capita



[6]

[4] Source: https://www-statista-com.eu1.proxy.openathens.net/statistics/591409/household-net-adjusted-disposable-income/

[5] Source: https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2270~9c72a27c18.en.pdf

Figure 10: Ratio of country Real GDP to average European Real GDP

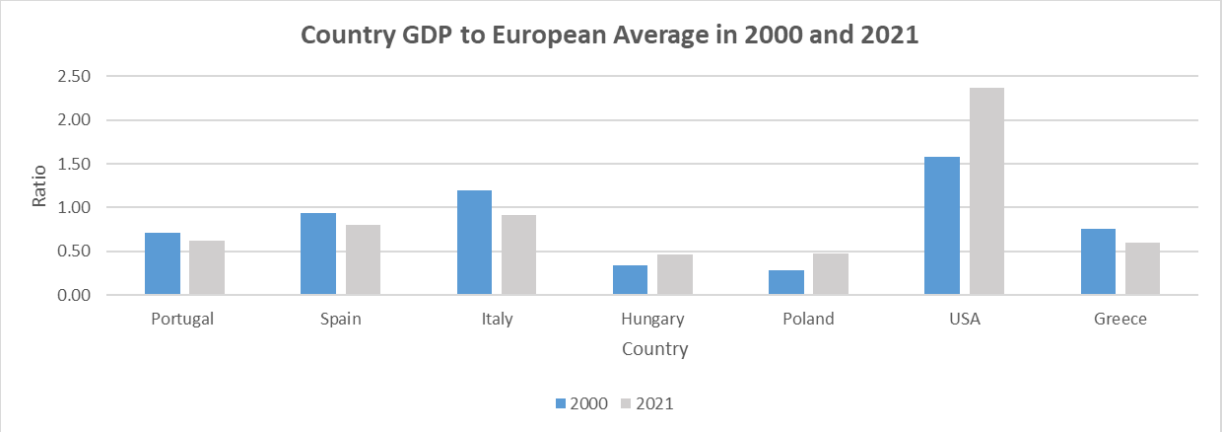
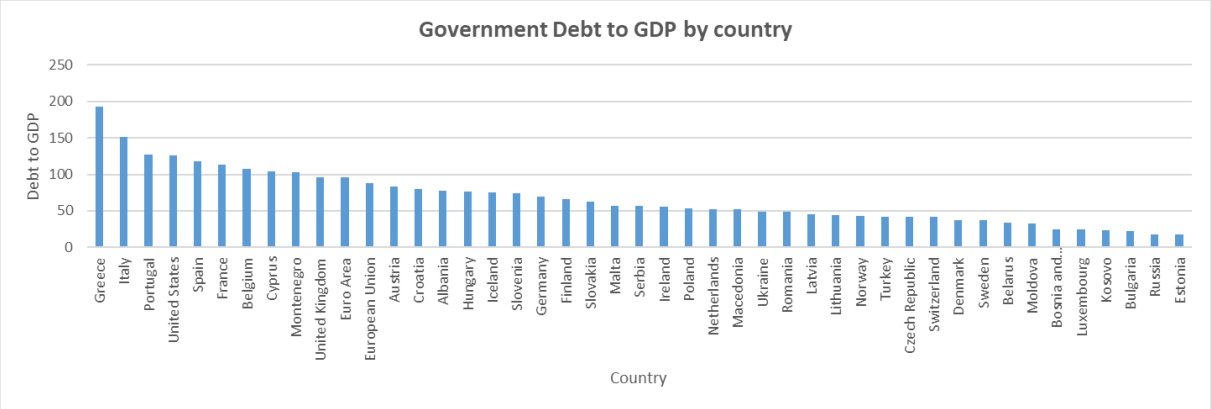
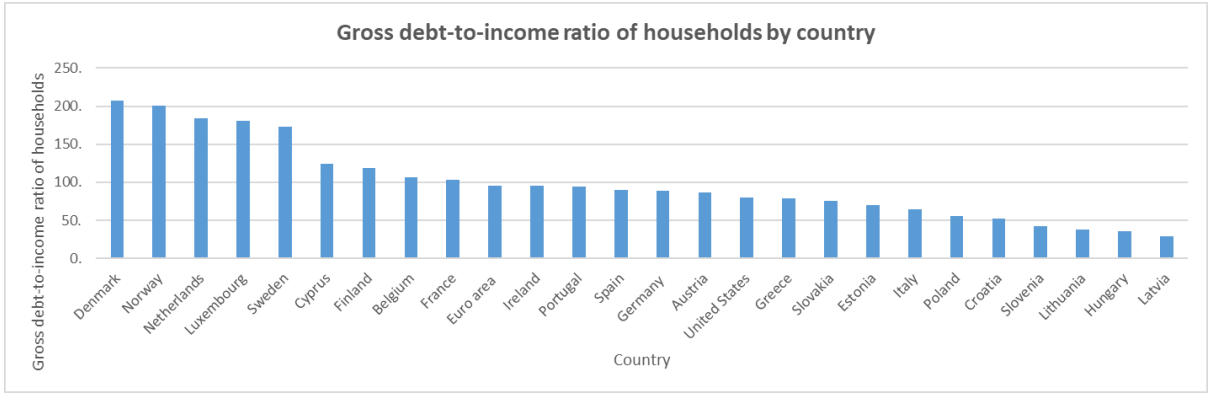


Figure 11: Government Debt to GDP by country



7

Figure 12: Gross debt-to-income ratio of households by country



8

6 Source: https://ec.europa.eu/eurostat/databrowser/view/sdg_08_10/default/table?lang=en

7 Source: https://tradingeconomics.com/country-list/government-debt-to-gdp?continent=europe

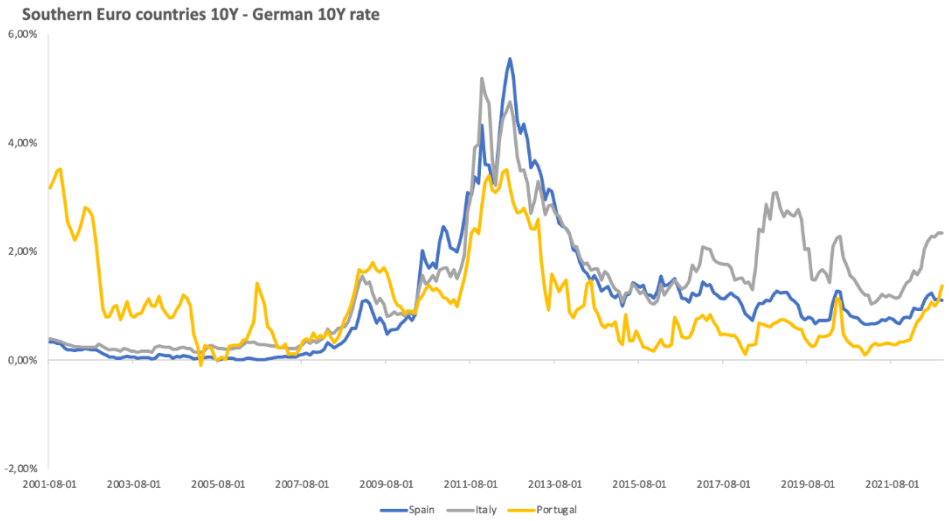
Figure 13: Average Number of Houses owned per country

PORTFOLIO SHARES

Country	Net own housing	Net financial	Net real	Net business	Net wealth< 0
AT	48	14	19	19	6
BE	48	25	18	8	3
DE	40	24	23	13	9
ES	48	15	28	9	4
FR	44	19	24	14	2
GR	52	60	35	7	3
IT	61	11	20	7	2
NL	53	29	16	2	14
PT	37	13	34	16	5
Average	**48**	**17**	**24**	**11**	**5**

Notes: Values in percentages. All values are averages over the two survey waves. Sample weights are used.
Source: HFCS 2013-2016.

Figure 14: Southern Euro Countries – German 10Y Rate



8 Source: https://ec.europa.eu/eurostat/databrowser/view/tec00104/default/table?lang=en

10 Source: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Distribution_of_equivalised_disposable_income_by_income_quintile,_2020_(%25).png

Figure 15: Euro Area 10Y Gov Bond Rates 2001-2022

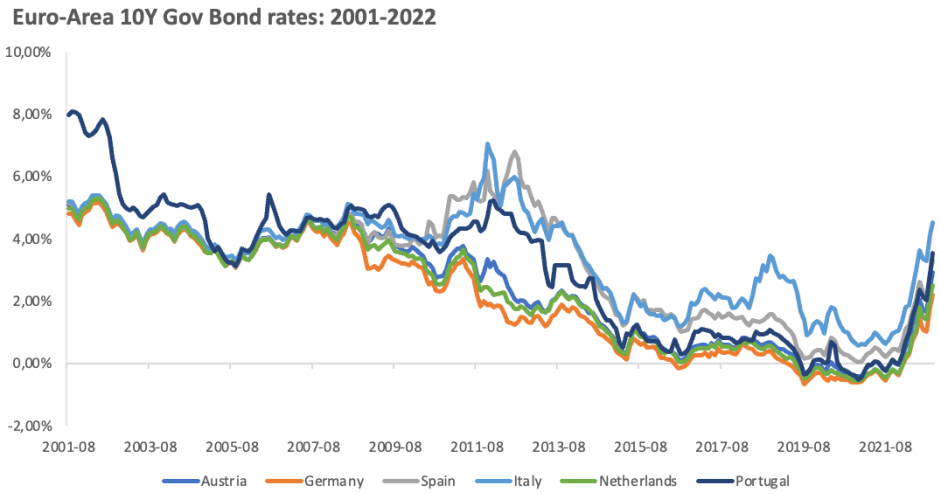
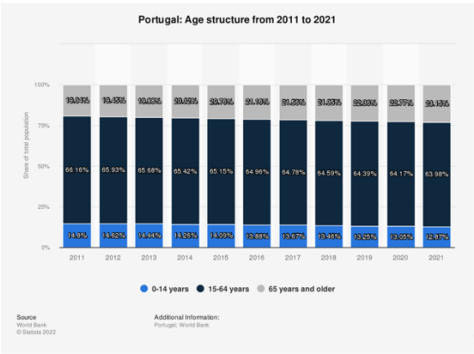
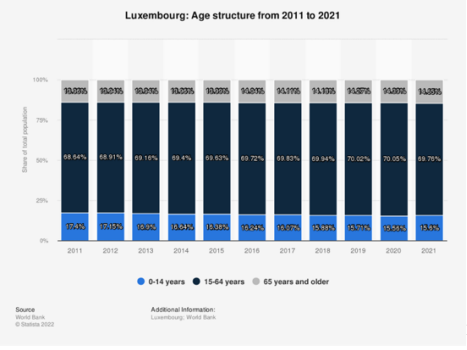


Figure 16: Portugal Age Structure 2001-2021



[9]

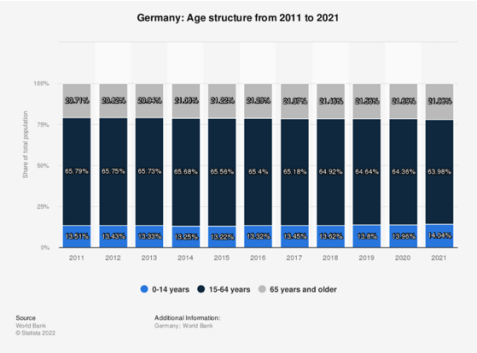
Figure 17: Luxembourg Age Structure 2001-2021



[10]

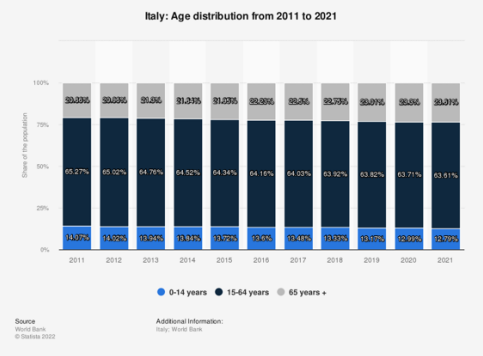
[9] Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/372171/age-structure-in-portugal/
[10] Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/380269/age-structure-in-luxembourg/

Figure 18: Germany Age Structure 2001-2021



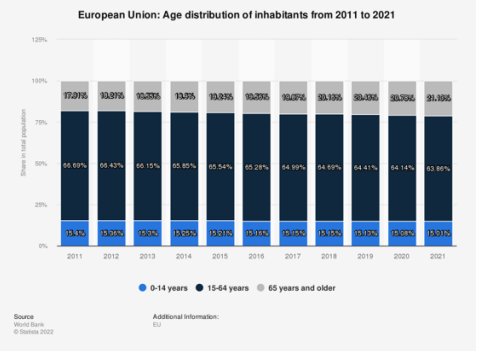
[11]

Figure 19: Italy Age structure 2001-2021



[12]

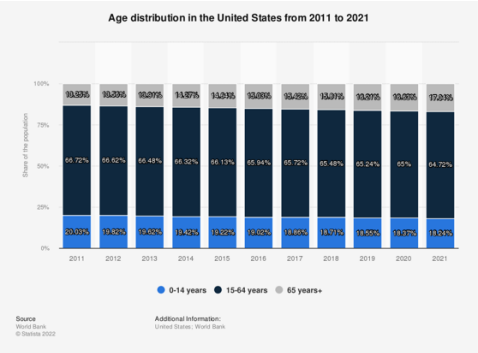
Figure 20: European Union Average Age structure 2001-2021



[13]

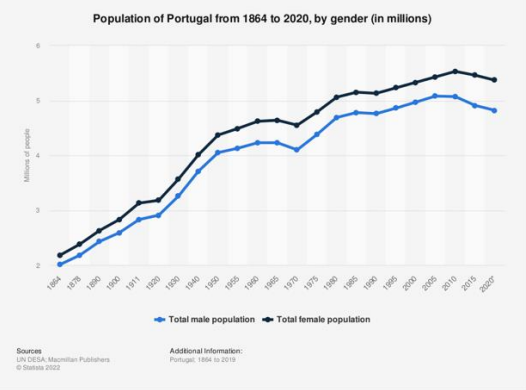
[11] Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/624306/age-structure-in-germany/
[12]Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/270473/age-distribution-in-italy/
[13] Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/253408/age-distribution-in-the-european-union-eu/

Figure 21: U.S. Age structure 2001-2021



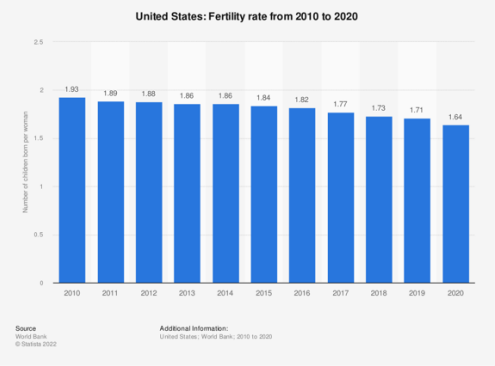
[14]

Figure 22: Population of Portugal 1864-2020, by Gender



[15]

Figure 23: US Fertility rate 2010-2020



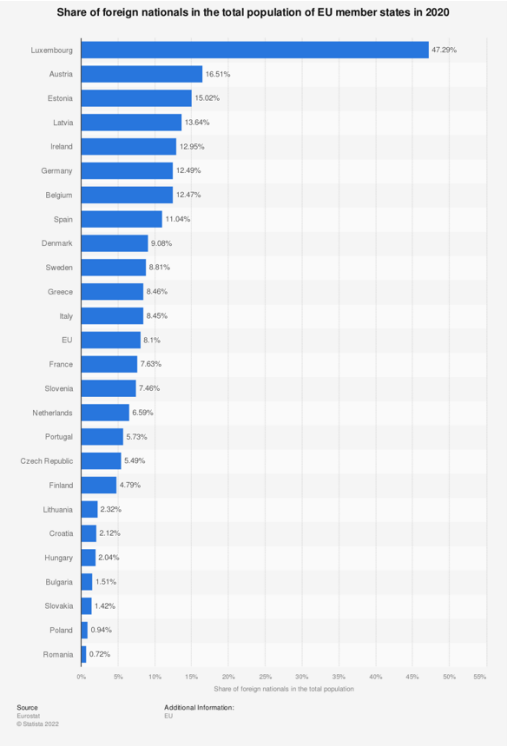
[16]

[14] Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/270000/age-distribution-in-the-united-states/

[15] Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/1017340/male-female-population-portugal-1864-2020/

[16] Source: https://www-statista-com.acces-distant.sciencespo.fr/statistics/269941/fertility-rate-in-the-us/

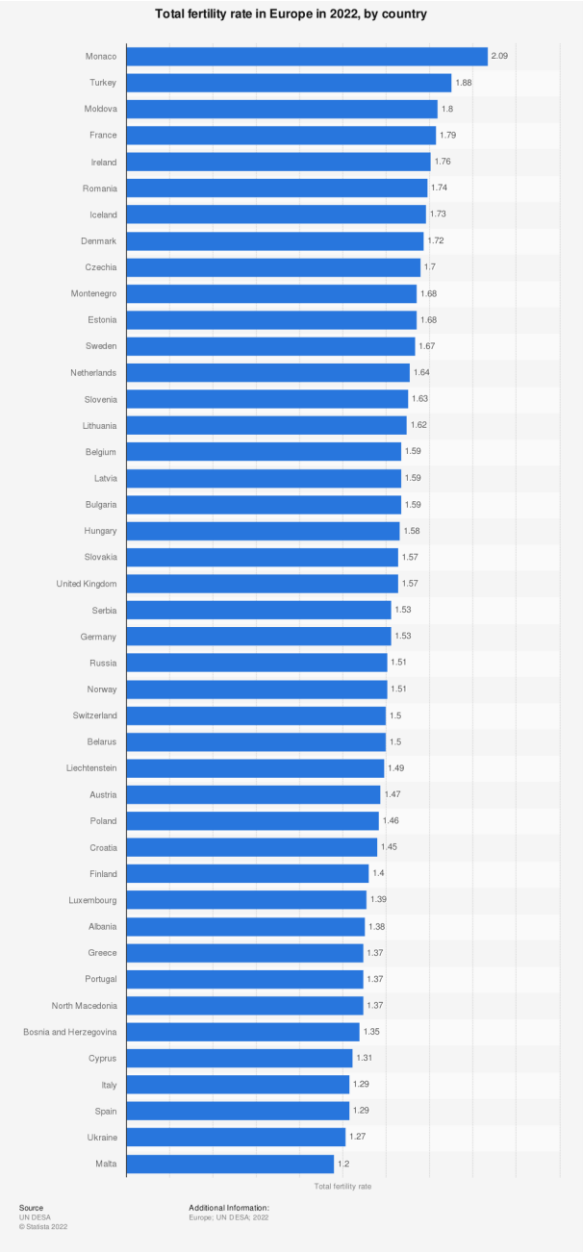
Figure 24: Share of foreign nationals in Europe



[17]

[17] Source: https://www-statista-com.eu1.proxy.openathens.net/statistics/266170/share-of-foreign-nationals-in-eu-member-states/

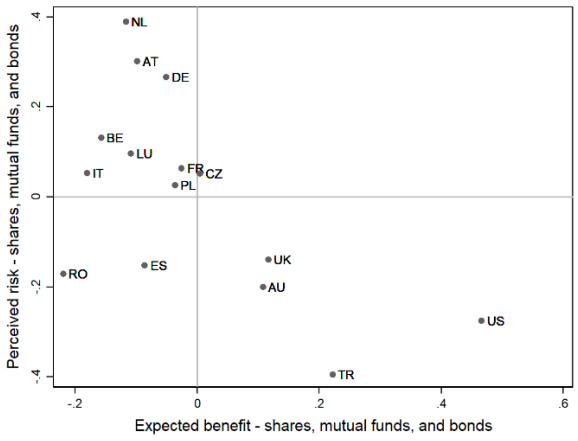
Figure 25: Total fertility rate in Europe in 2022



[18]

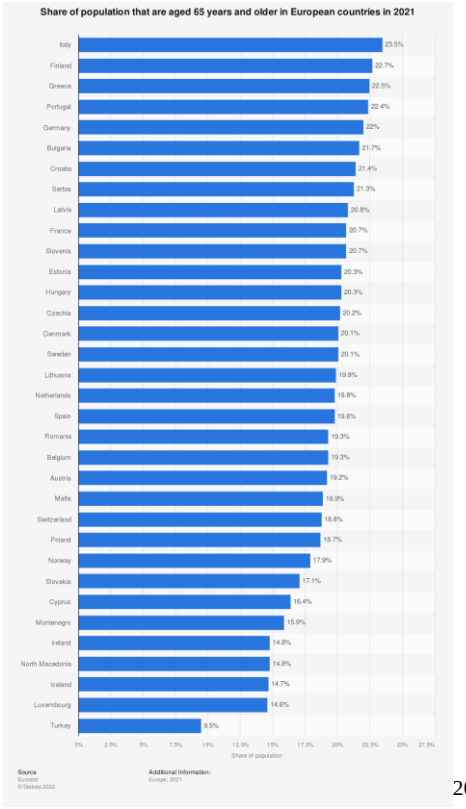
[18] Source: https://www-statista-com.eu1.proxy.openathens.net/statistics/612074/fertility-rates-in-european-countries/

Figure 26: Perceived risk - Expected benefit



19

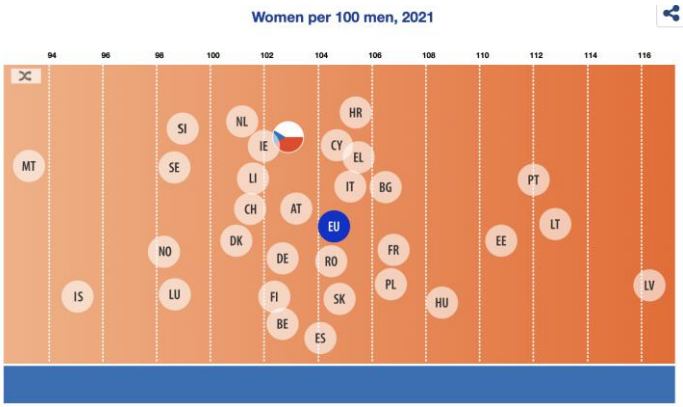
Figure 27: Share of the senior population in Europe, per country



20

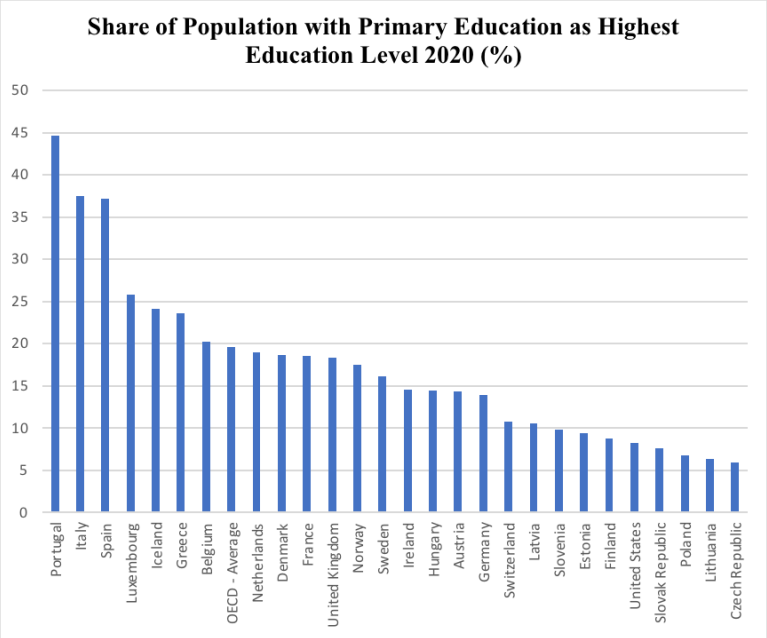
[19] Source: https://cepr.org/voxeu/columns/cross-country-differences-risk-attitudes-towards-financial-investment
[20] Source: https://www-statista-com.eu1.proxy.openathens.net/statistics/1105835/share-of-elderly-population-in-europe-by-country/

Figure 28: Women per 100 men 2021



[21]

Figure 29: Share of Population with Primary Education as Highest Education Level 2020 (%)

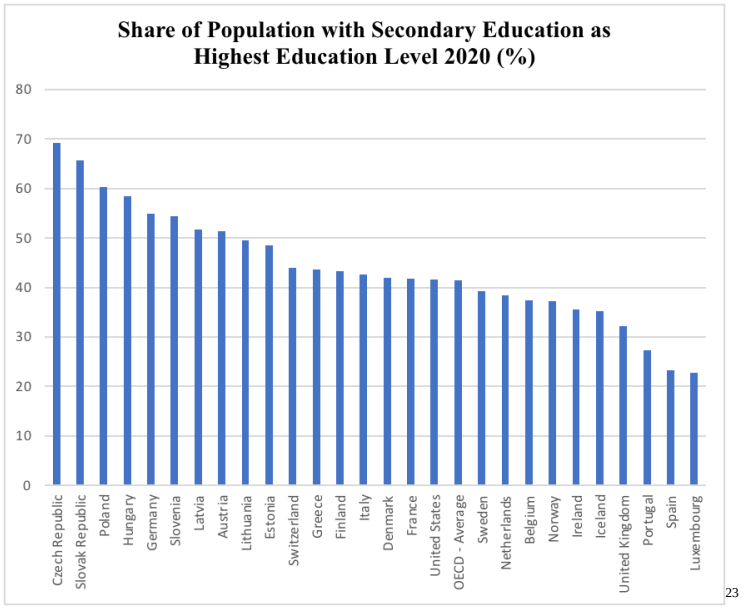


[22]

[21] Source: https://ec.europa.eu/eurostat/cache/digpub/demography/bloc-1b.html?lang=en#:~:text=Almost%205%20%25%20more%20women%20than,4.6%20%25%20more%20women%20than%20men.

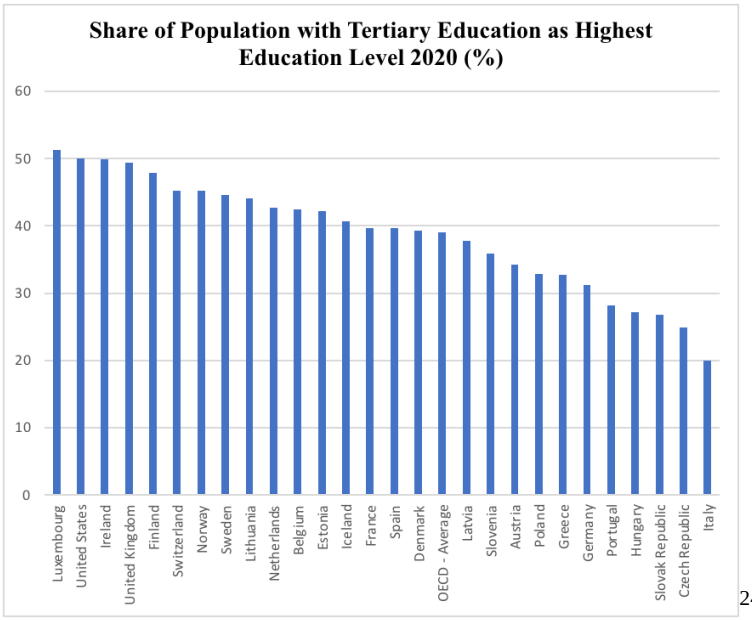
[22] Source: https://www.statista.com/statistics/1227301/share-of-oecd-population-with-primary-education-as-highest-education-level/

Figure 30: Share of Population with Secondary Education as Highest Education Level 2020 (%)



[23]

Figure 31: Share of Population with Tertiary Education as Highest Education Level 2020 (%)

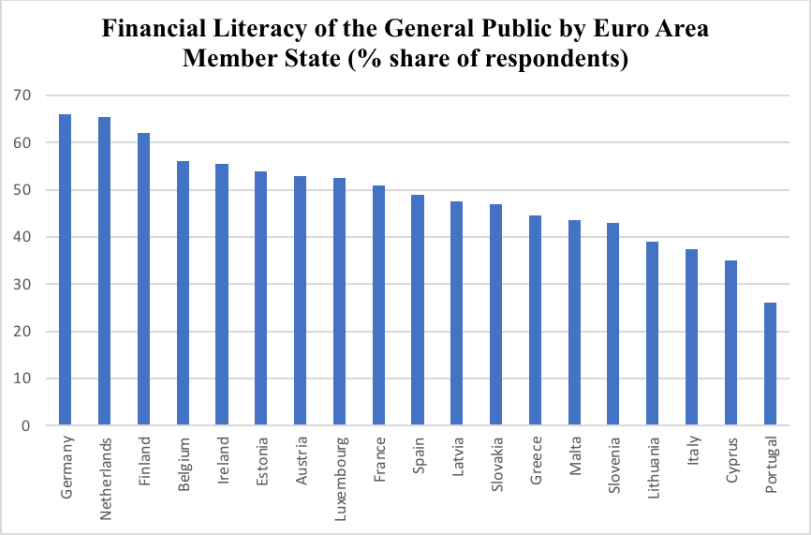


[24]

[23] Source: https://www.statista.com/statistics/1227294/share-of-oecd-population-with-secondary-education-as-highest-education-level/

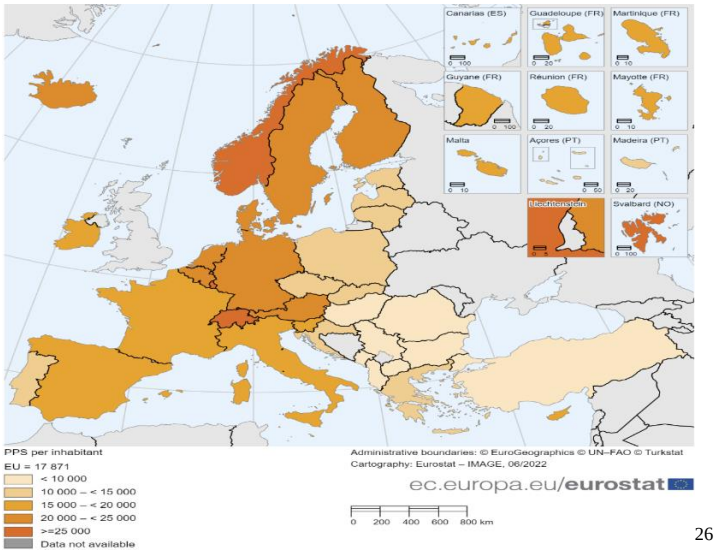
[24] Source: https://www.statista.com/statistics/1227287/share-of-people-with-tertiary-education-in-oecd-countries-by-country/

Figure 32: Financial Literacy of the General Public by Euro Area Member State



[25]

Figure 33: Median equivalized disposable income, 2020 (PPS per inhabitant)

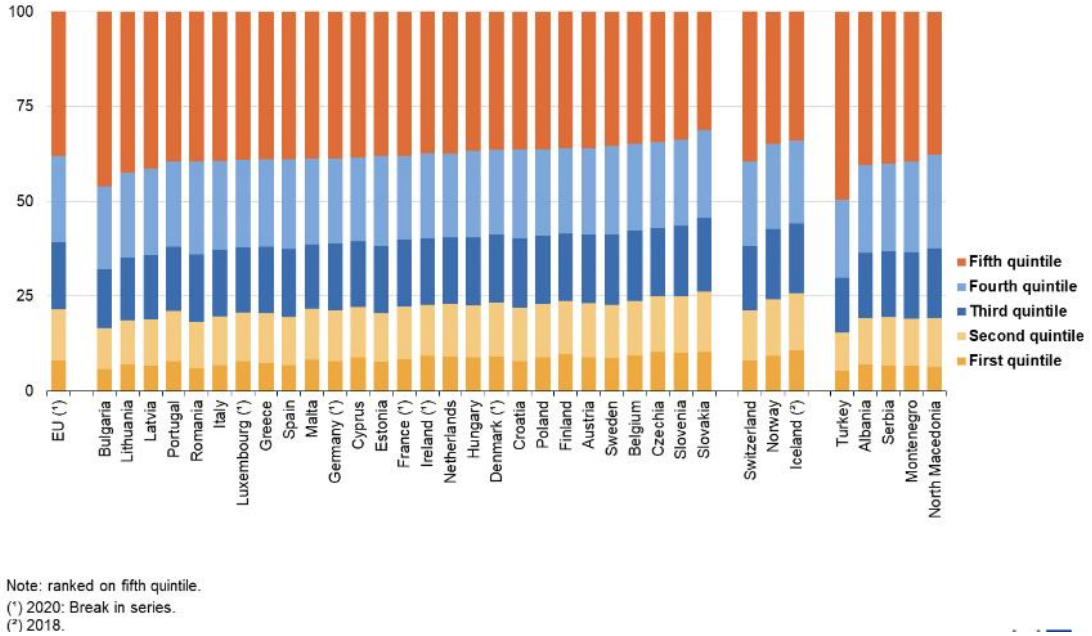


[26]

[25]Source:https://www.ecb.europa.eu/pub/economicbulletin/articles/2022/html/ecb.ebart202108_02~5c1e5a116d.en.html

[26]Source:https://ec.europa.eu/eurostat/statisticsexplained/images/b/ba/Map1._Median_equivalized_disposable_income_2020.png

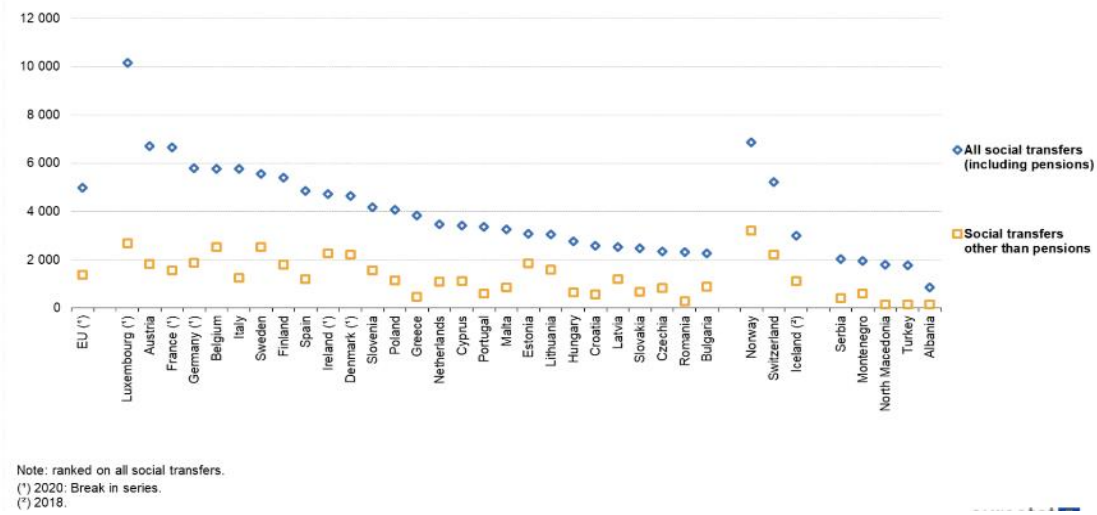
Figure 34: Distribution of equivalized disposable income by income quintile, 2020 (%)



Note: ranked on fifth quintile.
(¹) 2020: Break in series.
(²) 2018.

[27]

Figure 35:Contribution of social transfers to median equivalized disposable income, 2020 (PPS per inhabitant)



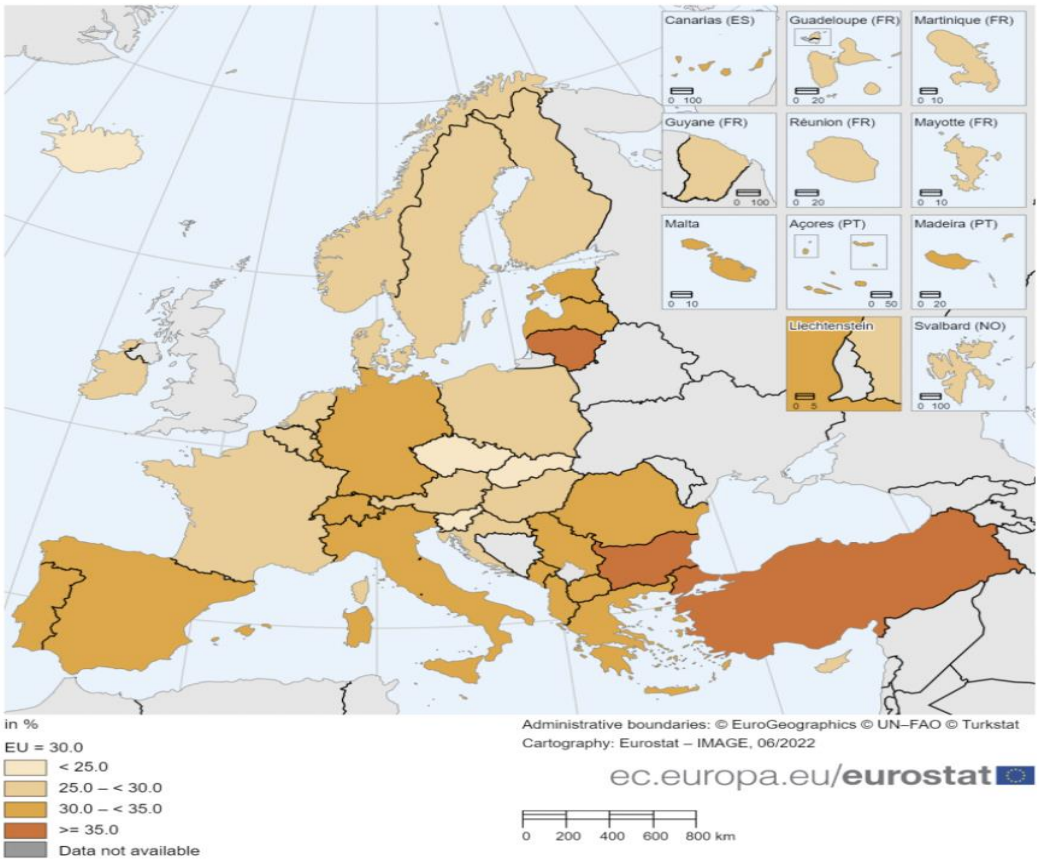
Note: ranked on all social transfers.
(¹) 2020: Break in series.
(²) 2018.

[28]

[27]Source:https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=File:Distribution_of_equivalised_disposable_income_by_income_quintile,_2020_(%5).png

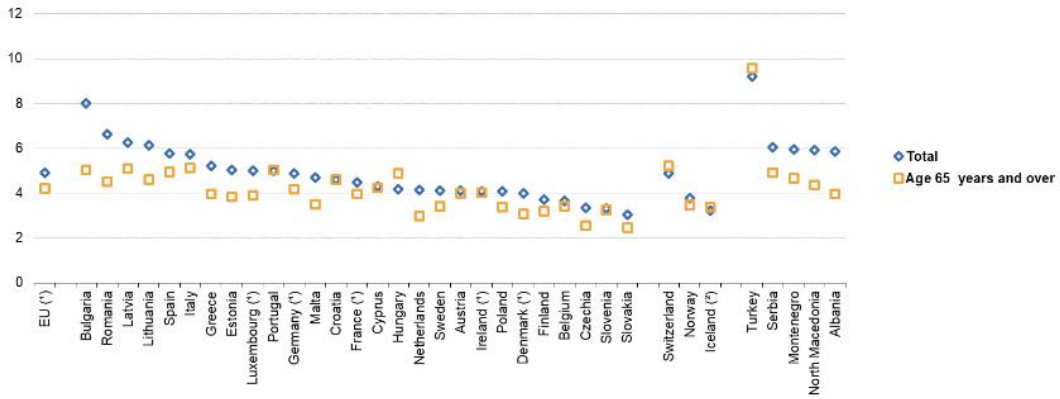
[28]Source:https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=File:Contribution_of_social_transfers_to_median_equivalised_disposable_income,_2020_(PPS_per_inhabitant).png

Figure 36: Gini coefficient for equivalized disposable income per inhabitant, 2020 (%)



[29]

Figure 37:Income quintile share ratio, 2020 (%)



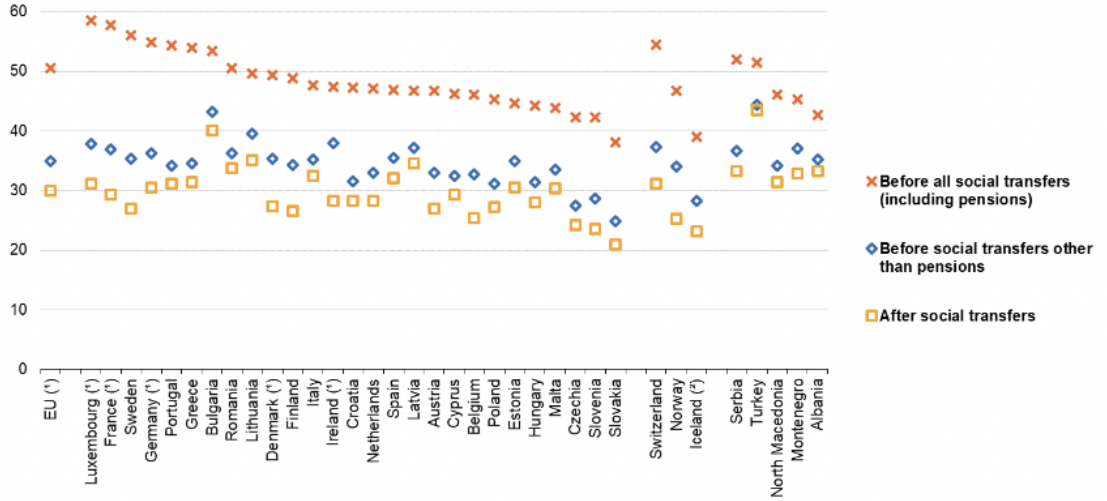
Notes: ranked on the total population; the income quintile share ratio (also referred to as the S80/S20 ratio) is calculated as the ratio of the total income received by
the 20 % of the population with the highest incomes (the top/fifth quintile) compared with the total income received by the 20 % of the population with the lowest incomes
(the bottom/first quintile).
(*) 2020: Break in series.
(²) 2018.

[30]

[29]Source:https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=File:Map_2_Gini_coefficient_for_equivalised_disposable_income_per_inhabitant,_2020.png

[30]Source:https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=File:Income_quintile_share_ratio,_2020_(%25).png

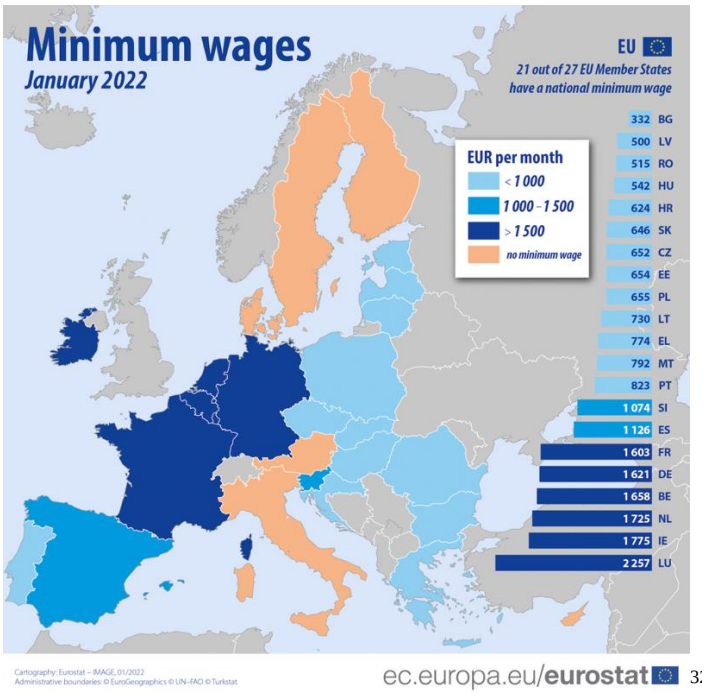
Figure 38:Gini coefficient for equivalized disposable income per inhabitant, 2020 (%)



Note: ranked on the Gini coefficient: before social transfers (pensions included in social transfers)
(*) 2020: Break in series.
(*) 2018.

[31]

Figure 39: Minimum wages January 2022

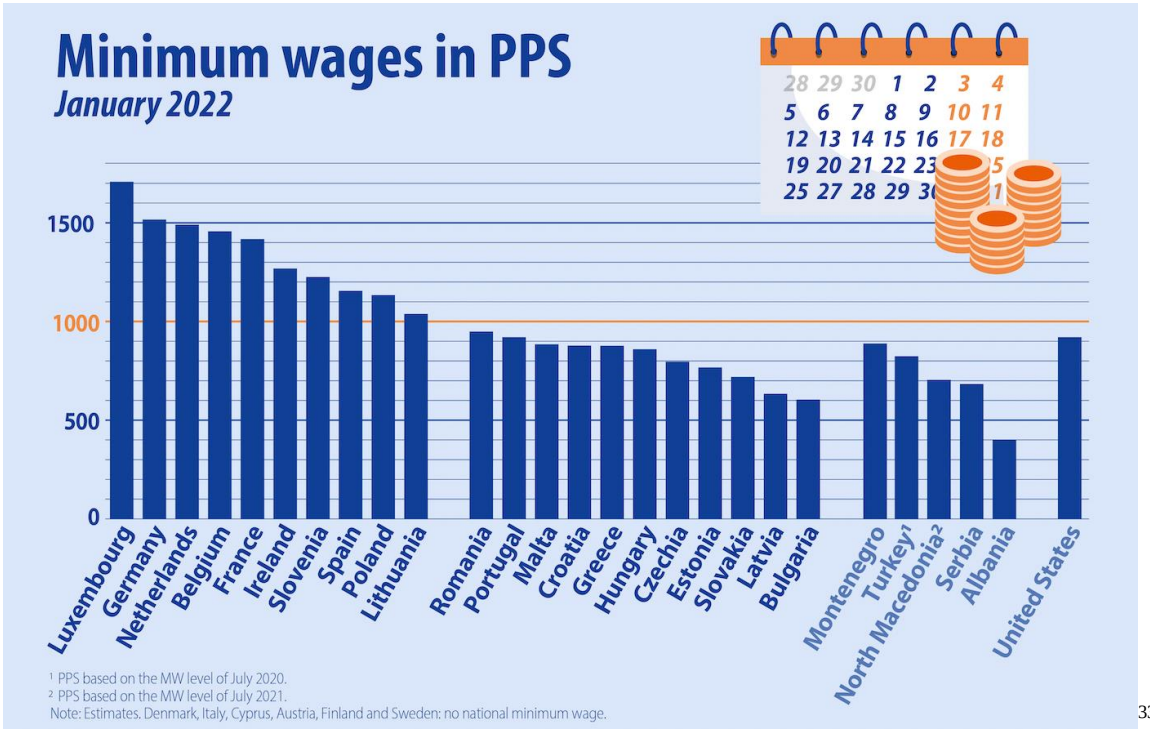


[32]

[31]Source:https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=File:Gini_coefficient_for_equivalised_disposable_income_per_inhabitant,_2020_(%25).png

[32]Source:https://ec.europa.eu/eurostat/documents/4187653/13722714/Minimum_wage_January2022_MAP.png/5ab6a55a-bcf4-0947-17a1-6d0ef810c365?t=1643304263741

Figure 40: Minimum wages in PPS January 2022



[33]

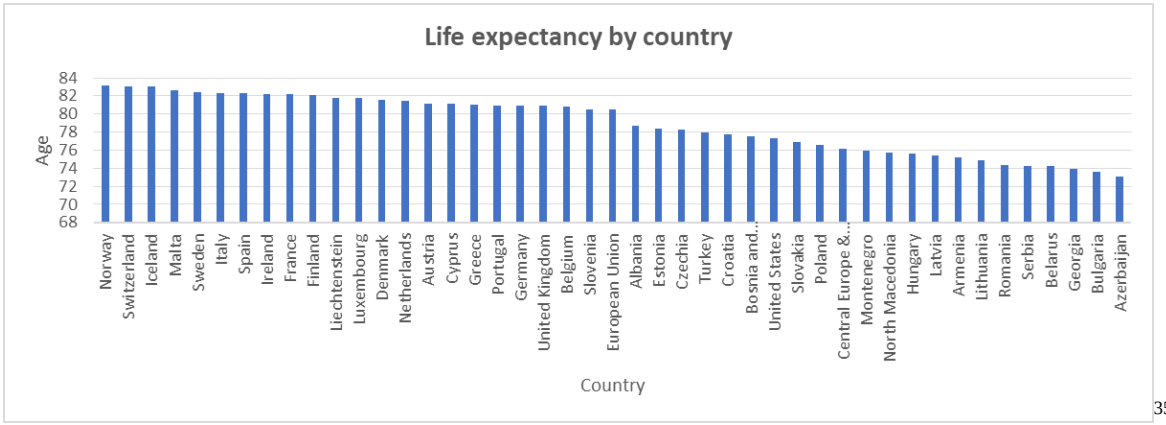
[33]Source:https://ec.europa.eu/eurostat/documents/4187653/13722714/Minimum_wage_January2022.png/0f0239de-ee2f-3e97-008f-cedd1a91dd2b?t=1643304385592

Figure 41: Mean income

GEO ↕	TIME	2020 ↕	2021 ↕
European Union - 28 countries (2013-2020)		:	:
Germany (until 1990 former territory of the FRG)		29 896 (b)	29 090
Ireland		30 709 (b)	31 832
Spain		18 116	18 103
France		25 382 (b)	25 973
Italy		20 449	20 278 (p)
Luxembourg		43 687 (b)	48 220 (b)
Poland		8 907	9 161 (p)
Portugal		12 696	13 113

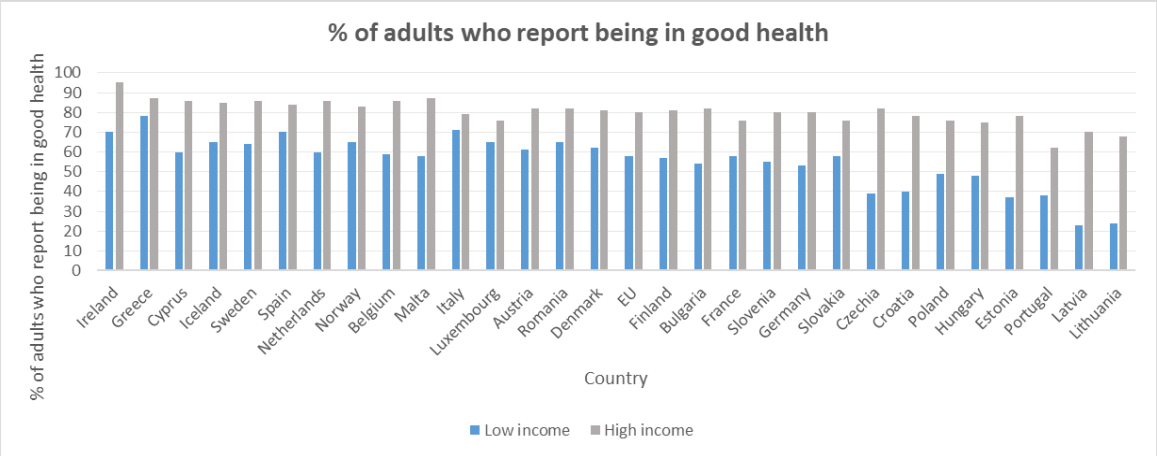
34

Figure 42:: Life expectancy at birth in each country



35

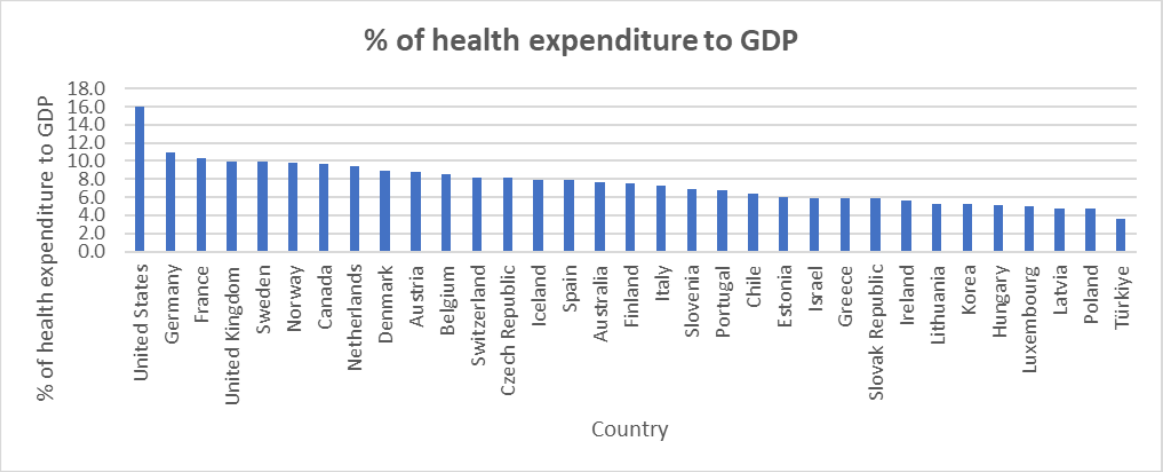
Figure 43: Portuguese people rate their health lower than most other EU citizens



36

[35]Source :https://ec.europa.eu/eurostat/databrowser/view/DEMO_R_MLIFEXP__custom_2539037/bookmark/table?lang=en&bookmarkId=d8bb5b19-65b5-4b47-a1e6-256e814b50a8

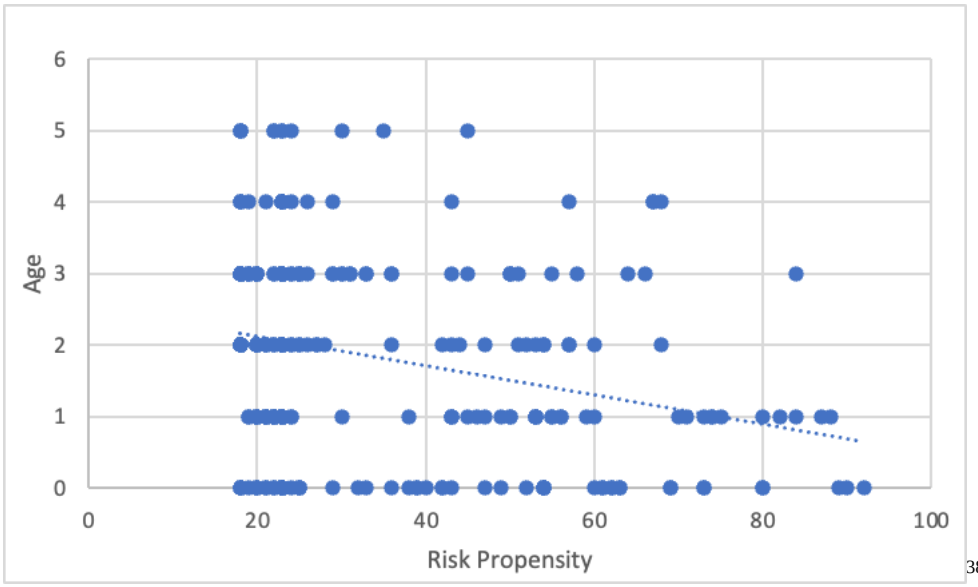
Figure 44:% of health expenditure to GDP by country



[37]

Regression

Figure 45: Risk propensity per Age



[38]

Figure 46: Survey Sample Distribution

Sample Distribution

Factor	Minimum	1st Quartile	Median	3rd Quartile	Maximum	Average	Mode
M / F	0	0	1	1	1	0,51	1
Age	18	22	24	50	92	35,22	23
Income	1	1	2	5	6	2,79	1
Education	1	4	4	5	6	4,00	4
Financial Literacy	0,00	0,44	0,56	0,78	1,00	0,55	0,44
Wealth	0	0	0	0	1	0,03	0

[36] Source: https://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions

[37] Source: https://stats.oecd.org/Index.aspx?ThemeTreeId=9

Portfolio allocation

Figure 47: Expected Return Monthly by Index

Expected Return Monthly		
STOXX	IEAC.L	SEGA.MI
0.37%	0.00%	0.03%

Figure 48: Expected Return Yearly by Index

Expected Return Yearly		
STOXX	IEAC.L	SEGA.MI
4.53%	-0.03%	0.41%

Figure 49: Expected Volatility Monthly by Index

Vol Monthly		
STOXX	IEAC.L	SEGA.MI
4.03%	1.39%	1.47%

Figure 50: Expected Volatility Yearly by Index

Vol Yearly		
STOXX	IEAC.L	SEGA.MI
13.95%	4.80%	5.08%

Figure 51: Portfolio allocation by risk and respective returns

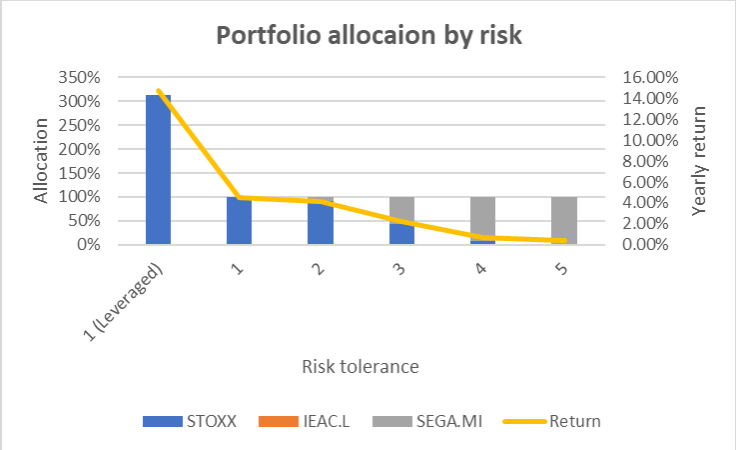


Figure 52: Return evolution between risks 3 and 4

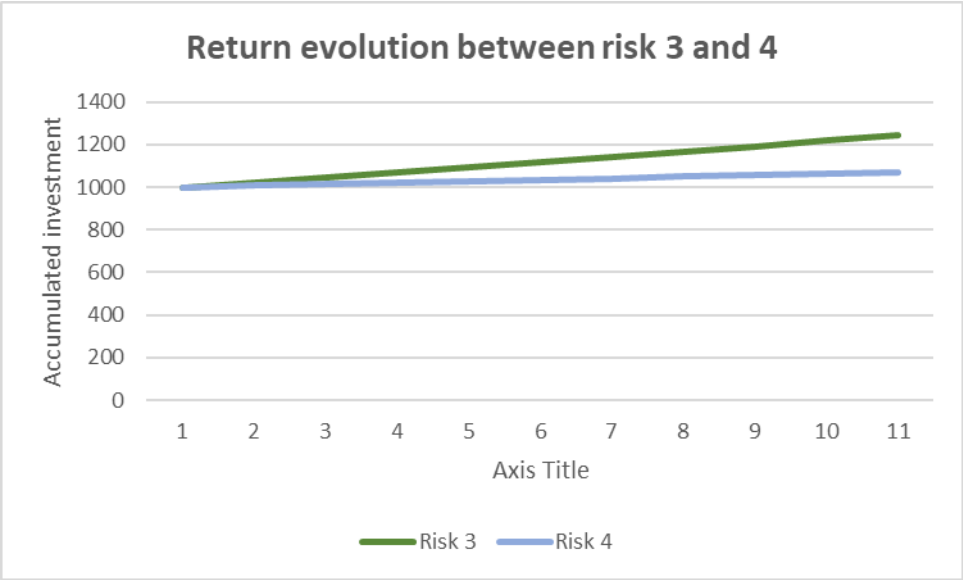


Figure 53: Summary indices and strategies analysis

	STOXX	IEAC.L	SEGA.MI	1 (Leveraged)	1	2	3	4	5
Monthly average	0.37%	0.00%	0.03%	1.15%	0.37%	0.34%	0.18%	0.06%	0.03%
Average Annual Return	4.44%	-0.03%	0.41%	14.76%	4.53%	4.15%	2.20%	0.69%	0.41%
Standard Deviation	13.95%	4.80%	5.08%	43.45%	13.93%	13.37%	10.00%	6.13%	5.07%
Info Sharpe	0.32	-0.01	0.08	0.34	0.33	0.31	0.22	0.11	0.08
Positive Months	58.17%	54.25%	56.29%	57.05%	57.05%	57.05%	57.05%	52.56%	53.85%
Monthly Skew	-0.61	-1.00	-0.50	-0.61	-0.61	-0.61	-0.55	-0.49	-0.50
Monthly Kurt	1.66	4.41	0.69	1.75	1.75	1.75	1.56	0.79	0.79
Montly Max	12.86%	4.85%	3.79%	40.14%	12.86%	11.79%	6.20%	3.14%	3.79%
Q3	2.82%	0.79%	0.96%	8.79%	2.82%	2.59%	1.36%	1.01%	0.96%
Med	0.94%	0.13%	0.22%	2.81%	0.90%	0.81%	0.33%	0.12%	0.16%
Q1	-1.64%	-0.54%	-0.86%	-5.01%	-1.61%	-1.48%	-0.78%	-0.82%	-0.83%
Monthly Min	-16.01%	-6.44%	-5.24%	-49.97%	-16.01%	-14.53%	-6.78%	-5.35%	-5.24%

Value at Risk

Figure 54: Monthly VaR (EWMA)

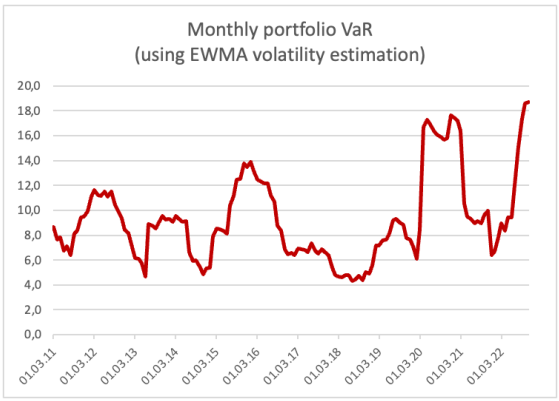


Figure 55: Portfolio 1 Leveraged

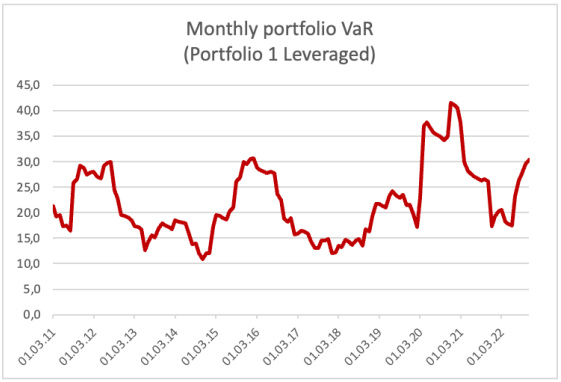


Figure 56: Portfolio 1

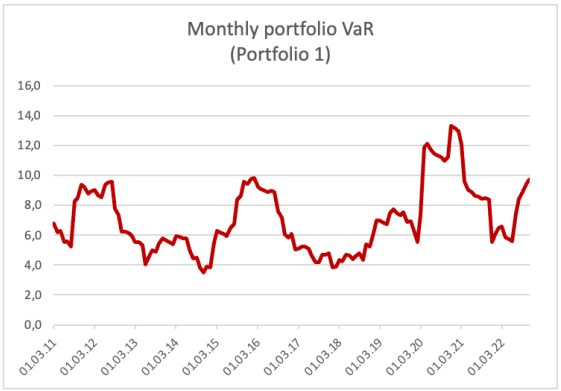


Figure 57: Portfolio 2

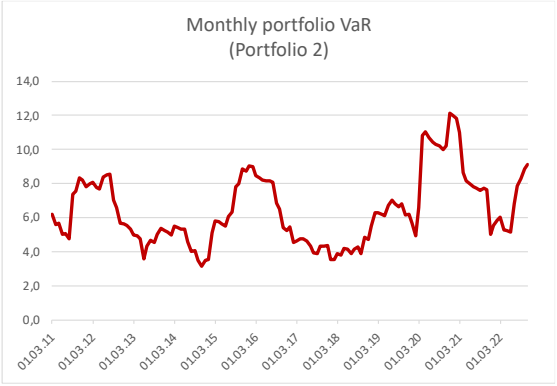


Figure 58: Portfolio 3

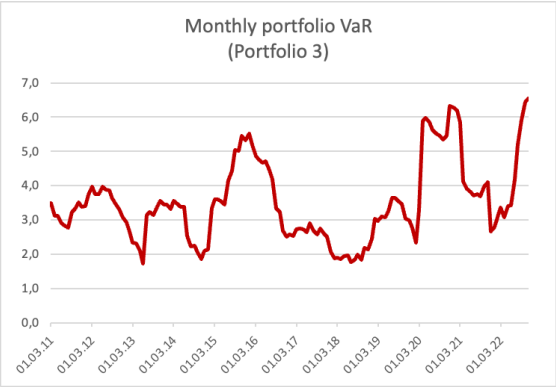


Figure 59: Portfolio 4

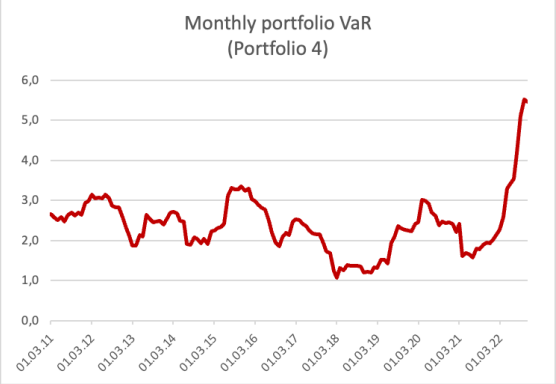


Figure 60: Portfolio 5