Households' Portfolio Behavior During the Covid-19 Pandemic: Evidence from Portugal

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ABSTRACT

Using data from the 2020 CNSF, the 2020 CMVM, and the 2023 CNSF surveys in Portugal, we extend the literature on household finance by examining the effects of financial literacy, …

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> "By facilitating participation and efficiency of both the economic and financial system, Capital Markets Union can facilitate a better reallocation of wealth, support the future financial well-being of EU citizens and help achieve a fairer participation of vulnerable social groups"
> ("A new vision for Europe's Capital Markets", Final Report of the High-Level Forum on the Capital Markets Union)"

1. Introduction

It is widely acknowledged among economists that savings are a key driver of capital accumulation, economic development, and wellbeing. It is also consensual that efficiently functioning financial systems are the catalyst for strengthening the linkage between savings and economic growth, and ultimately societal welfare (e.g., Mankiw, 2010).

The importance of households' savings and portfolio allocative behavior for aggregate economic performance has attracted increasing academic attention over the past decades for the field of household finance research (e.g., Campbell, 2006; Badarinza et al., 2016; Changwony et al., 2021; Gomes et al., 2021).

Theoretical positive and normative approaches to household finance have both advanced the field highlighting, respectively, how households should optimally allocate wealth to savings, and how to choose the composition of investment portfolios (e.g., Guiso and Sodini, 2013).

Research using data collected on extensive household finance surveys on aggregate data for households from different sources, made available empirical evidence, among others, on saving behavior, asset market participation, and household portfolio choice (e.g., Guiso et al., 2002; Badarinza et al., 2016).

For example, prior work has documented that households of European Union countries "are amongst the highest savers in the world" (Communication from the European Commission on the mid-term review of the CMU action plan (8 June 2017))".[1]

[1] According to U.S. News report by Sintia Radu on October 23, 2019, OECD data shows that the top 10 countries households with the highest personal savings rates in 2020 were Luxembourg, Switzerland, Sweden, Germany, Netherlands, South Korea, Hungary, Ireland, Estonia, and Slovenia; https://www.usnews.com/news/best-countries/slideshows/top-10-countries-with-the-highest-rates-of-household-savings?slide=12, accessed on October, 19 2023.

However, cross-country and intra-country household portfolio choice behavior is heterogeneous, and household participation in financial markets is also limited (e.g., Arrondel et al., 2016; Thomas and Spataro, 2018; Athreya et al., 2023).[2]

The relative low share of capital market assets hold in households portfolios, the so-called "participation puzzle", still is a challenging conundrum for financial economists (e.g., Guiso and Sodini, 2013; Wang et al., 2020; Oehler and Horn, 2023).[3]

The Covid19 pandemic has disrupted unprecedently the various facets of households' behavior, notably, in terms of attitudes towards consumption, savings, and portfolio asset allocation (e.g., Demertzis et al., 2020; Dossche and Zlatanos, 2020; Allllen and Rebiillllarrd, 2021; Dossche, Krustev et al., 2021; de Weijeret al., 2022; Yannelis and Amato, 2023).

As governmental lockdown measures, travel bans, and other kinds of restrictions, including stay-at-home 'lockdowns'; access to schools, workplaces, and other public places was severely constrained (and in certain cases partially replaced by teleworking); public gatherings were interdicted, riding public transit systems was limited (e.g., Demertzis et al., 2020).

As argued, among others, in Thomson (2020), the "worldwide response to the COVID-19 pandemic may be the first truly global natural experiment of the modern, big data era" (see also de Weijer et al., 2022).

In this paper, we investigate the determinants of households' savings and investment behavior in Portugal during the Covid-19 outbreak, namely the impact of households' financial literacy, using data from the CMVM 2020 survey, the CNSF (Conselho Nacional de Supervisores Financeiros) 2020 and 2023 surveys.

The paper contributes to the literature by providing evidence ….(to be completed)

Overall, results document that … (to be completed)

The remainder of the paper is organized as follows: the next section reviews relevant theoretical and empirical literature. Section 3 describes the research design, the data, and the specification of the empirical implementation. Section 4 presents and

[2] As argued in Athreya et al. (2023, p.2) "human capital returns is key in providing a path to understanding stock market participation over the life cycle."

[3] According to Hubar et al. (2020, p. 1-2),"in fifteen European-Union (EU) countries, China, and the US, risky asset shares are an increasing and convex function of household resources".

discusses results. The final section summarizes and offers concluding remarks and ideas for future research.

2. Theoretical and empirical background

Households allocate their resources intertemporally and intratemporally, under uncertain states of the world, aiming at optimizing the expected terminal well-being of their allocative behavior.[4]

Prior theoretical and empirical work, has laid down the foundations of the field of household financial economics, providing important predictions and empirical regularities on household in savings behavior, asset market participation, and household portfolio choice (e.g., Crockett and Friend, 1967; Gollier, 2002; Campbell, 2006; Guiso and Sodini, 2013).[5]

More recent empirical work has highlighted a number of empirical regularities on households' financial behavior, for example, in terms of: (*i*) the heterogeneity of households' saving rates, and intertemporal allocative behavior of saving resources (e.g., Alves and Cardoso, 2010; Le Blanc et al 2016; Gerhard et al., 2018; Yang, 2020); (*ii*) Financial markets participation (e.g., Christelis et al., 2013; (*iii*) Households' asset holdings, and portfolio composition (e.g., Arrondel et al., 2016); (*iv*) The relationship between psychological characteristics and household savings behavior (e.g., Gerhard et al., 2018);[6] (*v*) The impact of economic sentiment on households' financial decision-making (e.g., Białowolski, 2019); (*vi*) The effect of financial literacy on financial behavior (e.g., Xu et al., 2022; Oehler and Horn, 2023; Lusardi and Mitchell, 2023); (*vii*) The influence of cultural and institutional factors on households' financial behavior (Badarinza et al., 2016); (*viii*) The relationship of age and gender on financial market participation (e.g., Oehler and Horn, 2023); (*ix*) The impact of financial assets liquidity risk (e.g., Campanale et al., 2015); (*x*) The taxation effect on the wealth allocative behavior of households (e.g., Poterba, 2002); (*xi*) The importance of income hedging for

[4] Intertemporal allocation, in which households allocate wealth across time; intratemporal allocation, in which households invest saving resources in specific financial assets (e.g., Moro et al., 2017, online Appendix A).

[5] According to Thomas and Spataro (2018) "Households' stock market participation has significant effects on savings and on an economy's financial development and performance. Yet participation into capital markets is limited and quite heterogonous both among and within several countries. This phenomenon represents an empirical puzzle whose understanding is rather incomplete."

[6] It can be conjectured that "psychological characteristics influence an individual's propensity to save differently based on life-cycle stage, gender, education level, or income – factors which themselves also influence savings behavior" (Gerhard et al., 2018, p. 66-7).

financial market participation and asset allocative choices (e.g., Cardak and Wilkins, 2009; Bonaparte et al., 2014); (*xi*) The role of households' risk preferences on portfolio allocative behavior (e.g., Oehler and Horn, 2023); and (xii) The role of households' sociodemographic characteristics, such as, age, gender, wealth level, health status on households' savings behavior, financial markets participation, and portfolio composition choices (e.g., Crainich et al., 2017).

Households' behavior in terms of capital markets participation and life-cycle portfolio asset allocation choices, are prone to behavioral biases, such as, personality traits and temperaments, overconfidence, excessive self-belief, and propensity to risk taking, which can make them systematically deviate from rational choices (e.g., Gerhard et al., 2018; Białowolski, 2019; Vuković and Pivac, 2023; see, Beshears et al. (2018) for a comphreensive review of the behavioral household finance literature).

(to be completed)

3. Database Research Design, Data Description and Empirical Implementation

"The study of household finance is challenging because household behavior is difficult to measure" (Campbell, 2006, p. 1553). According to Badarinza et al. (2016, p. 2), household finance research "requires high-quality microeconomic data on household financial decisions". The field has developed "driven in part by the increasing availability of such data. Traditional household surveys have been augmented by administrative data from governments, financial institutions, and most recently technology companies that aggregate financial information for households" (Badarinza et al., 2016, p. 2). It is therefore appropriate to use surveys to analyze the problems at hand.

This paper uses the 2020 CMVM survey ('CMVM survey') of the Portuguese population carried out between 5/Oct/2020 and 12/Nov/2020 (first phase). The sample was stratified by gender, age, geographic location, and size of the town, with interviews with people aged 18 or over, using Computer Aided Telephone Interviews (CATI) for landline and mobile phones. At this stage, 15,173 contacts were made, which made it possible to identify 9,969 respondents who were (co)decision-makers, in their respective households, in matters of a financial nature[7].

The second phase of the survey took place between 19/Oct/2020 and 22/Jan/2021. At this stage, 2,207 people were interviewed through Computer Assisted Personal Interviews

[7] The survey was funded by the European Commission. Details of the survey can be found at Financial literacy for investors in the securities market in Portugal.pdf (cmvm.pt).

(CAPI), Computer Assisted Web Interviewing (CAWI) or CATI, depending on the possibility, due to fact that we were in the middle of the pandemic period.

The paper primarily analyzes responses to the question: "*Did you save money in any of the following ways in the last year? Answer even if you have already spent that money*." The alternatives provided were the following[8]: *I didn't save; I kept the money at home or in my wallet; I put the money in a savings account or time deposits; I bought investment products (stocks, mutual funds); I bought corporate bonds; I bought public debt (savings or Treasury certificates and/or Treasury bonds);* and *I saved in another way (gold, property, art, etc.).*

1,349 individuals (corresponding to 61.1% of respondents) reported having saved money in the last year, in (at least) one of the ways listed, while 811 respondents said they had not saved in the last year.[9]

A second survey was used.[10] It is the financial literacy survey of the Portuguese population, carried out within the scope of the Conselho Nacional de Supervisores Financeiros - CNSF ('CNSF survey'). The sample for this survey was stratified by gender, age, geographic location, employment status and level of education, with 1,502 individuals being interviewed. The door-to-door interviews were carried out between 13/Dec/2019 and 4/Feb/2020.[11] The main question of this 2020 CNSF survey analyzed in this text is the following: "*Did you save money in any of the following ways in the last year? Answer even if you have already spent that money*." Although this question is identical to that of the CMVM survey, the alternatives provided are slightly different:[12] *I left it in my checking account; I put the money in a term deposit account; I invested the money in bonds; I invested the money in stocks or mutual funds; I invested the money in crypto assets (such as virtual currencies or cryptocurrencies) or ICOs; I applied it in another way (transfers to the family abroad, purchase of gold, purchase of properties, purchase of art objects, ...); I kept the money at home or in my wallet; I gave the money to my family to save for me;* and *I didn't save.*

[8] Multiple answers allowed.
[9] 47 respondents did not answer this question.
[10] A more recent 2023 CNSF survey will be used as well. This survey will allow us to analyse how families responded to the normalization of the sanitary crises.
[11] Details of the survey can be found at Relatório do 3.º Inquérito à Literacia Financeira da população portuguesa (todoscontam.pt).
[12] Multiple answers allowed.

516 respondents said they had not saved in the last year and 978 (corresponding to 65.1% of those interviewed) reported having saved money in (at least) one of the listed ways.[13]

With the aim of analyzing the characteristics (sociodemographic or other) of individuals who saved money, and in order to use the same methodology for the databases collected in the two surveys, questions were identified that were asked identically in both questionnaires.[14] Some respondents did not respond to all questions, which is why the final sample used in this paper only includes 2,139 (1,282) respondents in the case of the CMVM survey (CNSF survey). A brief characterization of these samples is shown in Table 1.

[Table 1 here]

In both samples, around one in five respondents has completed higher or polytechnic education, respondents are mostly married and have a net monthly income between €500 and €2,500. However, in the CNSF survey's sample there is a higher prevalence of respondents residing in less populated towns.

There is a slight predominance of women in both samples. In terms of financial knowledge, the CMVM survey's sample has relatively more individuals who correctly answer all 8 financial literacy questions that were asked, or only get one wrong answer, and relatively fewer individuals who give more wrong answers. Self-assessment of financial knowledge is also more favorable in that sample, with 24.4% of individuals self-assessing their knowledge as higher or much higher than the average for the Portuguese population.

With regard to the type of information consulted, a little more than half of the respondents follow general news about the economy, with a relatively higher percentage of respondents in the CNSF survey's sample consulting information on the real estate market and legislation on financial products and services. Information relating to interest rates was reported by a relevant percentage of respondents in both samples.

[13] 8 respondents did not answer this question.
[14] And questions that, not being exactly the same, namely with regard to the alternatives provided, allow an identical or very similar treatment.

In the CMVM survey, among respondents who answered all the questions asked, 64.0% saved in the last year, a lower percentage than that in the CNSF survey (68.9%).[15] This means that the emergence of the health crisis is associated with a slight decrease in the percentage of savers in Portugal, despite the fact that it is recognized that the savings rate increased significantly in 2021 in our country.[16]

[Table 2 here]

Table 2 contains information on the sociodemographic characteristics of respondents who saved and of those who did not save. Among the first, more than half are women, active and married; some respondents very low levels of income (monthly net income of less than €500)[17] were able to save during the last year. On the other hand, education and income levels are differentiating factors between individuals who saved and those who did not, which occurs in both surveys.

[Table 3 here]

An alternative way of presenting the information in Table 2 is found in Table 3, which includes the percentages of savers and non-savers in each sociodemographic group. The most important conclusion that can be drawn from this Table 3 is that, in all the groups considered, in the 2020 CMVM survey the proportion of respondents who saved (compared to the 2020 CNSF survey) decreased. A preliminary conclusion of this analysis is, therefore, that the health crisis did have an impact on the saving behavior of several different socioeconomic groups.

(to be completed with the analysis of the 2023 CNSF survey).

[15] It should be recalled that the second phase of the 2020 CMVM survey took place between 19/Oct/2020 and 22/Jan/2021, and the 2020 CNSF survey between 13/Dec/2019 and 4/Feb/2020. Thus, the field work of the 2020 CNSF survey took place before the first confinement 'caused' by the emergence of the health crisis in Portugal and can therefore be considered to have taken place in a period of normality. In turn, the field work of the 2020 CMVM survey took place after the emergence of the health crisis, having already ended during the second confinement. Finally, the field work of the 2023 CNSF survey took place in 2023.

[16] Source: Statistics Portugal (INE). Neither of the two surveys collects information on the amount of savings made, but only on the existence of savings, which means that they do not allow inferences about the savings rate (as a percentage of GDP).

[17] From the numbers presented, it is also concluded that, among respondents with a net monthly income of less than €500, 65.6% did not save in the last year, according to the 2020 CMVM survey (60.2%, in the 2020 CNSF survey). In the case of respondents with a net monthly income of more than €2,500, identical percentages are 16.2% and 8.4%, respectively, in the 2020 CMVM survey and the 2020 CNSF survey (see also Table 3).

4. Methodology

With the aim of identifying the characteristics of individuals that may lead them to save, an econometric model is estimated, in which the variable of interest (*saved in the last year*) is used as a dependent variable in the model:

saved in the last year = f (sociodemographic, information, values and behaviors)

This model combines the different sociodemographic characteristics of respondents, their behaviors and values and the type of information they seek to assess the extent to which these characteristics, behaviors and values influence their preference for saving (to the detriment of consumption, or household deleveraging).

The explained variable results directly from the answers to a survey question (see the previous section), which was coded as 0, if the respondent did not save in the last year, and 1 if he/she saved (regardless of the mode of allocation of savings).[18] Since it is a binary variable, the various *logit* models are estimated by maximum likelihood.

Among the independent variables used, we have sociodemographic variables, and variables related to the behaviors and values of individuals (see details on the construction of these variables in Annex 1). In the latter case, both the 2020 CMVM survey and the 2020 CNSF survey include some questions that can be used for this purpose. Among these questions are the following: "*I would like to know how much you agree or disagree with the following statements*:

- "*It gives me more pleasure to spend money than to save for the future*"
- "*I personally and systematically control my personal finances*"
- "*Before I buy anything, I carefully ponder whether I can afford the expense*"

The answers to these three questions are coded on a Likert scale from 1 ("*I totally disagree*") to 5 ("*I totally agree*") and allow the construction of the binary variables "*spend money - yes*", "*control_no*" and "*ponder_no*", which are equal to 1 in cases where the answers are, respectively, "*totally agree*", "*totally disagree*" and "*totally disagree*". They also make it possible to create the binary variables "*spend money - yes*", "*control -*

[18] It should be remembered that the questionnaire is silent in relation to the amount actually saved.

high" and "*ponder - yes*", which are equal to 1 in cases where the answers are, respectively, "*totally disagree*", "*totally agree*" and "*totally agree*".

Another question allows the computation of a proxy for trust:[19] "*Do you read the contracts for financial products (for example, savings accounts, investments, loans, insurance) that you purchase?*". The alternatives are the following: "*yes, I read in great detail*"; "*yes, I read in some detail*"; "*yes, I read, but with little detail*"; "*I don't read, I trust what the employee at the counter transmits to me orally*"; "*I don't read, I don't give much importance*". We assume that a respondent who claims not to read the contracts for the financial products he buys because he trusts what the employee at the counter transmits to him orally is an individual who trusts others ("*trust*" is, therefore, a binary variable, which takes the value 1 for respondents who trust what the employee at the counter transmits to them orally, and the value 0 otherwise).

Finally, using 8 financial literacy questions (see Annex 2) and one question relating to self-assessment of financial literacy ("*on a scale of 1 (much lower than the average) to 5 (much higher than the average), how do you rate your financial knowledge when compared to the average of the Portuguese population*?"), a proxy for overconfidence is built. This indicator makes it possible to compare the self-assessment of each respondent with the effective knowledge revealed. In Annex 1 there are details on the construction of the qualitative variable "*ovenconfident*", which takes the value 1 in the case of individuals who show a more favorable self-assessment than their actual financial knowledge.

4. Results

4.1. The 2020 CMVM Survey

The methodology adopted was first applied to the 2020 CMVM Survey. The estimates of the various *logit* models are shown in Table 4. Columns [1] to [4] contain the estimates obtained for different groups of variables: in column [1] sociodemographic variables are used; in column [2] we use variables related to effective financial knowledge (*financial literacy - high* is a binary variable, equal to 1 if the respondent correctly answers 6, 7 or 8 financial literacy questions), the types of information that the respondent follows regularly (*type of information* is a discrete variable, which corresponds to the number – from 0 to 6 – of types of information that the respondent follows regularly), and

[19] This attitude is considered by some authors to be essential for understanding individual behavior (see, for example, Guiso et al., (2008), and Falk et al., (2018).

household wealth indicators (associated with the period during which the household could cover the respective expenses without borrowing money or without moving to another house, in a hypothetical situation where the household loses the main source of income); and in columns [3] and [4] indicators of values and behaviors of individuals (described in the previous section) are used. Finally, columns [5] and [6] tabulate the results obtained with the simultaneous introduction of all variables except overconfidence (column [5]) and including overconfidence (column [6]).

From a statistical point of view, several important conclusions emerge from these results. Firstly, the fact that statistically significant variables are found in the three sets of variables (sociodemographic characteristics; literacy, information and wealth; values and behaviors), which means that any microeconometric analysis of savings cannot leave aside any of those dimensions. Secondly, the fact that age, income, and wealth are highly significant, being the variables with the greatest contribution to the statistical significance of the estimated model (see, in particular, columns [5] and [6]). Thirdly, the stability of the signs of the estimated coefficients: except in one case (*control - no*, which changes from a negative sign in columns [3] and [4] to a positive sign in columns [5] and [6], but in none of these cases does this variable acquire statistical significance), the other variables maintain the signs of the respective estimates. Finally, the statistical significance of most variables is maintained, which also indicates the robustness of the results. It should also be noted that in 3 cases (*married*, *female* and *spend money - yes*) the simultaneous introduction of all the variables considered (columns [5] and [6]) brings about the statistical significance of these variables, and in 3 others (*income - low*, *ponder - yes* and *trust*) the statistical significance is lost.

[Table 4 here]

The relevance of the results is not limited, however, to aspects of a statistical nature, with the economic perspective being of particular interest. Thus, it is concluded that income strongly constrains the family capacity to save. In fact, compared to individuals with a net monthly income of less than €500 (the base category), those with a monthly net income of more than €2,500 are more likely to have saved in the last year (regardless of the amount saved), followed by respondents with a monthly net income of more than €1,000 (but less than €2,500). Evidence of a positive impact of income on savings is more

tenuous in the case of individuals with income between €500 and €1,000, where statistical significance is only found in column [1].

Wealth (measured by the ability to cover household expenses without borrowing money or moving to another house, in a situation of loss of the main source of income) is another strong constraint on savings: individuals who would be able to cover these expenses for more than 6 months (*loss income – no stress* variable) are more likely to have saved in the last year than the others, and individuals who could save for a very limited period of time (less than a week – *loss income - stress* variable) are less likely to have saved than the others.

We also conclude that schooling has a positive impact on household savings, with respondents who completed at least university or polytechnic education showing a greater probability of having saved in the last year than the others. A similar situation occurs with married people and women, but households with more than 5 members are less likely to have saved; age has a non-linear impact. The situation in the labor market (active *versus* non-active) does not differentiate the respondents, nor does their geographic location.

Regarding effective knowledge of matters of a financial nature, greater literacy is associated with a greater probability of having saved. Also, the greater concern with obtaining information on various matters of an economic and financial nature is associated with a greater likelihood of saving. In either case, obtaining information and effective knowledge will allow for better-founded financial decisions.

During the pandemic period, there are strong signs that behaviors and values have had an impact on individuals' saving. On the one hand, those who are overconfident and those who trust others are less likely to have saved in the last year than the others, which may indicate some optimism in the future evolution of the respective economic and financial situation and/or in the protection of the welfare state, if this becomes necessary in the future. On the other hand, individuals who personally and systematically control their personal savings, and those who, before buying anything, carefully ponder whether they can afford the expense, are more likely to have saved than others.[20] However, not having control over personal finances and not spending money for pleasure seem to have little impact on the savings of individuals who have these behaviors. Finally, respondents who, before making an expense, do not ponder whether they can afford it, and those who spend money for pleasure show a greater probability of having saved in the last year, a

[20] This conclusion is stronger when analyzing the results presented in columns [3] and [4].

less intuitive result that may be related to the fact that this survey took place in the middle of the pandemic period, when there were restrictions on people's mobility (both for leisure and work); faced with the increased difficulty in making expenses, these individuals may have made 'forced' savings.

4.2. The 2020 CNSF Survey

The methodology was also applied to the 2020 CNSF survey (results tabulated in Table 5). Again, the results are stable, which allows us to conclude that they are robust. Thus, the inclusion of all variables in the model (columns [5] and [6]) allows maintaining the sign and statistical significance of most independent variables. There are only 3 exceptions: in the cases of *occupation - not active* and *spend money - yes*, the sign of the estimated coefficient is maintained, although with loss of statistical significance (in bilateral tests); in the *trust* variable, there is loss of statistical significance, with alteration of the estimate sign.

In economic terms, the strong relevance of the variables wealth and income, and, to a lesser extent, schooling, effective knowledge, and information, as well as the non-linear impact of age, are confirmed. Women and the active are more likely to have saved. With regard to values and behaviors, these variables do not have a strong explanatory power during the pre-Covid period. Respondents who do not spend money for pleasure are more likely to have saved in the last year than others, and there is weaker evidence that spenders for pleasure and those that trust others are less likely to have saved. The other variables are not statistically significant for the usual confidence levels.

[Table 5 here]

4.3. The 2023 CNSF Survey

(to be completed)

4.4. Comparison of pre-Covid and Covid periods

The existence of two surveys of the Portuguese population in two periods that are close in time, but which differ due to the occurrence of a health crisis, allows a first assessment of the impact of Covid on household savings in Portugal. This is what we try to do in the next paragraphs, essentially using the results reported in columns [5] and [6] of Tables 4 and 5.

Our results suggest that, despite the problems created by the pandemic crisis, 'some things never change' with regard to the determinants of household savings, in particular with regard to the importance of income and wealth. A relevant number of variables maintain statistical (in)significance and the sign of the respective estimated coefficient. These are the cases of the variables schooling, gender, age, income (high and medium), wealth, financial literacy, regularly monitored news, residence, and lack of control over personal finances.

However, other variables have their statistical importance profoundly altered. The situation in the labor market, which contributed positively to the probability of an individual having saved in the last 12 months in the pre-Covid period,[21] ceased to have statistical relevance in the Covid period. This can be explained by the changes that occurred in the labor market during the health crisis, the emergence of simplified lay-off, the exceptional and temporary measures aimed at supporting families' income, the diminishing activity in the informal sector of the economy and the increasing, albeit not very expressive, unemployment rate and the consequent income loss (particularly in households with lower incomes).

Individuals who are married or in a *de-facto* union are more likely to have saved during the Covid period, and the family size contributed negatively to the probability of saving.

The most relevant difference between the pre-Covid and Covid determinants of saving concerns values and behaviors. These behavioral variables were seldomly relevant and gain significant relevance during the pandemic period. Individuals who, before buying anything, carefully ponder whether they can afford that expense are more likely to have saved in the Covid period than other individuals, when in the pre-Covid period there were no statistically significant differences between these two groups. This change may have been caused by mobility restrictions, which may have led less thoughtful respondents to limit their expenses and, therefore, to have an attitude towards savings that they did not have in 'normal' times.

Similarly, individuals who control their personal finances in a systematic and personal way, and those who are happier to spend money than to save for the future, have become more likely to save in the Covid period, perhaps as a result of that control,

[21] Both the active and the non-active were more likely to have saved in the last year than the unemployed.

together with restrictions on mobility, allowing them to refrain from spending and thus to save more.

Overconfident individuals, who in the pre-Covid period did not differ from others, are less likely to have saved in the Covid period. A possible explanation lies in the possible change in behavior of non-overconfident individuals: faced with an exceptional situation, they may have increased their willingness to save, while this did not occur with overconfident individuals. As a result, the overconfident individuals are less likely to have saved during the Covid period, convinced that it would be a temporary health crisis with a reduced impact, after which everything would return to normal, so it would not be necessary to change their attitude towards savings.

Finally, the variable *spend money - no* has, in the Covid period, a statistically insignificant coefficient, but which is positive and significant in the pre-Covid period. Also in this case, the change in statistical significance may be associated with a change that occurred in individuals who enjoy spending money more than saving for the future and in those who are indifferent between the pleasure of spending money and saving for the future.

4.4. Comparison of the Covid and post-Covid periods

(to be completed)

5. Allocation of savings

It is equally important to analyze the destination of the savings made in the last year, in order to verify whether or not the composition of these investments has changed.

There is information in both surveys that allows analyzing this issue. As mentioned in section 2, the CNSF surveys include the question "*Did you save money in any of these ways in the last year? Answer, even if you have already spent that money*", with the following possibilities provided (multiple answers allowed):

i) *I left it in my checking account*;

ii) *I put the money into my time deposit*;

iii) *I invested the money in bonds*;

iv) *I invested the money in stocks or mutual funds*;

v) *I invested the money in crypto assets (such as virtual currencies or cryptocurrencies) or ICOs*;

vi) *I applied the money in another way (transfers to the family abroad, purchase of gold, purchase of properties, purchase of art objects, etc.);*

vii) *I kept the money at home or in my wallet*;

viii) *I gave the money to my family to save it for me*;

ix) *I did not save*.

In the 2020 CMVM survey, the question is identical, but the alternatives given were slightly different (multiple answers allowed):

i) *I kept the money at home or in my wallet*;

ii) *I put the money in a savings account or in time deposits*;

iii) *I bought investment products (stocks, mutual funds*);

iv) *I bought corporate bonds*;

v) *I bought public debt (Treasury certificates, savings certificates, Treasury bonds*);

vi) *I saved in another way (gold, property, art, etc.)*

vii) *I did not save*.

Given the different sets of alternatives, and in order to be able to carry out the intended analysis, the following aggregations were carried out: in the CNSF surveys, alternatives i), v), vi), vii) and viii) were grouped, giving rise to the option "*other savings*". Identical option results, in the CMVM survey, from the aggregation of alternatives i) and vi). On the other hand, the aggregation of alternatives iv) and v) in the CMVM survey corresponds to alternative iii) in the CNSF surveys, henceforth referred to as "*invested in bonds*". Finally, alternative iv) in the CNSF surveys corresponds to alternative iii) in the CMVM survey, and is designated "*applied in shares*", while alternative ii) in the CNSF surveys is assumed to be identical to ii) in the CMVM survey, being designated "*applied in time deposits*".

[Table 6 here]

In the pre-Covid period, 7.0% of respondents who saved in the last year reported having invested those savings, in whole or in part, in the stock market or in investment funds, a percentage that rises to 12.4% during the health crisis (Table 6). The percentages of those who invested in bonds or time deposits also increased, with that of those who

made other investments decreasing, which indicates some reconfiguration of asset portfolios because of the pandemic crisis.

In the particular case of the securities market (investment in shares, bonds[22] or investment funds), it is interesting to note the different sociodemographic and behavioral characteristics that lead individuals to invest their recent savings in this market in the pre-Covid period and in the Covid period. Table 7 shows the estimation results of a logit model in which the dependent variable takes the value 1 if the respondent invested his recent savings in stocks, bonds or mutual funds, and the value 0 if he/she invested in other products (term deposits or other applications, including real estate).[23]

[Table 7 here]

Regarding the determinants of investments in securities, once again, some things never change: high income individuals, those who follow the news and those who do not experience the pleasure of shopping, tend to invest more in securities.

However, there are important differences between the two periods. During the health crisis, women became less likely than men to have invested their savings in securities. Or, from a slightly different perspective, men are now more likely than women to have invested their savings in stocks, bonds and/or mutual funds, which did not occur in the pre-Covid period. A possible explanation lies in the fact that women tend to value security more. In this period of high risk in terms of health and strong socio-economic uncertainty, women may have perceived investment in stocks, bonds, and funds as an additional source of risk and preferred investments perceived as safer.

The higher level of education (university degree) became a differentiator in the Covid period, indicating that a greater proportion of graduates invested their recent savings in stocks, bonds or investment funds. Individuals with higher levels of education might also have higher financial literacy. Individuals with higher financial literacy were more likely to invest in stocks, bonds and/or investment funds in the pre-Covid period, but this does not occur in the Covid period, which suggests that, during the health crisis, a relevant fringe of individuals with lower financial knowledge invested their savings in securities

[22] The concept of bonds must be understood here in a broad perspective, as in the CMVM survey it is not possible to isolate savings certificates and Treasury certificates from Treasury bonds.
[23] Only variables that are statistically significant in at least one of the regressions are tabulated; variables that did not prove to be statistically significant were omitted for simplicity.

(another possible explanation is the disinvestment in securities of individuals with higher literacy).

Wealth (measured by the period of time that the household would be able to pay the respective expenses if it lost its main source of income) is also a differentiating factor between the two periods, having proved to be a significant variable (and with a positive sign) in the Covid period. This could have resulted from a more accurate management of individual asset portfolios, which the longer time spent at home provided.

In the pre-Covid period of 'normality', residents in towns with up to 5,000 inhabitants were less likely to invest their savings in the securities market, a situation that ceased to be seen in the Covid period. Mobility restrictions may have led these residents to make more investments in securities, taking advantage of the conditions provided by remote work and digitization. These restrictions may also have led more individuals who find it difficult to judge whether they are able to incur expenses to apply the savings resulting from restrictions on economic activity (and, therefore, from the lower value of their expenses) in the securities market.

Regarding values and behaviors, individuals who do not ponder expenses are most probably more prone to invest in securities during high-risk periods.

(to be completed with the comparison with the 2023 CNSF results)

6. Concluding remarks

Even though the sanitary crisis led to a significant increase in the savings rate in Portugal, the results presented in this paper suggest that the percentage of savers fell during the period of the health crisis, suggesting a deepening of the difference between those who save and those who do not save, the former having started to save much more (considering the increase in the savings rate in Portugal).

Regarding the determinants of the saving attitude, some things never change: schooling, gender, age, income, place of residence, wealth, financial literacy and regular monitoring of information have a similar impact on savings in times of crisis and in normal times. This means that any policy measures aimed at increasing savings can look at these savings constraints in a homogeneous way in periods of crisis and normality, particularly in the cases of wealth and income.

However, pandemic period brought about changes in the determinants of savings. These are the cases of the situation in the labor market, family size and marital status. The most impressive change regards values and behaviors. Individuals who, before buying

anything, carefully ponder whether they can afford that expense, individuals who control their personal finances in a systematic way, and those who are happier to spend money than to save for the future, have become more likely to save in the Covid period. Overconfident individuals became less likely to save in the Covid period. The increase in the explanatory power of these variables leads us to conclude that in uncertain times values, attitudes and behaviors make a difference.

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Table 1: Descriptive analysis of the samples

	2020 CMVM survey		2020 CNSF survey	
	#	%	#	%
Concluded University/Polytecnic degree	401	18.8	269	21.0
Married	1 339	62.6	800	62.4
Occupation - Active	1 184	55.4	727	56.7
Gender - Female	1 107	51.8	668	52.1
Monthly net income				
> 2 500€	290	13.6	166	13.0
< 500€	151	7.1	161	12.6
Residence: town with up to 4 999 inhabitants	578	27.0	613	47.8
Financial literacy				
Self-evaluation: higher or much higher than the average	522	24.4	169	13.2
Number correct answers: 7 or 8	437	20.4	166	13.0
Number correct answers: 0, 1 or 2	74	3.5	238	18.6
Type of information				
Real estate	457	21.4	389	30.3
Legislation	160	7.5	217	16.9
Stock market	308	14.4	193	15.1
General news about the economy	1 183	55.3	662	51.6
Interest rates	737	34.5	390	30.4
Did not save in the last year	771	36.0	399	31.1
Number of respondents	2 139	100.0	1 282	100.0

Table 2: Who saved and did not save - Descriptive analysis (1)

	CMVM survey				CNSF survey			
	Saved		Did not save		Saved		Did not save	
	#	%	#	%	#	%	#	%
Concluded University/Polytecnic degree	324	23.7	77	10.0	244	27.6	25	6.3
Married	885	64.7	454	58.9	563	63.8	237	59.4
Occupation - Active	802	58.6	382	49.5	549	62.2	178	44.6
Gender - Female	708	51.8	399	51.8	458	51.9	210	52.6
Monthly net income								
> 2 500€	243	17.8	47	6.1	152	17.2	14	3.5
< 500€	52	3.8	99	12.8	64	7.2	97	24.3
Residence: town with up to 4 999 inhabitants	366	26.8	212	27.5	412	46.7	201	50.4
Total	1 368	100.0	771	100.0	883	100.0	399	100.0

Table 3: Who saved and did not save - Descriptive analysis (2)

	2020 CMVM survey					
	Saved		Did not save		Total	
	#	%	#	%	#	%
Concluded University/Polytecnic degree	324	80.8	77	19.2	401	100.0
Married	885	66.1	454	33.9	1 339	100.0
Occupation - Active	802	67.7	382	32.3	1 184	100.0
Gender - Female	708	64.0	399	36.0	1 107	100.0
Monthly net income						
> 2 500€	243	83.8	47	16.2	290	100.0
< 500€	52	34.4	99	65.6	151	100.0
Residence: town with up to 4 999 inhabitants	366	63.3	212	36.7	578	100.0
Total	1 368	64.0	771	36.0	2 139	100.0

	2020 CNSF survey					
	Saved		Did not save		Total	
	#	%	#	%	#	%
Concluded University/Polytecnic degree	244	90.7	25	9.3	269	100.0
Married	563	70.4	237	29.6	800	100.0
Occupation - Active	549	75.5	178	24.5	727	100.0
Gender - Female	458	68.6	210	31.4	668	100.0
Monthly net income						
> 2 500€	152	91.6	14	8.4	166	100.0
< 500€	64	39.8	97	60.2	161	100.0
Residence: town with up to 4 999 inhabitants	412	67.2	201	32.8	613	100.0
Total	883	68.9	399	31.1	1 282	100.0

Table 4: Logit model, 2020 CMVM survey

	CMVM survey					
	[1]	[2]	[3]	[4]	[5]	[6]
Family size - Big	-1.547 ***				-1.588 **	-1.561 **
	(-2.75)				*(-2.30)*	*(-2.24)*
Occupation - Active	0.375				0.314	0.326
	(1.54)				*(1.26)*	*(1.31)*
Occupation - Not Active	0.078				0.040	0.042
	(0.31)				*(0.15)*	*(0.16)*
Married	0.168				0.266 **	0.274 **
	(1.52)				*(2.26)*	*(2.32)*
Education - High	0.633 ***				0.408 **	0.395 **
	(4.20)				*(2.52)*	*(2.44)*
Gender - Female	0.102				0.236 **	0.250 **
	(1.04)				*(2.25)*	*(2.38)*
Age	-0.101 ***				-0.117 ***	-0.118 ***
	(-5.46)				*(-6.03)*	*(-6.05)*
Age x Age	0.001 ***				0.001 ***	0.001 ***
	(5.16)				*(5.54)*	*(5.54)*
Income - High	2.102 ***				1.404 ***	1.379 ***
	(8.78)				*(5.42)*	*(5.33)*
Income - Average	1.446 ***				1.046 ***	1.026 ***
	(7.69)				*(5.24)*	*(5.13)*
Income - Low	0.420 **				0.235	0.228
	(2.20)				*(1.17)*	*(1.13)*
Town - Small	0.118				0.105	0.102
	(1.11)				*(0.94)*	*(0.91)*
Financial literacy - High		0.327 ***			0.217 **	0.157
		(3.30)			*(2.01)*	*(1.39)*
Type of information		0.429 ***			0.334 ***	0.329 ***
		(7.25)			*(5.63)*	*(5.54)*
Loss Inc - No Stress		1.172 ***			1.115 ***	1.118 ***
		(9.65)			*(8.39)*	*(8.38)*
Loss Inc - Stress		-1.427 ***			-1.116 ***	-1.092 ***
		(-4.56)			*(-3.18)*	*(-3.11)*
Ponder - No			1.084 **	1.167 **	0.864	0.908 *
			(2.39)	*(2.50)*	*(1.61)*	*(1.69)*
Ponder - Yes			0.354 ***	0.351 ***	0.158	0.160
			(3.33)	*(3.27)*	*(1.29)*	*(1.30)*
Control - High			0.182 *	0.177 *	0.229 *	0.225 *
			(1.76)	*(1.69)*	*(1.91)*	*(1.87)*
Control - No			-0.108	-0.164	0.032	0.003
			(-0.27)	*(-0.40)*	*(0.06)*	*(0.01)*
Spend money - No			-0.165	-0.145	-0.073	-0.074
			(-1.55)	*(-1.34)*	*(-0.59)*	*(-0.60)*
Spend money - Yes			0.156	0.188	0.401 *	0.408 *
			(0.83)	*(0.99)*	*(1.90)*	*(1.92)*
Trust			-0.467 ***	-0.434 ***	-0.162	-0.157
			(-3.53)	*(-3.27)*	*(-1.07)*	*(-1.04)*
Overconfident				-0.789 ***		-0.351 **
				(-5.31)		*(-2.05)*
# Observations	2139	2139	2139	2139	2139	2139
McFadden R2	0.100	0.106	0.015	0.026	0.172	0.174
LR stat.	279.4	297.4	41.1	71.7	481.5	486.1
Prob(LR stat.)	0.000	0.000	0.000	0.000	0.000	0.000

Notes: 1) The models include a constant; 2) The matrix of variances and covariances was calculated using the Huber-White method; 3) Z statistics in parentheses; 4) *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Table 5: Logit model, 2020 CNSF survey

	CNSF survey					
	[1]	[2]	[3]	[4]	[5]	[6]
Family size - Big	-0.487				-0.168	-0.181
	(-1.58)				*(-0.45)*	*(-0.48)*
Occupation - Active	0.803 ***				0.746 **	0.736 **
	(3.18)				*(2.57)*	*(2.54)*
Occupation - Not Active	0.721 **				0.544 *	0.532
	(2.52)				*(1.67)*	*(1.63)*
Married	-0.060				-0.084	-0.079
	(-0.39)				*(-0.50)*	*(-0.47)*
Education - High	1.123 ***				0.821 ***	0.836 ***
	(4.59)				*(2.89)*	*(2.91)*
Gender - Female	0.087				0.307 **	0.309 **
	(0.65)				*(2.04)*	*(2.05)*
Age	-0.051 **				-0.084 ***	-0.084 ***
	(-2.20)				*(-3.33)*	*(-3.35)*
Age x Age	0.000 *				0.001 ***	0.001 ***
	(1.83)				*(2.66)*	*(2.69)*
Income - High	2.399 ***				1.516 ***	1.510 ***
	(6.64)				*(3.92)*	*(3.90)*
Income - Average	1.761 ***				1.269 ***	1.272 ***
	(7.69)				*(4.94)*	*(4.93)*
Income - Low	0.673 ***				0.435 *	0.444 *
	(3.28)				*(1.92)*	*(1.96)*
Town - Small	-0.004				-0.093	-0.082
	(-0.03)				*(-0.63)*	*(-0.55)*
Financial literacy - High		0.628 ***			0.418 **	0.409 **
		(3.88)			*(2.31)*	*(2.24)*
Type of information		0.176 ***			0.127 **	0.125 **
		(3.66)			*(2.42)*	*(2.37)*
Loss Inc - No Stress		1.593 ***			1.514 ***	1.502 ***
		(7.62)			*(6.73)*	*(6.67)*
Loss Inc - Stress		-2.243 ***			-1.939 ***	-1.924 ***
		(-7.41)			*(-6.42)*	*(-6.45)*
Ponder - No			0.272	0.303	0.208	0.215
			(0.79)	*(0.88)*	*(0.47)*	*(0.49)*
Ponder - Yes			0.084	0.093	0.271	0.271
			(0.62)	*(0.69)*	*(1.63)*	*(1.63)*
Control - High			0.006	0.015	-0.226	-0.216
			(0.05)	*(0.11)*	*(-1.37)*	*(-1.31)*
Control - No			-0.166	-0.202	0.255	0.220
			(-0.43)	*(-0.51)*	*(0.68)*	*(0.58)*
Spend money - No			0.347 **	0.357 **	0.416 **	0.434 **
			(2.25)	*(2.31)*	*(2.23)*	*(2.30)*
Spend money - Yes			-0.675 **	-0.724 ***	-0.482	-0.498
			(-2.51)	*(-2.67)*	*(-1.22)*	*(-1.27)*
Trust			-0.270 **	-0.241 *	0.182	0.190
			(-1.96)	*(-1.73)*	*(1.05)*	*(1.09)*
Overconfident				-0.405		-0.062
				(-1.04)		*(-0.15)*
# Observations	1282	1282	1282	1282	1282	1282
McFadden R2	0.146	0.168	0.012	0.017	0.246	0.248
LR stat.	231.3	266.6	18.7	27.0	391.8	394.1
Prob(LR stat.)	0.000	0.000	0.009	0.001	0.000	0.000

Notes: 1) The models include a constant; 2) The matrix of variances and covariances was calculated using the Huber-White method; 3) Z statistics in parentheses; 4) *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Table 6: Forms of savings

	% of those who saved		% of the sample	
	2020 CNSF survey	2020 CMVM survey	2020 CNSF survey	2020 CMVM survey
Invested in stocks	7.0	12.4	4.8	7.9
Invested in bonds	4.3	9.7	3.0	6.2
Invested in time deposits	35.6	59.4	24.5	38.0
Other savings	75.2	42.7	51.8	27.3

For reference: the percentage of respondents who answered that they have saved is 68.9% in the CNSF survey and 64,0% in the CMVM survey.

Table 7: Investments in securities

	Invested in stocks, bonds or investment funds	
	Pre-Covid	Covid
Education - High		0.457 **
		(2.53)
Gender - Female		-0.412 ***
		(-2.78)
Income - High	0.875 ***	0.405 **
	(2.95)	*(2.22)*
Town - Small	-0.684 **	
	(-2.51)	
Financial literacy - High	0.565 **	
	(2.03)	
Type of information	0.283 ***	0.358 ***
	(3.84)	*(5.69)*
Loss Inc - No Stress		0.795 ***
		(4.88)
Ponder - No		0.858 *
		(1.89)
Spend money - No	0.493 *	0.421 **
	(1.74)	*(2.51)*
# Observations	880	1324
# Observations Y=1	89	275
McFadden R2	0.166	0.105
LR stat.	95.5	142.5
Prob(LR stat.)	0.000	0.000

Notes: 1) The models include a constant; 2) The matrix of variances and covariances was calculated using the Huber-White method; 3) Z statistics in parentheses; 4) *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Annex 1 – Definition of variables

	Definition
Sociodemographic	
Gender - Female	binary, equal to 1 if female
Married	binary, equal to 1 if married or in *de facto* union
Family size - Big	binary, equal to 1 if se number of family members higher than 5
Occupation - Active	binary, equal to 1 if employed
Occupation - Not active	binary, equal to 1 if not active
Occupation - Unemployed	binary, equal to 1 if unemplyed and looking for a job
Education - High	binary, equal to 1 if completed university or polytechnic studies
Age	age at the data of the survey
Financial literacy - High	binary, equal to 1 if number of correct financial literacy questions is 6, 7 or 8
Town - Small	binary, equal to 1 if residing in town with up to 5,000 inhabitants
Income - High	binary, equal to 1 if monthly family net income higher than 2,500 €
Income - Average	binary, equal to 1 if monthly family net income higher than 1,000 € but lower than 2,500 €
Income - Low	binary, equal to 1 if monthly family net income higher than 500 € but lower than 1,000 €
Income - Very low	binary, equal to 1 if monthly family net income lower than 500 €
Loss Inc - No Stress	binary, equal to 1 if answer to the question "*If your family was to lose the main source of income, how long would it be able to cover family expenses without borrowing money or moving to another house*?" is "*6 or more months*"
Loss Inc - Stress	binary, equal to 1 if answer to the question "*If your family was to lose the main source of income, how long would it be able to cover family expenses without borrowing money or moving to another house*?" is "*less than a week*"
Type of information	
Type of information	number of different types of information (real estate; stock market; general news about the economy; evolution of interest rates; securities legislation; other information) that regularly follows
Values and attitudes	
Ponder - Yes	binary, equal to 1 if completely agrees with the statement "*before I buy anything, I carefully consider whether I can afford the expense*"
Ponder - No	binary, equal to 1 if completely disagrees with the statement "*before I buy anything, I carefully consider whether I can afford the expense*"
Control - High	binary, equal to 1 if completely agrees with the statement "*I personally and systematically control my personal finances*"
Control - No	binary, equal to 1 if completely disagrees with the statement "*I personally and systematically control my personal finances*"
Spend money -Yes	binary, equal to 1 if completely agrees with the statement "*It gives me more pleasure to spend money than to save for the future*"
Spend money - No	binary, equal to 1 if completely disagrees with the statement "*It gives me more pleasure to spend money than to save for the future*"
Trust	binary, equal to 1 if answer to the question "*do you read the contracts of the financial products you purchase?*" is "*I don't read, I trust what the employee at the counter transmits to me orally*"
Overconfident	binary, equal to 1 if financial literacy self-evaluation is "*equal to the average of the Portuguese population*" and the number of correct financial literacy answers is less than 3, or if financial literacy self-evaluation is "*higher than the average of the Portuguese population*" and the number of correct financial literacy answers is less than 4, or if financial literacy self-evaluation is "*much higher than the average of the Portuguese population*" and the number of correct financial literacy answers is less than 6

Annex 2 - Financial literacy questions

1. Suppose that 5 brothers receive 1,000 euros and that this amount is distributed equally among them. How much money does each one receive? (**A: 200 euros**)

2. Suppose now that the 5 brothers must wait a year to receive their share of the 1,000 euros. If the inflation rate is 2%, a year from now they will be able to buy:

i) More than they could buy today; ii) The same as they could buy today; **iii) Less than they could buy today.**

3. Suppose you put 100 euros into a term deposit with an annual interest rate of 2%. You do not make any other deposits, you do not withdrawal any money from this account, and there are no taxes or fees. How much will you have in this account at the end of one year? **(A: 102 euros)**

4. And after 5 years, knowing that at the end of each year you put the interest amount on that same term deposit [also remember that there are no commissions, taxes, new deposits or withdrawals]. It would be:

i) More than 110 euros; ii) Exactly 110 euros; iii) Less than 110 euros; iv) It is impossible to answer based on the information provided.

5. If you lend 25 euros to a friend and he returns the 25 euros the next day, how much interest did he pay? **(A: 0 euros)**

6. Please tell me whether the following statement is true or false: "*An investment with a high return is usually associated with a high risk*" **(A: true)**

7. Please tell me whether the following statement is true or false: "*It is usually possible to reduce the risk of investing in the capital market if we buy a diversified set of stocks*" **(A: true)**

8. For some financial products, the return is indexed to a reference rate, which is usually the "Euribor". Please tell me, the Euribor:

i) Is a rate defined by the Portuguese Government; ii) Is a rate defined by the Bank of Portugal; iii) Is a rate defined by the European Central Bank; **iv) Is a rate resulting from loans made between a group of European banks**.

Note: Correct answers are highlighted in **bold**.