

Household Portfolio Choices, Health status and National Health Systems : A cross-country analysis based on SHARE

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Abstract Health risk is increasingly viewed as an important form of background risk that affects household portfolio allocations. Even so, its effect on household portfolios should vary with the household's exposure to out-of-pocket medical expenditure risk. Based on data from the Survey of Health, Ageing and Retirement in Europe (SHARE), we relate current and future health risk to risky asset holding across 10 European countries with different national health care systems, each offering a different degree of protection against out-of-pocket medical expenditures. We find that perceived health risk matters more than objective health risk, and consistently with the theory of background risk, we find that health risk affects portfolio choices only in countries with less protective healthcare systems, and that in the very same countries a forward-looking attitude in making portfolio decisions is observed only with respect to younger and highly-educated investors.

1 Introduction

The increase in health care costs has produced a vast concern among policy makers, who have enforced restrictive measures to contain those trends. As a

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consequence, patients have witnessed either a rationing or an increase in co-payments to access publicly provided health care services. In both cases, this has increased patient demand for private health care services, leading to a surge in expected costs associated with bad health conditions: medical expenses have thus become an increasingly important contributor to financial risk, as documented in several countries [e.g. 8 for US, 2 for Italy].

Whenever health risk leads to higher medical out-of-pocket (OOP) expenditure risk, beside an increase in precautionary saving, there could be a change in financial portfolio allocation, as the increased background risk makes individuals reduce their exposure to other risks, in particular the financial one. In this paper we concentrate on this issue by modelling and testing how health status and medical expenditure risk affects portfolio choices at the household level.

A rich theoretical and empirical literature has investigated portfolio decisions, whereby many among the most recent contributions have focussed on un-diversifiable (or uninsurable) risks, the rationale being that individuals (or households) adjust their financial risky demand in response to their exposure to some other kinds of risk.³ Among these, some bring forward health risk as possible determinant of portfolio choices. Of these, only a minority find no significant role for health risky in shaping household portfolios as e.g. [11, 19], while the vast majority points towards a relevant effect of health on both participation and allocation decisions as e.g. [21,8,7,23,4,5].

This literature is still scant under at least two aspects. First, most of the empirical contributions focus on US, with European countries being rarely considered, whit the only exception of [5]. Second, generally no cross-country comparison is performed, so that the role of National Health Systems in affecting household portfolio allocation in presence of adverse health events results cannot be actually taken into account, with the only exception of [4]. With our analyses we try to fill these gaps.

2 The health care systems in SHARE countries

The countries included in the SHARE survey have quite different health care systems [see 1].

Table 1: Country classification by NHS

<i>Panel A</i>		<i>Panel B</i>		
NHS		NHS & insurances		Mainly private
Denmark	Italy	Austria	France	The Netherlands
Spain	Sweden	Germany	Greece	Switzerland

Countries such as Denmark, Italy, Spain and Sweden enjoy a, generally tax-based universal national health system, which grants full coverage for a comprehensive package of medical expenditures, others, such as the Netherlands and Switzerland are

³ A related literature has examined the effect of background risk on precautionary savings rather than on portfolio allocation, generally finding that precautionary saving is positively associated with both income risk as in [9 and 12] and medical expenditure risk as in [13, 18, 22, 6 or 2].

mainly based on private health insurances, while the remaining countries are somewhere in-between, as their NHS coexists with several forms of private health insurances. Accordingly, we classify the countries as reported in Table 1, whereby countries such as those in Panel A will be associated with a NHS “more protective” and hence with lower background risk, while those in Panel B, having a NHS somehow “less protective”, will be associated with a higher background risk.

3 Model and Data

In our model, households allocate their financial wealth across assets heterogeneous in terms of risk. In this process, households are influenced by the degree of medical expenditure risk they face, which in turn depends on their actual and expected future health status and on the level of (public and private) insurance coverage they have. The problem could be formalized as follows:

$$Y_{i,j} = f(\mathbf{X}_{i,j}, \mathbf{H}_j) \quad (1)$$

where the index i refers to households and the index j refers to the country. Since in this paper we focus on the participation decision (extensive margin), $Y_{i,j}$ is a binary variable assuming value 1 if risky assets are present in the financial portfolio and 0 otherwise. Furthermore, $\mathbf{X}_{i,j}$ and $\mathbf{H}_j$ are two vectors of explanatory variables including individual and system-wide characteristics, respectively.

As for system-wide characteristics, we focus on the specific health care system existing in each country. More specifically, the presence of a universal National Health System (NHS) offering full or almost full coverage for unexpected future health expenditures might represent a good sheltering tool against high future health risk. In such a case, we should expect health-related individual characteristics to play a lesser role in shaping portfolio allocation choices. We thus create a dummy assuming value 1 for country's with fully protective NHS systems (namely Sweden, Spain, Italy and Denmark, see Table 1), and 0 otherwise, and we split our dataset accordingly.

As for the individual characteristics, we focus on a set of socio-economic individual characteristics (income, wealth, age, gender, education, but also cognitive abilities, social interactions, and financial literacy) as well as by a set of variables that capture the role played by health status (both perceived and objective). Additionally, we extend the existing literature by considering both the effects of Current Health Status (CHS) and those of Future Health Risk (FHR). In this way, if the model highlights a negative role for both CHS and FHR, a rational forward-looking attitude could be inferred; otherwise, if only CHS matters, we infer an irrational behavior due to myopic attitude. In all the remaining cases, a purely irrational behavior is inferred.

The empirical counterpart of Eq. (2) is obtained assuming a direct relationship between the dependent variable $Y_{i,j}$ and the set of regressors. In order to better highlight the role of the organization of the health care systems in shaping household financial portfolios, we adopt a flexible model specification by splitting our sample in two subsamples containing countries with and without NHS:

$$Y_{i,j,k} = \Phi(\sum_j \alpha_{0,j,k} C_j + \alpha_{1,k} CHS_{i,j,k} + \alpha_{2,k} FHR_{i,j,k} + \alpha_{3,k} FHR_{i,j,k} \cdot EDU_{i,j,k} + \sum_n \alpha_{n,k} \mathbf{X}_{i,j,n,k}) + \varepsilon_{i,j,k} \quad \text{for } k = 0, 1 \quad (2)$$

where subscripts i refer to the household, j to the country and k to the category to which the country belongs. Within the set of explanatory variables C_j , represents a vector of country dummies, X a vector of socio-economic and demographic variables⁴, CHS and FHR as above represent Current Health Status and the Future Health Risk respectively, and EDU represents years of education. Finally, ε is an idiosyncratic error distributed standard $N(0, \sigma^2)$ and Φ represents the cumulative distribution function of a standard normal distribution.

More specifically, we use two different indicators for CHS, namely the Objective Health Status (OHS) and the Perceived Health Status (PHS). Concerning the PHS indicator we use it either as categorical variable or as a dummy variable. In the former case, it is obtained as the average evaluation of the overall health condition that all respondents in the households have provided based on a 5-point scale⁵. In the latter case, it takes the value 1 if the average household health status is from fair (3) to very bad (5), and 0 otherwise. PHS variables should capture how households subjectively judge their current overall health.⁶ On the contrary, the OHS indicator relies on information provided on a series of chronic diseases diagnosed by a physician including heart attack, high blood pressure, high blood cholesterol, diabetes, asthma, arthritis, osteoporosis, Parkinson's and cancer. We construct the OHS indicator as a weighted index in which each single disease suffered is weighted with weights obtained according to its degree of severity and disability implied.⁷

As for FHR, we consider as relevant information the current undertaking of risky behaviors (RB), a selection of objectively diagnosed but currently asymptomatic diseases (Asymptomatic Objective Health Status, AOHS), as well as the Grip Strength (GS). Based on this information we define $FHR_{i,j}$ as:

$$FHR_{i,j} = \left((1 + RB_{i,j}) * (1 + AOHS_{i,j}) \right) / GS_{i,j} \quad (3)$$

Where RB represents the average number of currently undertaken risky behaviors such as smoking, drinking, and a sedentary lifestyle among the households' members (unhealthy behaviors increase the likelihood of future health shocks and hence the risk of future health expenditure), while AOHS is measured as the number of asymptomatic diseases diagnosed by a doctor among namely high blood pressure, high blood cholesterol and osteoporosis (again, the higher AOHS, the higher the risk of future health shocks and hence of associated expenses).⁸ Finally, we include Grip Strength

⁴ The variables included are: linear and quadratic terms for income, total wealth and age of the head of household, gender, marital status and education of the head of household and household size. As a robustness check, we also tried a more flexible specification by including into the model quintile dummies for households' total income and wealth, finding qualitatively similar results

⁵ Respondents are asked to provide an answer based on both the European (1 = Very good, 2 = Good, 3 = Fair, 4 = Bad, 5 = Very bad) and US scale (1 = Excellent, 2 = Very good, 3 = Good, 4 = Fair, 5 = Poor). In this study we rely on the European scale.

⁶ From an operational point of view, such measures present several advantages, including being fully understood and internalized by the agents, as they are the result of a personal assessment and should therefore be quite reliable. As stated by in [21, 462], "a large literature documents the validity of self-reported health measures. Poor self-reported health is strongly correlated with mortality [...]"

⁷ For further information see <http://www.ncbi.nlm.nih.gov/pubmed/11004416>.

⁸ We add 1 to both elements in the numerator to avoid the unpleasant situation for which individuals without asymptomatic diseases and without risky behaviour could end up having the same value as those with at least one of the two components in the numerator equal to 0.

(GS), which is proven to be a powerful predictor of functional decline, disability and mortality [see e.g. 14 or 20]; since greater GS is associated with better future health status, it enters in the denominator of Eq. (3).

In this model, all else equal, a rational agent in worse current health will be less likely to invest in risky assets. Similarly, the higher his future health risk (and therefore his risk of incurring future health expenses), the lower the likelihood he will invest in risky assets. Furthermore, current and future health risk should affect portfolio allocation differently depending on the degree to which the healthcare system in the country shields individuals against OOP expenditures: living in a country with a NHS or with generous coverage of health care services should mitigate the effect of worse current health and reduce expected future OOP expenditures. In the empirical model we allow for flexible estimation of the parameters for current (CHS) and future health risk (FHR).

Finally, education might play a dual role in our model. It is well-known that education positively affects both the probability and magnitude of risky asset holding, perhaps by enhancing financial literacy as in [16, 17]. However, education may also affect *health* literacy. If highly educated patients are more knowledgeable about their health risk factors, they may place greater weight on their future health risk when making portfolio decisions. In other words, how health information is perceived and internalized by agents might also play a crucial role in shaping portfolio decisions. In our empirical model we thus interact FHR with EDU. A negative coefficient on the interaction term would be consistent with the notion that more educated households reduce risky asset holding more in response to greater future health risk than less educated households.

We empirically estimate our model using data from the Survey on Health, Ageing and Retirement in Europe (SHARE), a survey of households with at least one person aged 50 or older in 2004. Due to relevant data availability we focus on 10 countries (Austria, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden and Switzerland) and we drop all households whose financial respondent is more than 90 years old (less than 1.5% of total sample). The resulting sample is composed of 11,923 individuals and 5,981 households.

Besides the traditional demographic variables (including age, gender, marital and occupational status, education), SHARE also reports detailed information on households' financial wealth allocation in a comprehensive set of financial instruments, which we collapse into three main groups with relatively homogeneous risk-profiles, namely "safe", "fairly safe" and "risky" assets, to ease comparison with the relevant literature on portfolio allocation [see e.g. 3, 10, 21].

Explorative descriptive analyses confirm that households with a better health conditions on average prefer to hold a higher share of risky assets in their financial portfolio compared with those with a worse health condition. Nonetheless, the average portfolio allocation is quite disparate across European country, which also substantially differ in terms of health care systems: some countries, enjoying a more generous health care system (e.g. Italy or Sweden) rely much rarely on health insurances, others (e.g. France or Belgium) have compulsory social health insurances side by side with health care system, others again (e.g. Netherlands or Switzerland) have health care system offering much lower coverage and hence rely more strongly on private health insurances. In the next section we estimate the sensitivity of portfolio choices current health status as well as to the risk of unexpected health expenditures trying to isolate

the effect of a (more or less) generous health care system and controlling for a series of standard socio-economic variables.

4 Econometric analysis

The main results of the econometric analyses can be summarized as follows. The probability of participating to the stock market is positively associated with income and wealth but at a decreasing rate, confirming the humped-shaped pattern well-known in literature. Age-coefficients are not statistically significant, which might be due to the fact that SHARE data refer to people of 50 years or more, so that the focus is just on the very last phase of the life-cycle. The gender and marital status gaps in investment decisions are also confirmed, as households headed by male and married individuals are on average more inclined to participation in risky assets with respect to those headed respectively by females and singles, despite the effect of gender (marital status) is statistically relevant only in NHS (non-NHS) countries. Household size and education do not really seem to matter, whereby as for the latter, a higher education level, most likely associated with a better financial education, seems to encourage holding risky assets. Nevertheless, this effect does not reach statistical significance.

Consistently with [5], we find that social activities (i.e. participation to some sport or political association) are associated with a higher likelihood of investing in risky assets, even though only in NHS countries. Additionally, in both subsamples bequest motive is strongly statistically significant and positively associated with the decision to hold risky assets, consistently with the idea that bequest lengthens the investment horizon of the household. As for cognitive abilities, despite we find comparable results in terms of magnitude, we find no evidence of fluency and recall to significantly affect participation, while, interestingly, numeracy seems to play a role, fostering participation, but only in the non-NHS countries.

Notably, the two subsamples differ substantially in terms of the health-related variables. Both current perceived health status variables (dummy and categorical PHS), whenever significant, are negatively signed, suggesting an inverse relationship between the current perceived health condition and the probability of holding risky assets in the financial portfolios. Nevertheless, these variables are strongly significant only in non-NHS subsample, indicating that in NHS countries a bad health status does not influence portfolio allocations, while it has some effect in non-NHS countries. Finally, when using objective health status indicator the parameters are not statistically significant in both subsamples, suggesting that households rely on perceived rather than on objective health status when taking financial portfolio decisions.

Finally, and quite interestingly, a difference between NHS and non-NHS countries holds even when considering the coefficients of FHR and its interaction with the education variable. Both coefficients turn out to be not statistically significant in the NHS sample, while statistically significant in the non-NHS subsample. Additionally, while FHR is positive, its interaction term with higher education is negative and almost similar in magnitude. This implies that FHR plays a role in shaping households' participation decision only in those countries that lack a fully protective NHS. However, this effect is positive suggesting a non forward-looking behavior, as it entails that households with a higher future health risk are, on average, associated with a higher

probability of holding risky assets and hence with a higher exposition to financial risk. On the contrary, the almost off-setting coefficients of the interaction term suggest that highly educated individuals are not influenced by FHR. In a sense, they are less “myopic” as at least they do not increase the exposition to financial risks, knowing that they can incur in future out-of-pocket health expenses. This result is quite interesting as, in our context, it goes in the direction of the well known rationality hypothesis for which an individual is rational if and only if he/she has the information and knows how to use them.

We also run several robustness checks, ranging from different measures of CHS indicator or of the bequest motive, to more flexible parameterizations of age control variable of income and wealth. In all cases our key parameters on health status remain substantially unaltered.

5 Conclusions

In this paper we have focused on the health status of the household members as well as the role of a protective National Health Systems, by testing the association between (current and expected future) health status and portfolio choices at the household level across 10 European countries, substantially heterogeneous not only in terms of financial education and financial markets development but also in terms of NHS. To this end we estimate a probit model for the likelihood of holding financial risky assets on two different subsamples, including countries with NHS and countries without NHS.

Overall, our results are consistent with the implications of the stylized model we propose, which could be summarized as follows. First, household decision to hold risky financial assets seems to be driven mainly by perceived rather than objective health status. Second, a worse current perceived health condition, entailing a higher risk of unexpected OOP medical expenditures for the household, crowds out other sources of risks, including the financial one. Third, this latter effect is apparent only in non-NHS countries, pointing towards a possible sheltering role for NHS in affecting households’ portfolio allocation decisions. More specifically, our interpretation is that the presence of the NHS acts as shelter against the risk of unexpected health expenses and might thus decrease the background risk and hence encourage the presence of risky assets in the household financial portfolio. Finally, an independent and heterogeneous role is played also by the FHR indicator. In fact, it appears that FHR is significant only in non-NHS countries, although it turns out to be positive and thus suggesting a sort of myopic behavior. However, once we concentrate on highly-educated households, we find evidence of a forward looking behavior.

From a policy perspective this study might shed more light in household portfolio determinants, highlighting not only the role of individual characteristics on portfolio allocation, that as such are difficult and costly to handle for a policy makers, but also the role of the health care systems that, instead, although difficult to change, should be easier to manage for politicians. Furthermore, the urgency and relevance of this issue are apparent as long as we consider that health status tends to deteriorate with age, that older people own a substantial proportion of total wealth and, last but not least, that the trends for the future point towards a marked ageing dynamics.

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