



ALLIANZ RESEARCH

RISK LITERACY & CHOICES: STUBBING TOES IN THE DARK

18 February 2021

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EXECUTIVE SUMMARY



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In the midst of uncertainty, risk literacy can help us make the right decisions in an informed way. Risk literacy is the ability to perceive risks and the aptitude to make appropriate decisions after becoming aware of these risks. To measure risk literacy during the Covid-19 crisis, we asked almost 7,000 people in seven countries questions related to numeracy and risk literacy, as well as about the impact of the pandemic on their finances.

Overall, the level of risk literacy is rather dismal: Less than one third of our sample can be deemed “risk literate”. The highest levels of risk literacy are seen among Swiss, Austrian and German respondents: 33%, 31% and 29%, respectively. The Latin clan followed, with 26% for French and Italian respondents and 25% for Spanish respondents. While there are not marked differences in risk literacy across ages in most countries, we observe that in the U.S., the older generation is more risk-savvy (28%) compared to the overall country level (23%).

To what extent is risk appetite impacted by risk literacy? Hard to say, according to our data. In general, we cannot observe that higher levels of risk literacy correspond to higher levels of risk appetite, or vice versa. In Germany and Switzerland, for example, higher risk literacy seems to go hand in hand with higher risk appetite; in the U.S. or Italy it is the other way round. Respondents with a moderate risk appetite, however, are the ones that have the highest levels of risk literacy (with the only exception of Switzerland).

Women appear to have a lower risk appetite in our sample. Exceptions are France and Spain, where women exhibit a higher predisposition to take on risks (FRA: 30%; ESP: 27%) as compared to men (FRA: 26%; ESP: 20%). German women were the most cautious of our sample; only 8% of them were willing to accept higher levels of risk, as opposed to 15% of German men. Risk appetite between men and women were similar in Austria (women: 10%; men: 12%) and in Italy (w: 13%; m: 16%). In Switzerland, the levels of risk appetite were more divergent (w: 14%; m: 26%) as well as in the U.S. (w: 21%; m: 33%).

Does the level of risk literacy influence investment decisions? The relationship is not straightforward, although our survey results indicate that risk literacy could play a role in asset preference. A higher amount of the people in our survey that are not risk literate would prefer to hold cash (30%), as compared to the risk literate (22%). On the other hand, 36% of the risk-literate sample preferred securities (bond, equities or mutual funds), while only 26% of the non-risk-literate would consider it an appropriate investment. The non-existence of differences regarding cryptocurrencies and insurance products, however, makes clear that risk literacy alone cannot explain investment choices; personal preference and risk appetite play a big role here.

Cash is the most preferred investment instrument for women, while insurance is highly unpopular overall. In an experiment, we asked our subjects what instrument they would prefer to invest and hold for a year. Echoing their lower risk appetite, we found that cash is the most preferred instrument for women in almost all countries (average of 32%), with the exceptions of Austria (cash: 24% vs securities: 29%) and the U.S. (cash: 23% vs securities: 36%) where they prefer securities. Vice versa, in most countries, men choose securities as their financial instrument of choice (average of 33%) – with the only exception of France where they prefer cash to securities (cash: 29% vs securities: 23%). France is also the only country in our sample where both sexes prefer insurance over cryptocurrencies by a wide margin (insurance: 18% vs cryptocurrencies: 6%). While in Italy (and Austria) at least women see more value in insurance than in cryptocurrencies, in all the other countries, insurance is highly unpopular as a financial instrument (average of 10%; against cryptocurrencies average of 11%): a decade of zero or even negative interest rates has seemingly tarnished the perception of insurance as a valuable savings product.

Impact of the Covid-19 crisis and asset choice: Even among respondents negatively affected by the crisis and those who reported receiving social protection payments, securities are the most popular investment vehicle (28% and 35%, respectively). Cash is king only among those that had more income (34%) and of those who consumed more of their income (28%).

What does this mean for policymakers? Our results – a seemingly positive impact of risk literacy on investment choices on the one hand, and an only diluted impact of risk preferences and circumstances on the other hand – make a strong argument for improving risk literacy. After all, higher levels of risk literacy could help to make investments that better match the personal situation of the investor. The good news: Risk literacy is a cheap policy that can be achieved by educating the population in statistical thinking.



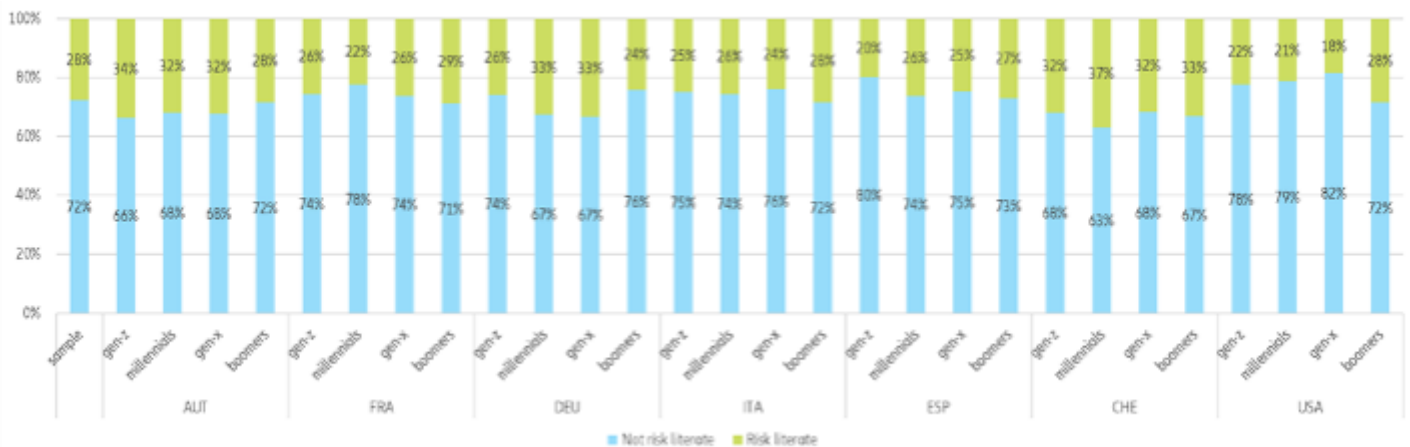
RISK LITERACY: INSIDE? GOOD. OUTSIDE? BAD.

The Covid-19 pandemic has forced us into a permanent state of risk assessment: Should I see my friends? Should I go to the office? Should I spend Christmas with my grandparents? Should I invest in trendy stocks? Should I buy a stationary bike? Although most of these decisions revolve around human contact – or the avoidance thereof – some of them are financial. Whether we are in the lucky situation of keeping our income, or struggling to make ends meet, the pandemic has changed the way we manage our resources, at least for now.

In the midst of uncertainty, risk literacy can help us make the right decisions in an informed way. Risk literacy is the ability to perceive risks and the aptitude to make appropriate decisions after becoming aware of these risks. In the context of increasingly available consumer credit and complex financial products, risk literacy plays a key role in our financial decisions¹, and the ability of individuals to meet their financial needs in the present and the future has important implications for the macro economy and the stability of their countries.

To measure risk literacy during the Covid-19 crisis, we asked almost 7,000 people in seven countries² questions related to numeracy and risk literacy, as well as the impact of the Covid-19 pandemic on their finances. In our survey, conducted in October 2020, we used questions from the Berlin Numeracy Test³, a proven and sound instrument that quickly assesses statistical numeracy and risk literacy.

Figure 1: Risk literacy by age and country⁴



Sources Allianz Research, Qualtrics.

1. Lusardi, Annamaria. (2015). Risk Literacy. Società Italiana degli Economisti (Italian Economic Association)
2. Austria, France, Germany, Italy, Spain, Switzerland and the U.S. See appendix for the survey description in detail.
3. The Berlin Numeracy Test typically takes about three minutes to complete and is available in multiple languages and formats, including a computer adaptive test that automatically scores and reports data to researchers (www.riskliteracy.org).
4. See appendix for risk literacy questions.

Overall, we find that the level of risk literacy is rather dismal: Less than one third of our sample can be deemed “risk literate”⁵. We observe the highest levels of risk literacy amongst our German-speaking subjects: 33% of our Swiss respondents were risk literate, along with 31% of Austrians and 29% of Germans. The Latin clan followed with 26% of the French and Italians responding to the questions correctly and 25% of the Spanish. While there are not marked differences in risk literacy across ages in most countries, we observe that in the U.S. only 23% of the people we surveyed responded correctly, but 28% of the population aged over 55 displayed risk skills. This could reflect the changes in school curricula: In the past, the American education model placed more importance on numeracy and arithmetic

skills, with 8th grade tests including topics such as the calculation of compound and simple interest and present and future value⁶. Today most young adults are not able to make these calculations and therefore lack important tools to make sound financial decisions.



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5. See our previous report: Allianz Research (2020). Financial and risk literacy survey – Resilience in times of Corona, Retrieved 8 February 2021, https://www.allianz.com/en/economic_research/publications/specials_fmo/2020_11_19_Allianz_Survey.html
6. Karapandza, R. (2011). Retrieved 8 February 2021, from <https://www.youtube.com/watch?v=u4k0bT8SA7Y>

RISK APPETITE: EXCITING OR DANGEROUS?

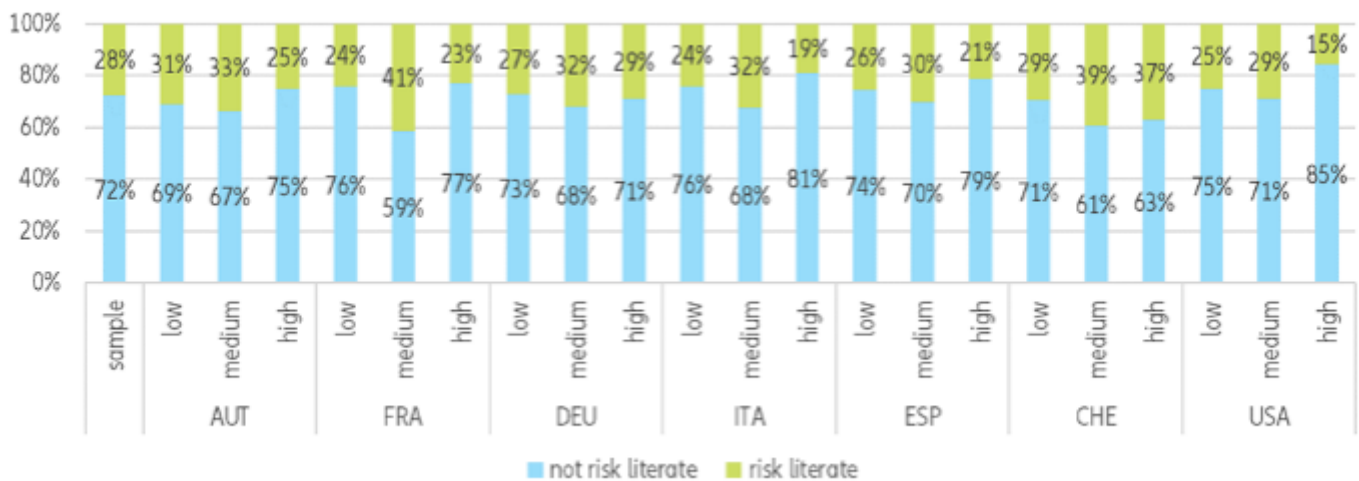
How does risk literacy translate into risk appetite, or the willingness to take on risks? We measured this with a bet experiment and questions related to expected value. Then, we created variables for stratifying our sample according to their “risk appetite”⁷. Knowing an investor’s risk profile is important for determining a proper investment asset allocation, we did not address any MIFID or regulatory questions related to the risk they were willing to take on investments, or the

expected returns they preferred in their portfolios, as that was not the subject matter of our survey.

Nonetheless, we observe that in general higher levels of risk literacy do not correspond to higher levels of risk appetite, or vice versa. In Germany and Switzerland, for example, higher risk literacy seems to correspond with a higher risk appetite, but in the U.S. or Italy it is the other way round, perhaps because risk literacy gives some respondents insights into risk exposure

and makes them more prudent, or perhaps because risk appetite is just a matter of personal preference.

Figure 2: Risk literacy and risk appetite (distribution of risk preferences across countries)



Sources Allianz Research, Qualtrics.

7. See appendix for risk appetite questions

We also observe that generally women have lower levels of risk appetite in our sample. However, this is not a trait indicative of any gender difference that needs to be bridged. Studies⁸ show that risk awareness might be misconstrued as low risk appetite. Others reveal that the average woman has a more unstable income than the average man or a more fragile labor situation, which makes women more predisposed to wanting to understand the risks they are undertaking as well as to invest in projects that have social value. When the wealth, income and labor status is the same, there is very little evidence for the gender dimension⁹. Another growing body of literature says that there are more hurdles to invest in the capital markets for women than men. However, of those women that do engage in capital markets, their risk appetite

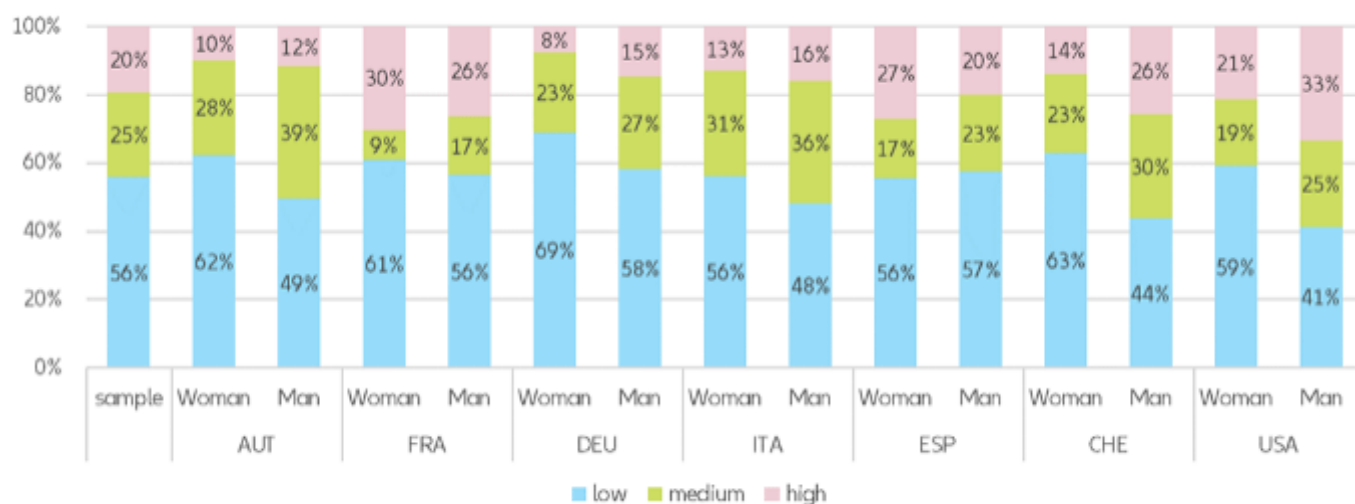
is not different from men. Women tend to avoid uncertainty risk and need more data before investing, and will therefore keep more of their assets liquid and miss-out on higher-yield opportunities¹⁰.

Avoiding uncertainty and requiring more information before making an investment is what is generally deemed "risk awareness". Unfortunately, we did not measure risk awareness in this survey, but it is an interesting dimension that needs to be mentioned. Risk awareness has more to do with past experiences and knowing what is at stake than accurately calculating probabilities, unlike risk literacy. For example, homeowners in Florida might be more aware that buying property insurance that covers water damage, not just wind damage, is necessary in

the event of a catastrophe, at least more so than someone living in a non-hurricane prone area. This can only be attributed to their personal history, not their numeracy skills.¹¹

In the results of our survey, women in France and Spain exhibit a higher predisposition to take on risks (FRA: 30%; ESP: 27%) as compared to their male counterparts (FRA: 26%; ESP: 20%). German women were the most cautious of our sample; only 8% of them were willing to accept high levels of risk, as opposed to 15% of German men. The risk appetites of men and women were similar in Austria (women: 10%; men: 12%) and in Italy (w: 13%; m: 16%). In Switzerland, the levels of risk appetite were more divergent (w: 14%; m: 26%) as well as in the U.S. (w: 21%; m: 33%).

Figure 3: Risk profile and gender (distribution of risk appetite by gender)



Sources Allianz Research, Qualtrics.

8. Harris, Christine & Jenkins, Michael & Glaser, Dale. (2006). Gender differences in risk assessment: Why do women take fewer risks than men? *Judgment and Decision Making*. 1. 48-63.
9. Merrill Lynch (2015). *Women and Investing Behavioral Finance*.
10. BCG (2020). *Managing the Next Decade of Women's Wealth*.
11. In Florida in 1992, after Hurricane Andrew, there were claims filed from property damage policyholders for water damage to their homes, unfortunately, only wind damage was covered and they had to cope with the losses.

CHOICES—WHAT WOULD YOU LIKE? CASH WITH SOME INSURANCE ON THE SIDE?

When looking at investment choices, we find that risk literacy does play a role in the choice between cash and securities, with the former considered riskless under “normal” circumstances¹². In our survey, the most popular investment instrument was securities, but the risk literate respondents were more likely to prefer them over cash: 36% of risk-literate respondents selected securities, while only 26% of those not risk-literate said the same. Moreover, 30% of non-risk-literate respondents said they preferred holding cash, compared to just 22% of risk-literate respondents.

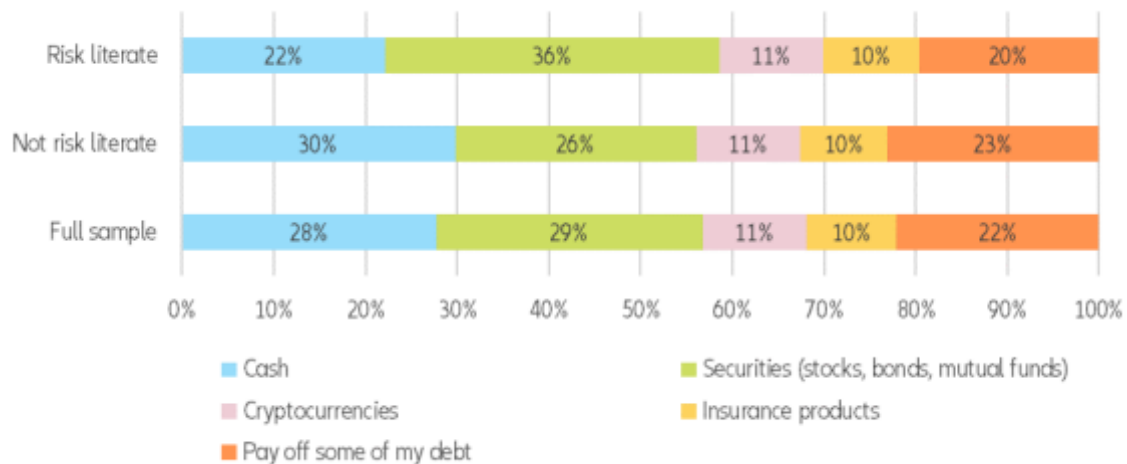
We do acknowledge, however, the importance of simple personal preference and risk appetite when it comes to this choice – and the non-existence of differences regarding crypto currencies and insurance products seems to underline.

After stratifying our data, we find that cash is the most preferred instrument for women in almost all countries, echoing their lower risk appetite, with the exceptions of Austria and the U.S. Vice versa, in most countries, men choose securities as their financial instrument of choice – with the excep-

tion of France. France is also exceptional in another way: it is the only country where both sexes prefer insurance to crypto currencies by a wide margin. While in Italy (and Austria) at least women see more value in insurance than in crypto currencies, in all the other countries, insurance is highly unpopular as a financial instrument: A decade of zero or even negative interest rates has seemingly destroyed the perception of insurance as a valuable savings product.

Figure 4: Risk literacy and preferred investment instrument

If you were given USD1,000 to invest in one of the following instruments and leave it for 12 months untouched, which of these options would you prefer?



Sources Allianz Research, Qualtrics.

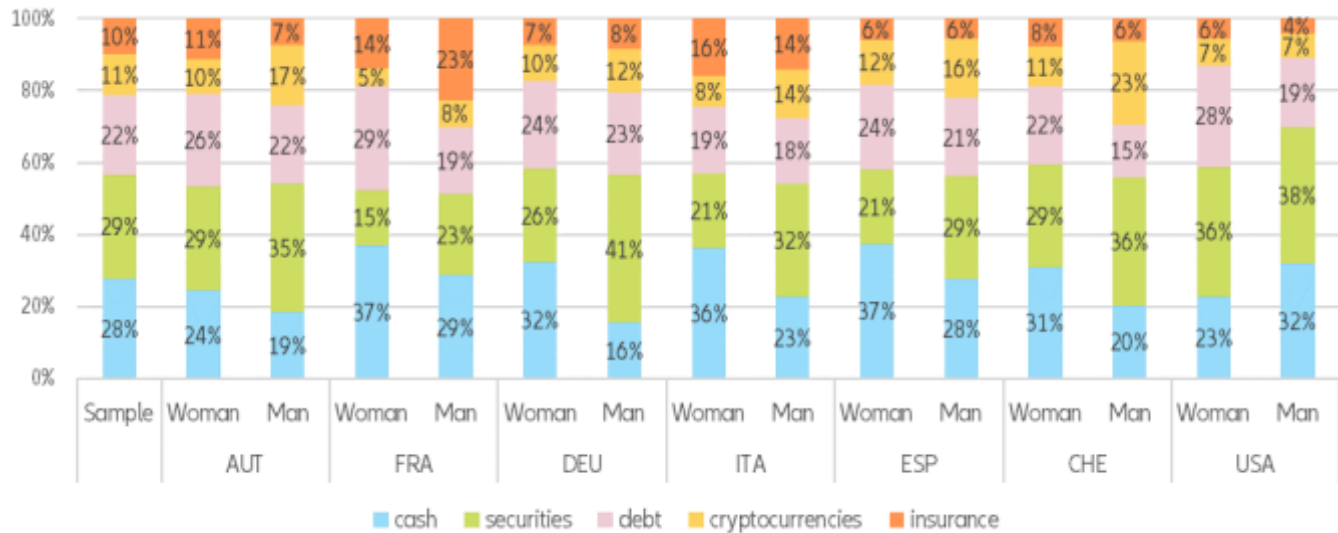
12. By “normal” circumstance, we mean no hyperinflation or no cash deposit tax, or any other hurdle in storing cash.



Photo by Leungchopan on Shutterstock

Figure 5: Asset preferences by gender

If you were given USD1,000 to invest in one of the following instruments and leave it for 12 months untouched, which of these options would you prefer?



Sources Allianz Research, Qualtrics.

BOX: I like to move it, move it. I like to move the ...market

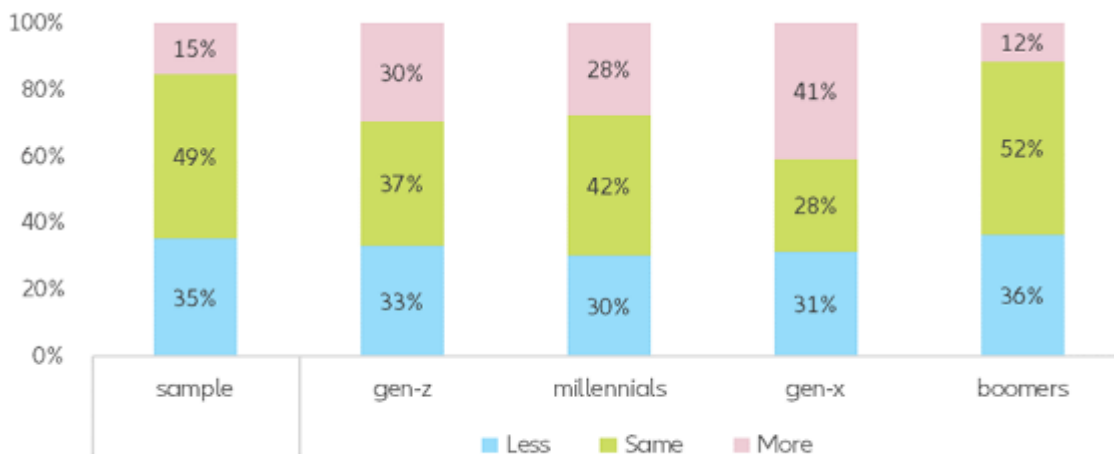
Online communities have taken matters into their own hands in terms of moving the market. Recently there was chatter about some Wall Street funds shorting – i.e. expecting the impending fall of stock prices – companies that had failed to pivot their business models when entertainment streaming and downloading became the main distribution channel. In a David and Goliath fashion, coordinated in not so obscure corners of social media, a group of retail traders decided to fight for the small guy: They acquired call options of the companies in question, increasing both demand for and the price of the stocks to manipulate the market.

This did not come without consequences: Some of the trading platforms that were used had to block trading in the stocks that were being toyed with as sky-rocking volatility called for more collateral, which in turn brought the wrath of users claiming the right to a free market that is not free at all.

In our survey, we asked if after the pandemic had increased our subjects’ interest in investing in equities. Mostly, across all countries and ages, the preferences were stable and just a smaller percentage showed an increased interest in investing in stocks. However, when looking closely at the U.S., we can observe that the younger generations display a different preference from their peers in other countries. 30% of our Generation Z subjects, those 24 years old and younger, reported an increased interest in investing in securities. 28% of millennials – those between 25 and 39 years old – and 41% of Generation X subjects also reported an increase in interest in equities. The Boomers were not so enthralled with the prospect of increasing their positions in equities as the rest: only 12% reported an increased interest in equities. Unfortunately or fortunately for the stock market, according to the latest wealth distribution data from the U.S., the population aged over 55 holds 69.8% of the wealth, not precisely the demographic of the amateur online traders. Therefore, the reality is that the main constraint of these younger traders is wealth. But with apps designed to gamify investment and make it as addictive as social media, and as reckless as betting, the preference for equity investment could evolve over time, and a similar event could happen again.

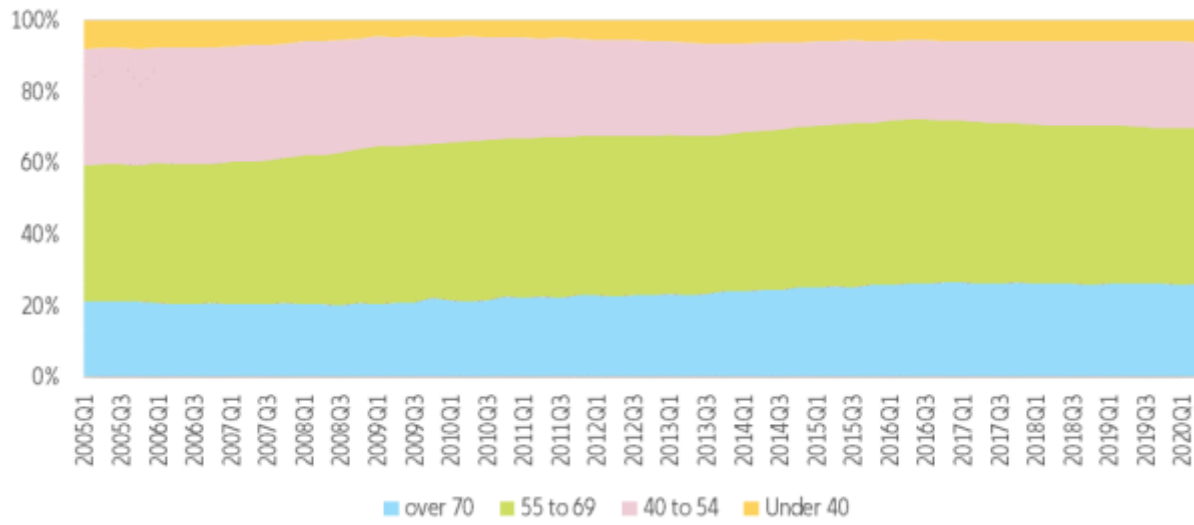
Figure 6: Interest in equities in the U.S. by age groups

Regarding my investments in equities and/or equity related mutual funds, I want to invest:



Sources Allianz Research, Qualtrics.

Figure 7: Wealth distribution in the U.S.



Sources: U.S. Federal Reserve; Allianz Research.

RISK APPETITE AND CHOICE: SO, YOU LIKE RISK?

How does our small and simple experiment of investing USD1,000 into different asset classes play out if we stratify the answers by risk appetite? The first nugget that jumped out is that respondents with low risk appetite seem to have a higher preference for paying off debt if they were to receive a small endowment; although we are not implying causation, we do see a correlation. These results are not solely dependent on their risk appetite, but also on their indebtedness level. If our subjects had higher levels of debt, they could be more prone to wanting to pay it back. If they had no debt, then there is very little or nothing to pay back. In Austria, 28% of the subjects with low risk appetite prefer to pay off debt, while in France the share of low-risk-appetite respondents that have the same preferences is 29%. Around 26% of the low-risk-appetite individuals in Germany and Italy would like to put forward the USD1,000 endowment towards debt repayment, while in Spain the share is 29%. In Switzerland, 23% of the respondents reported they had the same preference, while in the U.S. a whopping 34% share said the same. The share of risk lovers who would opt for paying off debt is much lower in all countries; sometimes the share is less than half. The other financial instrument with stark differences driven by levels of risk appetite is crypto currencies. In most countries, risk-lovers are twice (or more) as likely to invest into them than respondents with low risk appetite. So far, invest-

ment choices seem to reflect risk appetite in an expected or rational way.

For other financial instruments, however, differences are less pronounced. In Austria or Spain, for example, almost the same portion of respondents with high or low risk appetites choose cash as their preferred investment. The same can be said about securities in Germany. Moreover, if there are glaring differences, they are not always in the way you would expect: While in France, as expected, only 11% of risk-averse respondents would invest into securities (against 26% of risk-lovers), in the U.S. – surprisingly – risk-lovers are much more likely to hold cash (40% vs 21%). These choices seem to be at odds with revealed preferences. The overall wealth composition of individuals could also have a decisive impact. The weight of real estate in their assets could be also a decisive factor in determining the incentive to engage in investments. In the U.S., being cash-long could be an implicit way to diversify risk and not reflect a lack of risk literacy or a lack of risk appetite.

The situation with insurance products is similar: Demand for insurance seems not to be driven by the level of risk appetite as the differences are rather small. Only respondents in Austria and those with low risk appetite are significantly more likely to choose insurance as their investment vehicle.

In line with these observations – respondents with strong or weak risk appetite are more likely not to invest according to their revealed risk prefer-

ences – we find that in most cases the subjects that are neither too eager, not too scared to take on risks are the ones that have the highest levels of risk literacy, with the exception of Switzerland. Among Swiss respondents, the sample with high-risk appetite also had the highest share of risk literate people. This relationship is subject of much discussion over whether financial literacy effects risk appetite or not. Our data, however, seem to point to the direction that risk literacy at least makes extreme investment decisions less likely. But they also underline the consensus that risk appetite is one of the most important factors affecting financial planning, not only for individuals, but also for companies¹³.

There are diverse factors that affect risk appetite, including demographics such as age, gender, education, income, and marital status to name a few. Behavioral factors include personality traits, life satisfaction level, emotions, loss aversion bias, and anxiousness, amongst others. In this regard, education in risk literacy could enable individuals to better match their preferences with actual investment decisions. In either case, there might be a missing link in the financial decision-making of individuals: their background and personal situation. Perhaps what might seem like an irrational decision of resource allocation to someone else is a necessity. Decisions between yield and liquidity might not be uneducated, they might be made on a need bias.

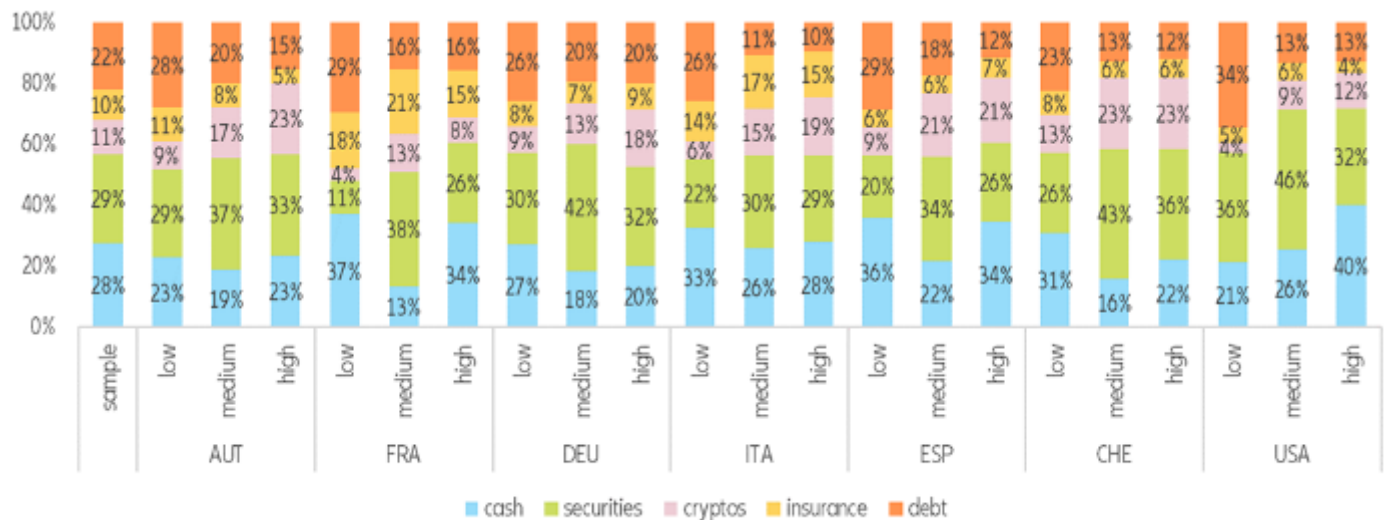
13. The literature about risk-appetite considers choices to belong to the realm of individual preferences and to be influenced by the structure of the risk (i.e. the smaller or greater dispersion of possible outcomes, see for example MacCrimmon, K.R., Larsson, S., (1979), *Utility Theory: Axioms versus 'Paradoxes'* in Allais, M., et Hagen, O., eds 1979), *Expected Utility Hypotheses and the Allais paradox*, Contemporary Discussions of Decision under Uncertainty with Allais's Rejoinder, D. Reidel Publishing Company, Dordrecht.).



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Figure 8: Asset choice by level of risk appetite

If you were given USD1,000 to invest in one of the following instruments and leave it for 12 months untouched, which of these options would you prefer?



Sources Allianz Research, Qualtrics.

IMPACT OF THE COVID-19 CRISIS AND CHOICES

In an effort to bridge the understanding gap between the people sitting behind a desk looking at data and regular citizens navigating the difficulties of the pandemic, we asked our subjects how the pandemic had affected their lives, if at all. We gave them a set of choices and we checked how their choices in assets differed according to the impact they experienced. A higher share of the population that had been negatively affected by the crisis would like to use the hypothetical USD1,000 from our aforementioned experiment to pay off some of their debt. 25% of those facing reduced income would rather pay some debt,

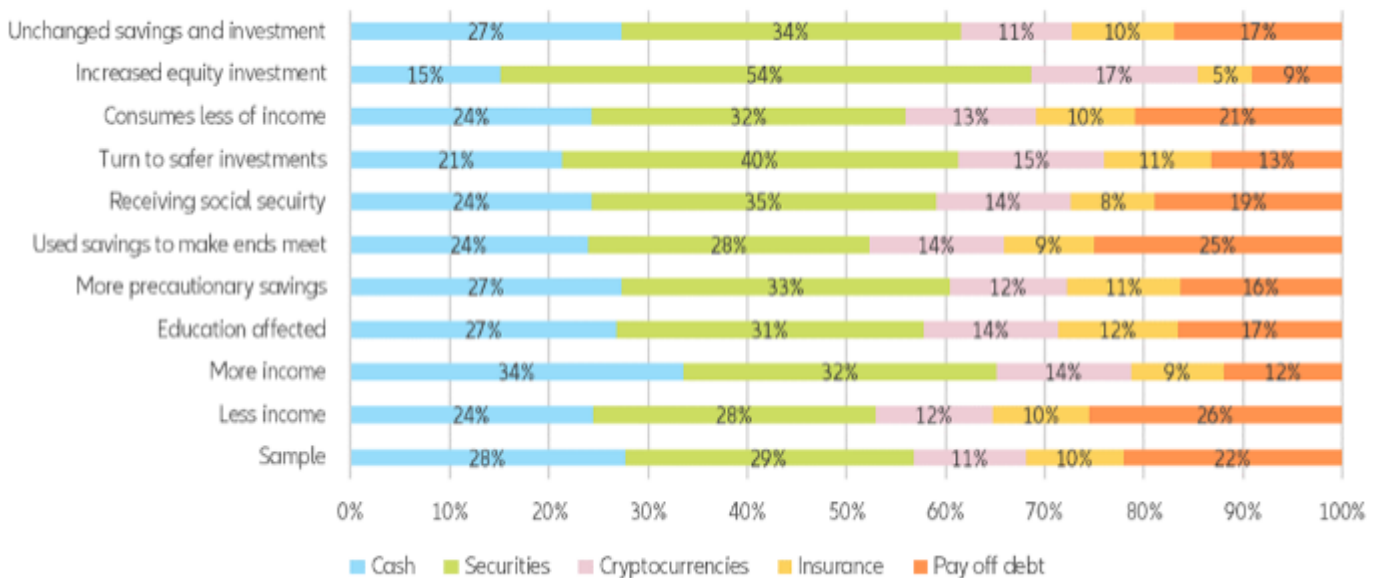
while 22% of those that reported spending more of their income would choose the same. 25% of those that have had to use savings to make ends meet would also like to pay off debt.

Unsurprisingly, 54% of those that reported that they had increased their investment in equities would use their "endowment" for securities: But the majority of those seeking safer assets would also put their money in securities (40%). At least this group would invest 11% in insurance, one of the highest shares in our sample, but still rather low: even among the respondents who look for safety, insurance is not the financial instrument

of choice. The other groups for which securities are the most popular investment vehicle are subjects that reported receiving social protection or social security payments because of the Covid-19 crisis (35%); respondents struggling to make ends meet (28%) and respondents trying to increase their precautionary savings (33%). Overall, securities are the most popular investment, in some cases even among those who have been hard-hit by Covid-19.

Figure 9: Asset choices by Covid-19 impact

Has the Covid-19 outbreak had an impact on any of the following? Multiple answers possible.



Sources Allianz Research, Qualtrics.

This is reflected when looking at the second most popular instrument, cash, which is king in only two categories of how our subjects have been affected by the crisis. Thirty-four percent of those that are perceiving more income, would like to keep it in cash and 28% of those who are spending more of their income prefer cash, too (but by a razor-thin margin).

Generally, it is quite hard to assess – on the basis of a few simple questions – whether investment choices are in line with or driven by circumstances or not. When looking at what respondents are going through during the pandemic, some of the choices they make seem less surprising, others look more so. All in all, they suggest that teaching risk literacy is more important than ever.



HOW TO IMPROVE RISK LITERACY?

Risk literacy is a cheap policy that can be achieved by educating the population in statistical thinking. In other words, statistical thinking is the ability to understand and critically evaluate uncertainties and risks. Yet 76% of U.S. adults and 54% of Germans do not know how to express a 1 in 1,000 chance as a percentage. Schools spend most of their time teaching children the mathematics of certainty – geometry, trigonometry – and spend little if any time on the mathematics of uncertainty¹⁴.

The Harding Center for Risk Literacy proposes the following two methods to improve risk understanding:

Use concrete terms:

There is a 40% chance of rain. In terms of what? Not in 40% of the territory. Not in 40% of the expert opinion. Then in percentage of what? In 40% of the days that are like this one, one can find oneself needing an umbrella. Think about the unit, in this case, the units are days.

Think about absolute risk, not relative risk:

When looking at the incidence of a disease in a different group. For example, the absolute risk of developing a lung disease is 4 in 100 in non-smokers. If you are a smoker, the relative risk of the disease is increased by 50%. The 50% refers to the four - so the absolute increase in the risk is 50% of four, which is two. Therefore, the absolute risk of smokers developing this disease is 6 in 100.

Ideally, this should be already taught at school. However, adults can and should be reached, too. Given the opportunities of e-learning, it is far from impossible. Very concretely, it could be an introductory part of trading apps. While keeping the gamified experience that has their users hooked, they could teach the basics about the products available on the platforms. They could also be taught how to make the most out of their money without endangering their livelihoods. Adults who would

like to drive a car need a license. Adults who would like to invest their money online without an advisor should obtain a similar thing, say, a risk literacy pass. It would be so much easier to obtain – and could do equally good.

14. See Gerd Gigerenzer, Director of the Harding Center for Risk Literacy and Max Planck Institute for Human Development (<https://www.edge.org/response-detail/10624>)

Appendix: Survey Data & Statistics

Overall responsibility for methods: Allianz Research, Allianz SE

Planning and drawing the sample: Qualtrics

Target groups surveyed

- Austrian resident population, age 18 and over in Austria
- French resident population, age 18 and over in France
- German resident population, age 18 and over in Germany
- Italian resident population, age 18 and over in Italy
- Spanish resident population, age 18 and over in Spain
- Swiss resident population, age 18 and over in Switzerland
- American resident population, age 18 and over in the US

Number of respondents: 6,916 persons (1,013 from Austria, 1,013 from France, 1,007 from Germany, 1,008 from Italy, 1,003 from Spain, 871 from Switzerland, 1,001 from the US)

Sampling method: Representative quota sampling

Qualtrics were given quotas instructing them on how many people to survey and which criteria to use in selecting respondents. The quotas were distributed in accordance with official statistics among gender, age groups, and education.

Representativeness: A comparison with official statistics shows that the survey data on the whole corresponds to the total population age 18 and over in the seven countries.

Type of survey: Web-based survey

Date of survey execution: 28.09. – 21.10.2020

Gender (in % of respondents)

	Total	Austria	France	Germany	Italy	Spain	Switzerland	USA
Female	50.6%	50.3%	52.7%	50.4%	52.2%	52.4%	44.7%	50.7%
Male	49.4%	49.7%	47.3%	49.6%	47.8%	47.6%	55.3%	49.3%

Age (in % of respondents)

	Total	Austria	France	Germany	Italy	Spain	Switzerland	USA
18 - 24	11.0%	11.7%	11.2%	9.2%	8.3%	8.6%	11.1%	16.6%
25 - 39	26.2%	28.1%	26.9%	24.0%	23.3%	29.6%	29.5%	22.1%
40 - 54	27.7%	29.9%	25.2%	24.4%	28.2%	28.4%	32.0%	26.2%
55 - 105	35.0%	30.0%	36.3%	42.3%	39.6%	33.3%	27.1%	35.2%

Education (in % of respondents)

	Total	Austria	France	Germany	Italy	Spain	Switzerland	USA
Primary (less than High school)	5.0%	3.4%	5.7%	0.9%	10.8%	6.4%	3.3%	4.1%
Secondary (High school or comparable)	54.6%	73.1%	53.4%	74.6%	53.2%	39.1%	56.3%	32.6%
Tertiary (University or comparable)	40.4%	23.6%	40.9%	24.5%	36.0%	54.5%	40.4%	63.3%

Appendix: Risk literacy

We measured risk literacy by asking the following to multiple-choice questions:

Probability: mutually exclusive and collectively exhaustive outcomes with a die.

"Imagine we are throwing a loaded die (6 sides). The probability that the die shows a 6 is twice as high as the probability of each of the other numbers. On average, out of 70 throws how many times would the die show the number 6?"

Risk diversification: strategies used to manage risk.

"Suppose you have some money for investing. Is it safer to put your money into one business or investment, or to put your money into multiple businesses or investments?"¹⁵

If both questions were answered correctly, the respondent is "risk literate"; if one or both answers are wrong, the respondent is deemed "not risk literate".

Risk appetite

We used the responses in the three questions below to create a variable with three degrees of risk appetite and stratify our subjects

Expected value: Which of the following options would you prefer? Only one answer possible.

100% chance of losing USD100

60% chance of losing USD300 and 40% of losing nothing

Expected value: Which of the following options would you prefer? Only one answer possible.

100% chance of winning USD100

60% chance of winning USD300 and 40% of winning nothing

Experiment: Someone offers you a coin flip bet: You can lose USD100, in which case would you accept the bet?

In case I could win...

USD80; USD100; USD120; USD150; USD200+; I would never take this bet

15. Measuring Risk Literacy: The Berlin Numeracy Test Edward T. Cokely, Mirta Galesic, Eric Schulz, Saima Ghazal and Rocio Garcia-Retamero

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