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Determinants of individuals' objective and subjective financial fragility during the COVID-19 pandemic

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ABSTRACT

We examine determinants of the objective and subjective financial fragility of 2100 individuals across Australia, France, Germany, and South Africa during the COVID-19 pandemic. Objective financial fragility reflects individuals' (in)ability to deal with unexpected expenses, while subjective financial fragility reflects their emotional response to financial demands. Controlling for an extensive set of socio-demographics, we find that negative personal experiences during the pandemic (i.e., reduced or lost employment; COVID-19 infection) are associated with higher objective and subjective financial fragility. However, individuals' cognitive (i.e., financial literacy) as well as non-cognitive abilities (i.e., internal locus of control; psychological resilience) help to counteract this higher financial fragility. Finally, we examine the role of government financial support (i.e., income support; debt relief) and find that it is negatively related to financial fragility only for the economically weakest households. Our results have implications for public policymakers, providing levers for reducing individuals' objective and subjective financial fragility.

1. Introduction

Since 2020, the COVID-19 pandemic has caused havoc around the world, disrupting financial markets and inflicting economic damage due to health restrictions. Goldstein et al. (2021) argue that the pandemic's origin as a health shock makes it fundamentally different from previous financial and economic crises, highlighting households' financial experience as an area for future research given that they were especially affected by the COVID-19 crisis. We answer this call for research and use survey evidence from 2100 individuals across Australia, France, Germany, and South Africa to examine the determinants of objective as well as subjective financial fragility during the pandemic. The countries selected for investigation allow drawing generalizable conclusions across countries with different COVID-19 experiences in terms of number of deaths, health restrictions, and government financial support, as well as different cultures and levels of economic development.

Objective financial fragility reflects one's (in)ability to deal with unexpected expenses, measured by individuals' assessment of their *factual ability* to deal with financial demands (Lusardi et al., 2011). Subjective financial fragility, on the other hand, reflects one's *emotional response* to these financial demands, measured by individuals' perceived current money management stress (Netemeyer et al., 2018). Given these differences, it is theoretically possible that individuals are objectively, but not subjectively, fragile (or vice versa), and the determinants of these two dimensions of financial fragility during the COVID-19 pandemic could thus also differ. Indeed, although we find a positive correlation between objective and subjective financial fragility, it is far from perfect, empirically justifying our approach of examining them separately.

Based on the existing evidence (Clark et al., 2021), we first account for an extensive set of socio-demographic factors as possible drivers of an individual's financial fragility. Given the nature of the COVID-19 pandemic and associated job losses (Coibion et al., 2020),

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and prior literature suggesting that both health shocks (Gross and Notowidigdo 2011) and employment shocks (Elul et al., 2010) affect financial distress, we consider a COVID-19 infection in the household as a health shock and reduced/lost employment as an employment shock that could increase an individual's financial fragility. We then account for factors that could *decrease* an individual's financial fragility. In particular, given the emerging literature on the importance of both cognitive and non-cognitive abilities in explaining individuals' financial distress (Kuhnen and Melzer 2018; Parise and Peijnenburg 2019), we examine financial literacy as well as internal locus of control and psychological resilience as mitigating factors. Finally, we account for government financial support, an important element of governments' policies aiming to ease the economic consequences of the COVID-19 pandemic for households (e.g., Chetty et al., 2020; Goldstein et al., 2021), as a factor that could decrease an individual's level of financial fragility.

The results from analyzing our survey data first indicate that individuals experienced the COVID-19 pandemic differently depending on their socio-demographics. Those in households with lower income, more dependents, and who are younger and less educated report higher objective and subjective financial fragility. Individuals who are female, divorced, retired or not employed also report higher objective financial fragility but the same subjective financial fragility as their peers. Second, individuals who experienced an economic or health shock during the pandemic report both higher objective and subjective financial fragility. Third, the extent to which an individual's cognitive and non-cognitive abilities mitigate the effects of these negative shocks differs for objective versus subjective financial fragility. For objective financial fragility, financial literacy, internal locus of control, and psychological resilience are equally effective, while for subjective financial fragility, having an internal locus of control is the most effective. Fourth, the extent to which an individual can mitigate financial fragility depends on how precarious the household's income situation is. With respect to objective financial fragility, individuals with a more precarious income benefit less from higher financial literacy but more from more generous government support. For subjective financial fragility, however, household financial support from the government does not appear to overcome individuals' money management stress, and differences across income levels are marginal. Finally, individuals with less precarious income benefit more from having higher levels of psychological resilience, but only marginally so.

We make several contributions to the existing literature in household finance. First, although some studies considered the role of the aforementioned explanatory variables in isolation on individuals' financial outcomes during normal times, none has examined the *joint effect* of socio-demographics, economic and health shocks, cognitive and non-cognitive abilities, and government support on *both* objective and subjective financial fragility during the COVID-19 *crisis period*. In particular, Clark et al. (2021) only examined individuals' objective financial fragility, not their subjective financial fragility, and only consider the role of cognitive ability (i.e., financial literacy) instead of also studying non-cognitive abilities (i.e., internal locus of control and psychological resilience). Second, compared to Klapper et al. (2013), we examine a crisis that is characterized by not only economic but also health uncertainties, and again examine the role of non-cognitive abilities in addition to cognitive abilities. Third, we add to the emerging literature on the role of non-cognitive abilities in individual financial decision-making by considering the role of psychological resilience, which has not been studied before, and by also examining the role of shocks such as lost or reduced employment during the COVID-19 pandemic and having a direct COVID-19 experience in terms of oneself or a household member being infected with the virus. Specifically, Kuhnen and Melzer (2018) studied the role of an internal locus of control (which these authors refer to as high self-efficacy) on individuals' financial distress while Parise and Peijnenburg (2019) examined the role of the Big Five personality traits. Neither of these studies examined the effect of psychological resilience on individuals' objective and subjective financial fragility. Furthermore, prior literature on the impact of employment shocks during the COVID-19 pandemic such as Baker et al. (2020) and Chetty et al. (2020) has focused on the effect on consumption behavior instead of financial fragility and did not consider the role of cognitive and/or non-cognitive abilities. Finally, our study employs a sample from four different countries, using quotas to represent as closely as possible the national populations in terms of gender, age, income, and ethnicity. In contrast, previous work on financial literacy and financial fragility during COVID-19 only considered older individuals between 45–75 years from the U.S. (Clark et al., 2021; Clark and Mitchell 2022) while prior work on employment shocks and financial well-being during COVID-19 in Australia used a convenience sample recruited through snowballing on social media, resulting in a sample which the authors admitted was unrepresentative (Botha et al., 2021). While acknowledging that the cross-sectional nature of our study does not allow us to draw conclusions regarding causality, we believe that our survey data add to the household finance literature by providing a unique perspective on individuals' financial fragility during the COVID-19 pandemic.

The rest of this study is organized as follows. Section 2 reviews the literature on cognitive and non-cognitive abilities as mitigators of financial fragility. Section 3 discusses our data and methodology. Section 4 presents results. Section 5 concludes the paper and provides implications.

2. Cognitive and non-cognitive abilities as mitigators of financial fragility

As mentioned in the Introduction, we examine individuals' cognitive and non-cognitive abilities as mitigating factors of their objective and subjective financial fragility during the pandemic. Specifically, we consider financial literacy as a cognitive ability and locus of control and psychological resilience as non-cognitive abilities. Next, we review the relevant previous literature.

2.1. Financial literacy

Financial literacy reflects an individual's understanding of basic financial concepts and is associated with the ability to better manage one's financial affairs (Lusardi and Mitchell 2014). We expect that individuals scoring higher on financial literacy will display lower objective and subjective financial fragility. Prior work by Klapper et al. (2013) on the experience of individuals during the Global Financial Crisis (GFC) suggests that financial literacy may enable individuals to better deal with macroeconomic shocks. These authors find that more financially literate individuals have greater availability of unspent income and lower levels of consumption inadequacy. Apart from the effect on objective financial fragility, we propose that financial literacy might also make individuals more confident about their ability to deal with unexpected financial demands and might thus reduce their subjective financial fragility. While prior research agrees on the conceptual relevance of financial literacy for reducing current money management stress, empirical findings are inconclusive, with Warmath and Zimmerman (2019) finding such an effect, but Netemeyer et al. (2018) not. Hence, the question of whether financial literacy can reduce subjective financial fragility during a crisis period such as the COVID-19 pandemic is ultimately an empirical one.

2.2. Locus of control

Locus of control reflects individuals' generalized belief whether the events occurring in their life are under their personal control or not, with the former case indicating one has an internal locus of control and the latter case indicating one has an external locus of control (Rotter 1966). An internal locus of control is associated with lower objective financial fragility as it has been related to a better ability to save (Cobb-Clark et al., 2016) and more positive financial behaviors such as paying off credit card balances in full each month (Hoffmann and Risse 2020). Individuals with an internal locus of control are also more likely to take precautions that can help mitigate adverse financial shocks (Kuhnen and Melzer 2018) including taking out health insurance (Hoffmann and Risse 2020).[1] We expect that an internal locus is also negatively associated with an individual's subjective financial fragility as it has been linked to lower levels of trait anxiety (Archer 1979) and less emotional exhaustion related to one's personal financial situation (Choi and Heo 2021).

2.3. Psychological resilience

Psychological resilience captures positive adaptation in the face of stress or trauma (Luthar et al., 2000) and refers to one's ability to thrive despite adversity (Campbell-Sills and Stein 2007). Given that psychological resilience reflects whether individuals have the mental resources to cope with difficult situations, we expect it to be negatively associated with objective and subjective financial fragility, as it will relate both to being prepared for dealing with financial demands in a monetary sense and being able to manage them emotionally. Little attention has been paid to the concept of psychological resilience in the finance literature, with the exception of Clark and Mitchell (2022). These authors did not use a validated scale to measure the general psychological trait of resilience but came up with a composite index of "financial resilience" that mixes objective indicators, such as having emergency savings, with subjective indicators such as feeling financially anxious.[2] Nevertheless, in support of our theoretical expectation, Clark and Mitchell (2022) do find that their measure of financial resilience is negatively related to individuals' objective financial fragility.

3. Data and methodology

We obtain the main part of our data from a survey conducted simultaneously in Australia, France, Germany, and South Africa between April 18, 2021 and June 5, 2021. This period represented the middle of the COVID-19 pandemic, which was officially declared a Public Health Emergency of International Concern (PHEIC) by the World Health Organization (WHO) on 30 January 2020, a situation which continued to be the case three years later at the time of the WHO's most recent emergency committee meeting on 27 January 2023 (Adam 2023). We recruited respondents from an online household panel maintained by market research firm Qualtrics, using quotas to approximate national populations in terms of gender, age, income, and ethnicity. As Table 1 shows, our final sample consists of 494 respondents from Australia, 549 from France, 510 from Germany, and 547 from South Africa, for a total of 2100 respondents completing the survey and providing a valid response.

Table 1
Descriptive statistics – socio-demographic variables.

Socio-demographic characteristic	Number of respondents	Fraction of respondents
Gender		
Male	1050	50%
Female	1050	50%
Number of dependents		
No dependents	1052	50%
1 dependent	379	18%
2 to 3 dependents	447	21%
4 to 5 dependents	170	8%
More than 5 dependents	52	2%
Marital status		
Single	630	30%
Married	1210	58%
Divorced	214	10%
Widowed	46	2%
Age group		
18–24 years	329	16%
25–54 years	1029	49%
55–64 years	328	16%
65+ years	414	20%
Education		
Primary school	178	8%
Completed secondary school	1079	51%
Completed university	843	40%
Employment		
Employed	1073	51%
Retired	464	22%
Not employed	403	19%
Self-employed	160	8%
Ethnicity		
White	1556	74%
Black	293	14%
Asian	124	6%
Other	127	6%
Country		
Australia	494	24%
France	549	26%
Germany	510	24%
South Africa	547	26%

Note: This table describes the socio-demomgraphic characteristics of our 2100 survey respondents.

Our survey timing means that we capture financial fragility among individuals who have had the chance to accumulate personal experiences with the pandemic and understand its effect on their financial situation. Hence, we can investigate the impact of a COVID-19 infection and lost or reduced employment on financial fragility, and examine whether and to what extent cognitive and non-cognitive abilities can mitigate the consequences of these economic and health shocks. Finally, we are able to relate differences in financial fragility to government financial support policies for households since people have experienced these policies since the first occurrence of the pandemic in early 2020.

In our analysis of the determinants of individuals' financial fragility during the COVID-19 pandemic, we distinguish two types of financial fragility: objective and subjective financial fragility.

[1] Note that some prior literature has referred to an internal locus of control as high self-efficacy (Kuhnen and Melzer 2018).

[2] We consider the psychological trait of resilience that we use to be better suited as an independent variable in the context of our study compared to the measure of financial resilience employed by Clark and Mitchell (2022). This is because Clark and Mitchell's (2022) measure actually incorporates aspects of our dependent variables of interest (i.e., objective and subjective financial fragility), which is problematic from a conceptual and an econometrical perspective. For example, our measure of objective financial fragility captures how certain respondents are that they could come up with a certain amount of funds in one month. This overlaps with Clark and Mitchell's (2022) question of the presence of an emergency fund, which these authors treat as an indicator of financial resilience. Similarly, our measure of subjective financial fragility includes items such as "My finances control my life." This again overlaps with Clark and Mitchell's (2022) question of respondents' level of concern over finances, measured by whether they are financially anxious or not, which these authors again treat as an indicator of financial resilience. In other words, if we would use Clark and Mitchell's (2022) measure, one of our key independent variables would already contain information on the dependent variables of interest. In contrast, the psychological trait of resilience that we use does not suffer from this limitation, as it is a general psychological trait, similar to the other non-cognitive ability of having an internal locus of control.

Table 2
Descriptive statistics – other variables.

Variable	Mean	Standard deviation	Min	Median	Max
Objective financial fragility	3.16	2.14	1.00	3.00	7.00
Subjective financial fragility	3.45	1.47	1.00	3.40	7.00
Reduced or lost employment	0.21	0.41	0.00	0.00	1.00
COVID-19 infection	0.28	0.45	0.00	0.00	1.00
Precarious income	1.14	1.34	0.08	0.78	9.50
Financial literacy	3.36	1.41	0.00	4.00	5.00
Financial literacy$_s$	0.00	1.00	-2.37	0.46	1.16
Internal locus of control	4.53	1.35	1.00	4.60	7.00
Internal locus of control$_s$	0.00	1.00	-2.62	0.05	1.83
Psychological resilience	5.00	1.11	1.30	5.00	7.00
Psychological resilience$_s$	0.00	1.00	-3.32	0.00	1.79
Household financial support	59.50	10.97	40.00	62.74	74.79
Pandemic impact$_{health}$	155.31	157.58	0.22	104.63	452.23
Pandemic impact$_{economy}$	10.31	2.19	6.20	10.08	15.65

Note: This table provides descriptive statistics for all non-demographic variables for our sample of 2100 respondent-level observations. Subscript s indicates a standardized variable.

We furthermore distinguish four groups of explanatory variables: socio-demographics, country characteristics, personal experiences during the pandemic related to encountering negative economic and health shocks, and potential mitigation mechanisms related to cognitive and non-cognitive abilities. We discuss our measures of financial fragility next, followed by a discussion of each group of explanatory variables. Appendix A provides a detailed description of all variables.

3.1. Financial fragility

Objective financial fragility reflects an individual's (in)ability to deal with unexpected expenses following the conceptualization of Lusardi et al. (2011). In our survey, it is measured by respondents' answer to the question "How confident are you that you could come up with 4000 AUD / 2000 EUR / 2000 ZAR if an unexpected need arose within the next month?"[3] Our amounts of unexpected expenses are in line with Lusardi et al. (2011), who used 2000 USD for their survey in the U.S., and are adjusted for the respective income level differences between the four countries. Answer categories for this question range from 1 = completely certain to 7 = not at all certain, so that a higher score for this question indicates that the respondent has a higher level of objective financial fragility.[4]

Subjective financial fragility reflects an individual's perceived current money management stress following the conceptualization of Netemeyer et al. (2018). In our survey, it is measured by respondents' average across their answers to five statements (see Appendix A for details on all statements). Example statements are: "My finances control my life" and "Whenever I feel in control of my finances, something happens that sets me back." Answer categories for each statement range from 1 = does not describe me at all to 7 = describes me very well, so that a higher score for this question indicates that the respondent has a higher level of subjective financial fragility.

While objective financial fragility measures the respondent's assessment of their *factual* ability to deal with financial demands, subjective financial fragility measures the respondent's *emotional* response to these financial demands. Table 2 shows that the average respondent has an objective financial fragility of 3.16 and a subjective financial fragility of 3.45.[5] While both numbers indicate moderate levels of financial fragility, the means are statistically different.[6] Fig. 1 compares the distributions of both measures of financial fragility, indicating that high objective financial fragility does not necessarily overlap with high subjective financial fragility. In other words, individuals who are unable to cover unexpected expenses during the pandemic are not necessarily stressed about it. Conversely, this also means that those who are, in fact, able to deal with unexpected expenses may still experience subjective financial fragility during the pandemic.[7] This observation, in turn, suggests that negative personal experiences might have a different effect on objective compared to subjective financial fragility, and that cognitive and non-cognitive abilities as well as government support programs might possibly mitigate one type of financial fragility but not the other. Hence, an analysis that differentiates

[3] Lusardi et al. (2011) note potential limitations of this question, including that there could be ambiguity in how respondents interpret the phrase "could come up with." Moreover, the amount of funds required to come up with could be relatively low for some respondents, while it is not clear whether respondents think about a single shock or multiple shocks that require funds, and which type of shock they should think about. Finally, the time frame of one month will affect what respondents can do and the specific period in which this question is asked can affect respondents' answer.

[4] We use a 7-point scale in terms of answer options instead of the four different answer options used by Lusardi et al. (2011) to obtain a more fine-grained insight into individuals' objective financial fragility and to have consistency in measurement vis-à-vis the subjective financial fragility assessment, which also uses a 7-point scale in terms of answer options. The wording of the end-points of our 7-point scale is similar to that used by Lusardi et al. (2011), referring to how *certain* respondents are that they are able to come up with the suggested amount of funds in a specific time. We leave out the "do not know" and "refuse to answer" options used by Lusardi et al. (2011) for consistency between the measurement of objective and subjective financial fragility, with the latter measure also not offering these answer options. Furthermore, research on financial literacy by Bucher-Koenen et al. (2021) indicates that when providing respondents with a "do not know" option, women are disproportionally likely to select that answer compared to men. However, when these authors did not provide this particular answer option, women were in fact likely to answer the questions correctly. Thus, not including the "do not know" answer option also avoids any such "gender gap" in response tendency between men and women. Finally, given that respondents were instructed not to complete the survey if they were unwilling to provide details on their personal financial situation, we did not consider the option "refuse to answer" to be relevant to include.

[5] The level of objective financial fragility in our sample is in line with observations of previous research. In particular, Hasler et al. (2018) report that one-third of American households are financially fragile, with Demertzis et al. (2020) reporting the same statistic for European households. In our study, we find that 34.14% of respondents have a level of objective financial fragility that is at or above the scale midpoint of 4, which is thus consistent with previous findings.

[6] Based on the standard deviations in Table 2, we conduct a two-sample *t*-test with *unequal* variances. The *t*-value of −5.15 indicates significantly different means between objective and subjective financial fragility at the 1% level.

[7] In fact, the correlation between objective and subjective financial fragility is only 0.43 (at the 1% significance level) as Table B1 of the online Appendix B shows. In addition to Figure 1, Figure B1 of the online Appendix B more directly reports the overlap between low versus high objective and subjective financial fragility and reveals that a substantial fraction of respondents reports low objective financial fragility combined with high subjective financial fragility, or vice versa.

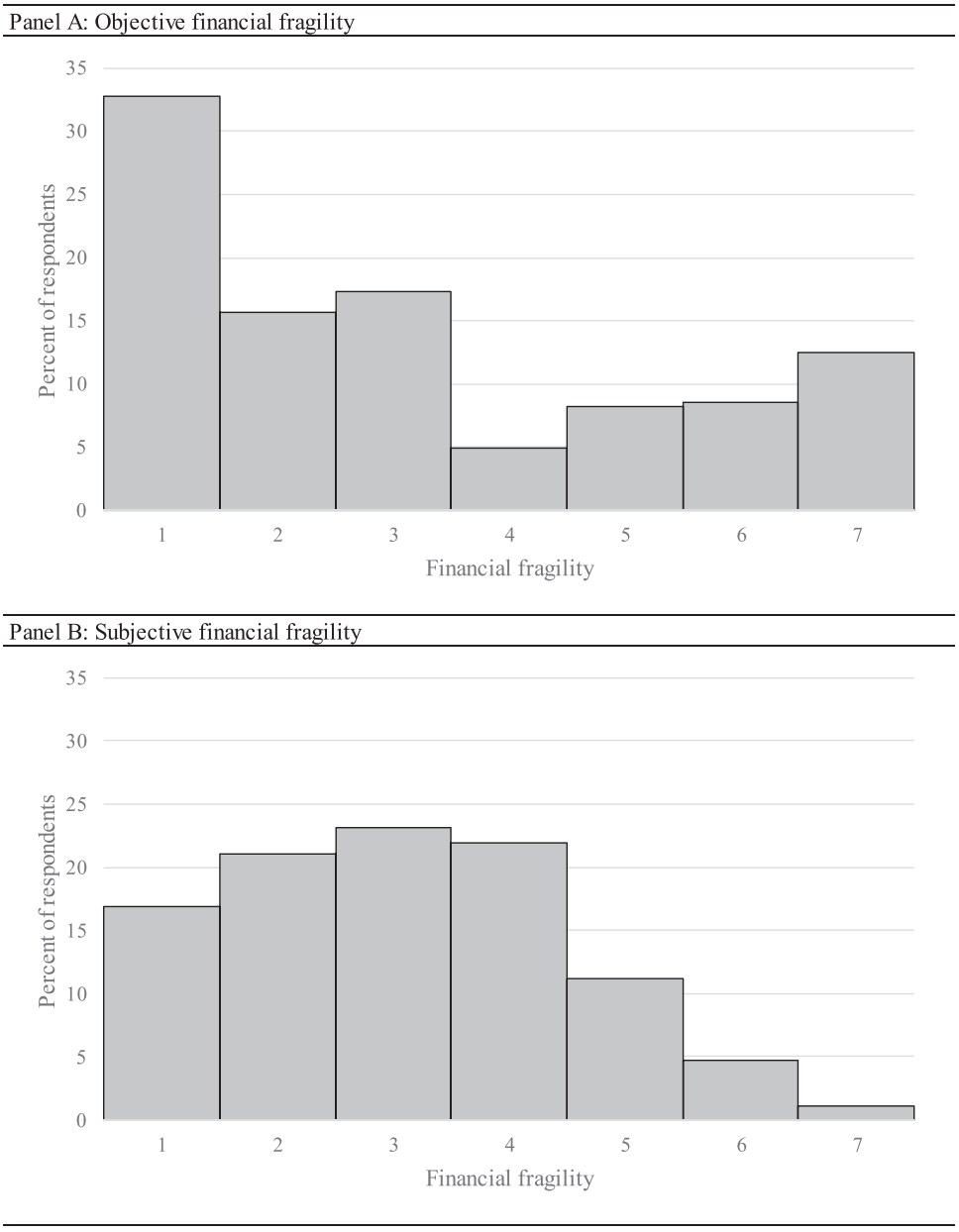

Fig. 1. Financial fragility.
This figure shows the distributions of objective and subjective financial fragility. Objective financial fragility is assessed as the ability to deal with unexpected expenses following Lusardi et al. (2011). Subjective financial fragility is measured as current money management stress following Netemeyer et al. (2018). Financial fragility ranges from 1 indicating low fragility to 7 indicating high fragility.

between individuals' objective and subjective financial fragility, as conducted in this study, appears justified, not just from a theoretical perspective, but also from an empirical perspective.

3.2. Determinants of financial fragility

Based on the existing evidence from the household finance literature, we first explore standard socio-demographics and country characteristics as possible determinants of an individual's financial fragility. But, as our study focuses on the COVID-19 pandemic as a crisis period (Goldstein et al., 2021), we pay particular attention to negative shocks to an individual's situation, such as a job loss/reduced employment during the pandemic or a COVID-19 infection. Then, based on more recent evidence, we explore an individual's cognitive and non-cognitive abilities as mitigators of the financial fragility resulting from their socio-demographic characteristics and the experience of negative shocks.

3.2.1. Socio-Demographics

We asked respondents standard questions on age, education, employment, ethnicity, gender, marital status, number of dependents, and income. With the exception of income, we categorize each of these socio-demographics into groups as described in Appendix A. Based on the income question, we define *precarious income* as the inverse of respondent's monthly net income (take-home pay) in their local currency divided by the country's average net income. A higher value for this question indicates a respondent with a lower income level and thus a more precarious income.

Table 1 shows the socio-demographic composition of our sample, which is equally split between male and female respondents. Most respondents have no dependents, are married, are between

25 and 54 years of age, completed secondary school, and are employed. Regarding ethnicity, 74% of our sample is White, 14% is Black, and 6% is Asian. The remaining 6% include other ethnicities such as Latin American or Aboriginal. In our main analyses, we control for potential fixed effects associated with ethnicity. However, for a given ethnic group, financial fragility might differ across countries and we therefore control for country-by-ethnicity fixed effects in a robustness check.

Table 2 reveals that the respondents have a moderate level of average income precariousness of 1.14. That is, the respective country's average income is 14% higher than the average respondent's household-level income. However, there is large variation in respondents' income precariousness, with the standard deviation being 1.34. For the most precarious respondent, the country's average income represents 950% of the respondent's income. For the least precarious respondent, the country's average income represents only 8% of the respondent's income.[8]

3.2.2. Country characteristics

Our survey captures the pandemic experience of individuals across four countries: Australia, France, Germany, and South Africa. Given the differences in COVID-19 experiences, cultures, and levels of economic development of these countries, it is important to control for the potential impact of country differences on individuals' financial fragility. We do so by including country fixed effects in our models. In addition, we control for the severity of the pandemic in terms of its health and economic impact: *Pandemic impact*$_{health}$ uses data from Ritchie et al. (2020) and measures per country the daily new confirmed COVID-19 cases per million people as a 7-day average prior to the survey response day of each individual respondent. A high value indicates an adverse health impact of the pandemic. *Pandemic impact*$_{economy}$ uses data from FTSE Russell and measures the cumulative return of each country's national stock market index from January 1, 2021 to the survey response day of each individual respondent. A low value indicates an adverse economic impact of the pandemic. By measuring both proxies in a time-varying manner, they provide additional, time-varying, information about the pandemic which the country fixed effects do not capture, and we therefore include them in addition to the country fixed effects in our models.

For the average respondent in our sample, the health impact of the pandemic amounts to 155.31 daily new confirmed COVID-19 cases per million people. However, there is large variation across countries and over time, as indicated by the minimum of 0.22 and maximum of 453.23. For the average respondent in our sample, the economic impact of the pandemic amounts to a 10.31% cumulative return of the national stock market index (see Table 2). This perhaps surprising finding of a positive cumulative return is explained by the fact that after the initial financial market downturn in 2020 associated with the great uncertainty of the economic impact of the pandemic, there was a strong recovery, further stimulated by the expansive monitory policies and financial support packages implemented by national governments around the world (see e.g., Ashraf 2020).

3.2.3. Personal experiences during the pandemic

We consider how pandemic-related negative shocks to an individual's situation affect their financial fragility. Specifically, we consider shocks brought about by an employment change or COVID-19 infection. We measure a negative employment shock as a dummy variable indicating *reduced or lost employment* during the COVID-19 pandemic. Botha et al. (2021, p. 657) discuss the effect of "negative involuntary labor market shocks, such as unemployment, reduced work hours, and lower wages" on financial well-being. In line with their notion, our dummy variable captures whether individuals stopped working due to personal circumstances, experienced reduced employment, or lost their employment entirely due to termination or lack of contract renewal.

To measure a negative health shock brought about by a *COVID-19 infection*, we asked respondents whether since February 2020 they or someone in their household have had any symptoms or signs of illness that made them believe to have contracted COVID-19. We also asked whether the COVID-19 infection was confirmed by a test. We combine the answers to these questions into a dummy variable. We focus on the subjective perception of having had COVID-19 instead of only confirmed cases, given that the fear of being infected already affects individuals' subjective well-being (Cavalera 2020) as well as their consumption and saving behavior during the pandemic (Immordino et al., 2022), and might thus also affect subjective financial fragility.[9]

Table 2 shows that 21% of respondents experienced a negative employment shock brought about by reduced/lost employment. These 21% are made up of 6% of respondents with reduced employment and 14% of respondents with lost employment; the remaining 1% cannot clearly be categorized as either having had lost or reduced employment. Twenty-eight percent of respondents experienced a negative health shock brought about by a (suspected) COVID-19 infection in their household. Twenty-four percent of respondents report a COVID-19 infection for themselves, of which 4% are confirmed infections. In terms of confirmed infections, our sample is near representative of the state of the pandemic at the time of data collection across the countries. Specifically, based on official data reported in Ritchie et al. (2020), one would expect 3.9% of our total sample to report a confirmed COVID-19 infection, and the corresponding number is 4.3%. However, between countries, we find some evidence of undersampling in France and Germany and oversampling in Australia and South Africa (see Table C1 in online Appendix C for details and how we arrived at the respective numbers).[10] Twelve percent of respondents report a (suspected) COVID-19 infection for another household member. Thus, amongst 8% of the sample, both the respondent him- or herself and another household member had contracted COVID-19 at the time of the survey.

3.2.4. Mitigation mechanisms

We asked respondents questions capturing their cognitive as well as non-cognitive abilities. Doing so allow us to measure three personal skills that potentially mitigate the financial fragility induced by negative personal experiences during the pandemic: financial literacy, internal locus of control, and psychological resilience. As a fourth potential mitigator of financial fragility, we consider the financial support policies that national governments implemented during the pandemic.

Financial literacy is measured as the number of correct answers by respondents to the five financial literacy questions of Klapper and Lusardi (2020), with one question each regarding diversification, risk, and numeracy, and two different compounding questions (see Appendix A).

Internal locus of control is measured as per Rotter (1966). We ask respondents to indicate agreement with seven statements (see

[8] These minimum and maximum values are obtained after winsorizing precarious income at the 1% and 99% level.

[9] In robustness checks in Section 4.3, we also consider alternative proxies, including the severity of a COVID-19 infection.

[10] We also compare the expected hospitalization rate due to COVID-19 based on official data as reported in Ritchie et al. (2020) to the actual rate in our sample, and again find that across the countries the reported hospitalization rate of 0.24% is close to the expected rate of 0.40%. However, since hospitalization is such a rare event (only 5 cases in the total sample), there is over- and undersampling between countries (for details, see Table C2 in online Appendix C).

Appendix A). Example statements are: "What happens to me in the future mostly depends on me" and "I can do just about anything I really set my mind to." Answer categories range from 1 = completely disagree to 7 = completely agree. Internal locus of control measures the respondent's average answer across all statements after re-coding reverse-scored questions, so that a higher score means respondents having a higher internal locus of control.

Psychological resilience is measured as per Campbell-Sills and Stein (2007). We ask respondents to assess their agreement with ten statements about themselves (see Appendix A). Example statements are: "I tend to bounce back after illness or hardship" and "Coping with stress can strengthen me." Answer categories range from 1 = completely disagree to 7 = completely agree, and psychological resilience measures the respondent's average answer across all the statements.

Policies enacted by the government to reduce the economic impact of the pandemic might also be able to mitigate financial fragility. Such financial support for households can directly reduce objective financial fragility, for example, through income support in the form of stimulus payments aimed to mitigate the effect of reductions in economic activity (Chetty et al., 2020). However, financial support can also have a signaling function indicating that the government will take care of its citizens and thus reduce individuals' (perceived) financial stress, and thus subjective financial fragility. Our measure *household financial support* is based on the Economic Support Index by Hale et al. (2021). The index reflects support provided by the government in terms of income support and debt/contract relief for households in the respondent's country of residence and ranges from 0 reflecting low support to 100 reflecting high support. We match the index to the exact day on which the respondent completed our survey and calculate household financial support as the average index in the preceding 365 days. Accordingly, household financial support reflects the financial support that was available to the respondent in the preceding year, which thus will have influenced their perceptions of and actual financial situation at the time of answering the survey.

Table 2 provides descriptive statistics for aforementioned mitigators. Fig. 2 shows the distributions of financial literacy, internal locus of control, and psychological resilience as well as the development of household financial support over time per country and survey response day. Among our respondents, financial literacy is relatively high with an average of 3.36 out of 5 correct answers.[11] More than 50% of respondents answer at least four of the five questions correctly while less than 5% of respondents answer all questions incorrectly.[12] The distributions of internal locus of control and psychological resilience are bell-shaped with averages of 4.5 and 5.0, respectively. Regarding household financial support, the governments of the four countries in our survey provide some financial support (sample minimum is 40) but no individual government provides the maximum possible support (sample maximum is 74.79 out of a possible 100).[13] For the average respondent, household financial support amounts to 59.50 during the year preceding the survey response date. However, this average conceals differences across countries and over time, as Panel D of Fig. 2 shows. Financial support is substantially lower in Germany than in the other three countries. During the sample period, South Africa is the only country that has increased its financial support for households while the other three countries reduced their financial support.

3.3. Methodology

For our main analyses, we estimate OLS regressions and infer statistical significance from robust standard errors. We include the explanatory variables from the above described four groups of variables. In particular, we populate the model with fixed effects for the respondents' socio-demographics and country of residence. To facilitate the comparison of coefficients across different mitigation mechanisms, we follow prior literature on the effect of cognitive and non-cognitive abilities (Cobb-Clark et al., 2016; Parise and Peijnenburg 2019) and standardize our measurements of respondents' cognitive (i.e., financial literacy) and non-cognitive abilities (i.e., internal locus of control, psychological resilience) to have a mean of zero and a standard deviation of one.

4. Results

Our discussion of results is organized as follows. First, we provide model-free evidence comparing the objective and subjective financial fragility of respondents who experienced an economic and/or health shock during the COVID-19 pandemic versus those that did not as well as of respondents with high versus low levels of cognitive and non-cognitive abilities and/or available government financial support. Second, we present our main regression results which show the determinants of respondents' objective and subjective financial fragility during the COVID-19 pandemic in a multivariate setup including relevant control variables. Third, we demonstrate the robustness of these main results to differences in regression specification; use of alternative or more detailed operationalizations of explanatory variables; and the accounting for potential confounding factors.

4.1. Model-Free evidence

In addition to the descriptive statistics in Tables 1 and 2 as well as Figs. 1 and 2, we provide model-free evidence in Table 3. Here, we compare the financial fragility of two groups of respondents: (i) those who experienced reduced/lost employment or a COVID-19 infection versus those who did not experience such an economic and/or health shock during the COVID-19 pandemic, and (ii) respondents with low levels of financial literacy, internal locus of control, psychological resilience or household financial support versus respondents with high levels of these cognitive and non-cognitive abilities and/or available government financial support.

Panel A shows that respondents who experienced a negative shock in the form of reduced/lost employment or a COVID-19 infection report higher objective and subjective financial fragility than respondents who did not experience any such shock. The differences in average reported financial fragility are statistically significant at the 1% level. Panel B shows that respondents with lower levels of financial literacy, internal locus of control, and psychological resilience are objectively and subjectively more financially fragile than respondents with higher levels of these cognitive and

[11] We ask the same questions as Klapper and Lusardi (2020). These authors find that, globally, 33% of respondents are financially literate (i.e., provide correct answers for at least three of four financial literacy concepts). For individual countries, the corresponding financial literacy percentages are: 64% (Australia), 52% (France), 66% (Germany) and 42% (South Africa). If we apply aforementioned authors' definition of financial literacy, then 65% (total sample), 67% (Australia), 61% (France), 65% (Germany) and 67% (South Africa) of our respondents are financially literate.

[12] The fraction of correct answers per question are: 60% correct answers for the diversification question; 64% for the inflation question, 76% for the numeracy question, and 72% (64%) for the basic (advanced) compounding question.

[13] Household financial support ranges from 0 to 100, with a level of 0 indicating that a government provides no income support and no debt/contract relief and a level of 100 indicating that a government is replacing 50% or more of lost salary and provides broad debt/contract relief. Values in between reflect a combination of income support and debt/contract relief. For example, household financial support of 50 can indicate that (i) the government is replacing 50% or more of lost salary but provides no debt/contract relief, or (ii) the government is replacing less than 50% of lost salary and provides narrow debt/contract relief, or (iii) the government provides broad debt/contract relief but no income support.

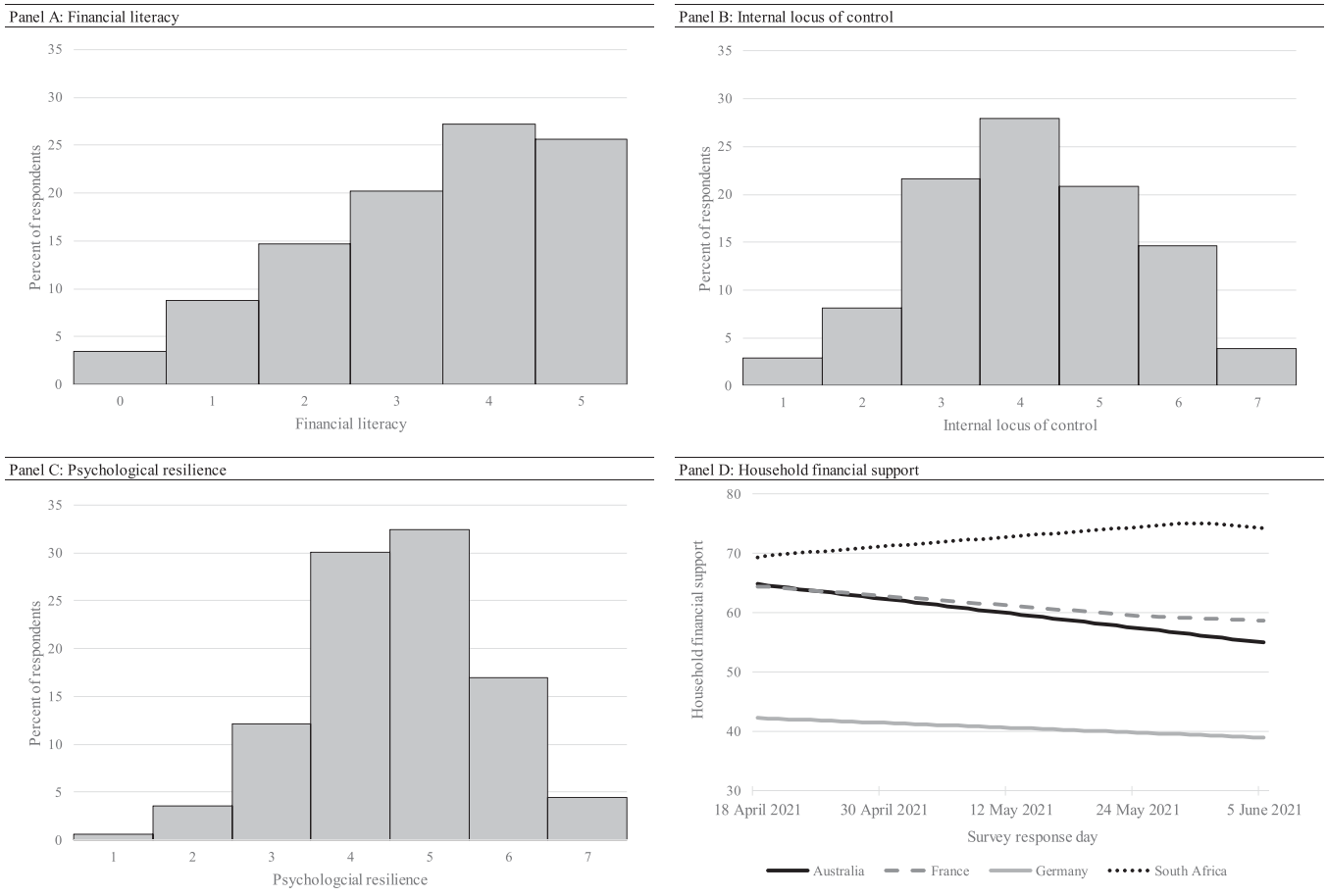

Fig. 2. Mitigators of financial fragility.
This figure shows the mitigators of financial fragility. Panel A to C show the distributions of financial literacy, internal locus of control and psychological resilience. Financial literacy is assessed as the number of correct answers to five questions about numeracy, inflation, diversification and compounding. Internal locus of control is assessed as one's own responsibility following Rotter (1954, 1966). Psychological resilience is assessed following Campbell-Sills and Stein (2007). Financial literacy ranges from 0 indicating low financial literacy to 5 indicating high financial literacy. Internal locus of control and psychological resilience range from 1 indicating low interal locus of control or psychological resilience to 7 indicating high internal locus of control or psychological resilience. Panel D shows the level of government's economic support over time. Household financial support is assessed based on the Economic Support Index provided by Hale et al. (2021). The index reflects support provided by the government in terms of income support and debt / contract relief for households in the respondents' country and ranges from 0 reflecting low support to 100 reflecting high support. The figure shows the index as a 365-day rolling average from survey response day t to day t-364.

non-cognitive abilities. Again, the differences in average reported financial fragility are statistically significant at the 1% level. For household financial support as a mitigator of financial fragility, the results are different. There is no statistically significant difference in objective financial fragility between the two groups. However, respondents who received higher levels of financial support report significantly higher subjective financial fragility than respondents who received lower levels of financial support. This finding suggests that governments' financial support policies reached the most vulnerable households. Despite this reduction in objective financial fragility, the signal sent by the government, however, appears not to have been strong enough to inspire confidence in respondents and overcome any money management stress induced by their personal experiences during the pandemic. Instead, subjective financial fragility *increases* with household financial support. This counterintuitive result could be explained by the fact that having to accept financial support to make ends meet might make individuals realize how precarious their financial situation is, which in turn creates emotional stress. While this interpretation is in line with our results, we cannot infer causality from our cross-sectional data.

In sum, this initial model-free evidence suggests that financial fragility is higher amongst respondents who experienced economic and/or health shocks; cognitive and non-cognitive abilities appear to at least partially shield respondents from experiencing financial fragility; while the effect of government financial support appears more complex. Next, we present our regression results.

4.2. Main regression results

Tables 4 and 5 present our main regression results. We develop our model in Table 4 as follows: Model 1 includes socio-demographics and country characteristics. We add our measures for respondents' personal experiences during the pandemic in Model 2 and for the mitigators in Model 3.[14] Model 4 represents the complete model containing all explanatory variables. The estimated coefficients are stable across models but some of the socio-demographics and country characteristics reduce in size and significance as we add more explanatory variables, such as in Models 3 and 4.

[14] For robustness, we also estimate alternative models in which we include each personal experience and mitigator separately. The results are robust, with coefficients somewhat larger in absolute size than those reported in Table 4. With respect to subjective financial fragility, this size difference is most pronounced for financial literacy and psychological resilience and least pronounced for internal locus of control, indicating that these mitigators are at least partially substitutes. Results are reported in Table B2 of the online Appendix B.

Table 3
Model-free analysis of objective and subjective financial fragility.

Panel A: Personal experiences during the pandemic						
	Objective financial fragility			Subjective financial fragility		
Personal experience	Mean for respondents without personal experience	Mean for respondents with personal experience	*t*-test for difference in means	Mean for respondents without personal experience	Mean for respondents with personal experience	*t*-test for difference in means
Reduced or lost employment	3.04	3.45	-4.00***	3.28	3.87	-8.33***
COVID-19 infection	3.03	3.63	-5.33***	3.30	4.00	-9.04***
Panel B: Mitigators of financial fragility						
	Objective financial fragility			Subjective financial fragility		
Mitigator	Mean for respondents with low mitigator	Mean for respondents with high mitigator	*t*-test for difference in means	Mean for respondents with low mitigator	Mean for respondents with high mitigator	*t*-test for difference in means
Financial literacy	3.91	2.88	10.04***	3.83	3.31	7.23***
Internal locus of control	3.76	2.98	7.08***	4.55	3.13	20.19***
Psychological resilience	4.48	3.01	9.75***	4.22	3.36	8.17***
Household financial support	3.05	3.19	-1.35	3.21	3.53	-4.24***

Note: For each personal experiences during the pandemic, Panel A compares the mean financial fragility of two groups of respondents: respondents without a personal experience during the pandemic versus respondents with a personal experience during the pandemic. A personal experience is attained when the dummy for reduced or lost employment or COVID-19 infection is equal to 1, respectively. For each mitigator of financial fragility, Panel B compares the mean financial fragility of two groups of respondents: respondents with low levels of the mitigator versus respondents with high levels of the mitigator. A high level is attained when the mitigator is larger than the mid-point of the mitigator's scale. A low level is attained when the mitigator is equal to or smaller than the mid-point of the mitigator's scale. The mid-points are 2.5 for financial literacy, 3.5 for internal locus of control and psychological resilience and 50 for household financial support. In both panels, the *t*-test assumes equal variances and tests the null-hypothesis that the mean financial fragility is the same in both groups. ***=1%, **=5%, *=10% significance.

First, our results in Table 4 indicate that respondents experience the COVID-19 pandemic differently depending on their socio-demographics. Individuals in households with more precarious income, more dependents, and who are younger and less educated report higher objective and subjective financial fragility. Individuals who are female, divorced, retired or not employed report higher objective financial fragility but the same subjective financial fragility as their peers. These patterns are equally present in each of the four countries under investigation, as ethnicity or country of residence are not related to either objective or subjective financial fragility.

The estimated effects are economically relevant. Compared to the average objective financial fragility of 3.16 and average subjective financial fragility of 3.45, Model 4 indicates the following: among all socio-demographics, educational attainment has by far the strongest impact on objective financial fragility. Completing university reduces objective financial fragility by 33% while completing secondary school reduces objective financial fragility by a still sizable 16%.[15] The not-employed are 23% more objectively fragile than those who are, and individuals aged 65 or older are 19% more objectively fragile than younger individuals between 18 and 24 years of age. At the lower end, women are 8% more objectively financially fragile than men. For subjective financial fragility, the impact is more homogenous across the significant socio-demographics, with differences typically ranging between 5% and 10%. Having a precarious income is positively associated with both objective and subjective financial fragility. Having a one-standard deviation higher level of income precariousness (i.e., lower household income relative to country average) increases one's objective financial fragility by 9% and one's subjective financial fragility by 3%.[16]

Second, Model 4 shows that individuals who experienced a negative shock during the pandemic in the form of reduced/lost employment or a COVID-19 infection in their household report both higher objective and subjective financial fragility. The coefficients are statistically significant as well as economically meaningful. A shock in the form of reduced/lost employment increases individuals' objective financial fragility by 8% and their subjective financial fragility by 9%. A shock in form of a COVID-19 infection in the household increases individuals' objective financial fragility and subjective financial fragility by 6%.

Third, the extent to which an individual's cognitive and non-cognitive abilities can mitigate the effects of these negative shocks differs for objective versus subjective financial fragility. For objective financial fragility, the estimated coefficients are similar in size but of opposite sign compared to the coefficients of a negative shock. This suggests that a one-standard deviation (e.g., one unit) increase in financial literacy, internal locus of control, or psychological resilience can overcome the negative effect of these economic or health shocks on objective financial fragility.[17] For subjective financial fragility, however, having an internal locus of control is by far the most effective ability. Here, a half-standard deviation increase in internal locus of control decreases subjective financial fragility by 10% and is thus able to fully overcome the negative effect of either type of negative shock. In contrast, an increase by about 3.5 to 4 standard deviations in financial literacy or psychological resilience is necessary to overcome the effect of a negative economic or health shock on individuals' subjective financial fragility.

Having established the main determinants of objective and subjective financial fragility in Table 4, we explore in Table 5 whether the extent to which an individual can mitigate financial fragility

[15] We calculate these differences by dividing the estimated coefficient by the sample average. For completed university education, this results in −1.046/3.16 = −0.3310 or −33%. We proceed similarly for the other socio-demographic categories.

[16] We calculate these differences by first multiplying the estimated coefficient by the standard deviation and then dividing by the sample average. For the relationship of income precariousness with objective financial fragility, this results in (1.34*0.201) / 3.16 = 0.0852 or 9%.

[17] Recall that our proxies for financial literacy, internal locus of control, and psychological resilience are standardized and thus have a mean of zero and a standard deviation of one.

Table 4
Financial fragilty during the COVID-19 pandemic.

Dependent variable	Panel A: Objective financial fragility				Panel B: Subjective financial fragility			
Regression	1	2	3	4	1	2	3	4
Personal experiences during the pandemic								
Reduced or lost employment		0.404***		0.239**		0.561***		0.300***
		(0.114)		(0.113)		(0.077)		(0.068)
COVID-19 infection		0.238**		0.205*		0.254***		0.216***
		(0.109)		(0.105)		(0.075)		(0.064)
Mitigation mechanisms								
Financial literacy$_s$			-0.279***	-0.270***			-0.091***	-0.081***
			(0.046)	(0.046)			(0.028)	(0.028)
Internal locus of control$_s$			-0.260***	-0.245***			-0.718***	-0.699***
			(0.048)	(0.048)			(0.031)	(0.031)
Psychological resilience$_s$			-0.243***	-0.241***			-0.098***	-0.096***
			(0.050)	(0.050)			(0.033)	(0.032)
Household financial support			0.010	0.010			-0.012	-0.012
			(0.060)	(0.061)			(0.042)	(0.041)
Demographics								
Precarious income	0.266***	0.255***	0.206***	0.201***	0.122***	0.106***	0.069***	0.063**
	(0.046)	(0.046)	(0.044)	(0.045)	(0.029)	(0.028)	(0.025)	(0.025)
Female	0.432***	0.411***	0.254***	0.248***	0.128**	0.098	-0.026	-0.034
	(0.090)	(0.090)	(0.089)	(0.089)	(0.064)	(0.062)	(0.055)	(0.054)
Number of dependents (baseline: no dependents)								
1 dependent	0.184	0.155	0.114	0.097	0.245***	0.206**	0.153**	0.133*
	(0.120)	(0.121)	(0.119)	(0.119)	(0.082)	(0.081)	(0.069)	(0.069)
2 to 3 dependents	0.256**	0.258**	0.210*	0.212*	0.239***	0.243***	0.210***	0.213***
	(0.119)	(0.118)	(0.115)	(0.114)	(0.089)	(0.087)	(0.073)	(0.072)
4 to 5 dependents	0.512***	0.489***	0.445***	0.432**	0.299**	0.269**	0.228**	0.213**
	(0.182)	(0.182)	(0.170)	(0.170)	(0.123)	(0.123)	(0.105)	(0.105)
More than 5 dependents	0.325	0.325	0.277	0.281	0.319*	0.318*	0.209	0.213
	(0.277)	(0.275)	(0.273)	(0.271)	(0.184)	(0.181)	(0.164)	(0.163)
Marital status (baseline: single)								
Married	-0.196*	-0.220*	-0.140	-0.158	0.018	-0.013	0.092	0.071
	(0.118)	(0.118)	(0.113)	(0.113)	(0.083)	(0.082)	(0.072)	(0.071)
Divorced	0.458**	0.417**	0.546***	0.516***	0.031	-0.021	0.116	0.081
	(0.188)	(0.187)	(0.180)	(0.181)	(0.122)	(0.119)	(0.103)	(0.102)
Widowed	-0.051	-0.076	0.123	0.099	-0.256	-0.287	0.064	0.036
	(0.309)	(0.300)	(0.289)	(0.285)	(0.220)	(0.210)	(0.180)	(0.176)
Age group (baseline: 18–24 years)								
25–54 years	-0.232	-0.156	-0.208	-0.150	-0.149	-0.059	-0.166*	-0.101
	(0.147)	(0.148)	(0.143)	(0.145)	(0.103)	(0.103)	(0.089)	(0.090)
55–64 years	-0.717***	-0.631***	-0.502***	-0.440**	-0.494***	-0.397***	-0.267**	-0.200*
	(0.189)	(0.190)	(0.186)	(0.188)	(0.129)	(0.127)	(0.112)	(0.111)
65+ years	-1.006***	-0.917***	-0.679***	-0.615***	-0.784***	-0.685***	-0.415***	-0.348**
	(0.225)	(0.226)	(0.222)	(0.224)	(0.161)	(0.158)	(0.137)	(0.137)
Education (baseline: completed primary school)								
Completed secondary school	-0.684***	-0.673***	-0.514***	-0.509***	-0.351***	-0.339***	-0.241**	-0.236**
	(0.174)	(0.174)	(0.172)	(0.172)	(0.119)	(0.118)	(0.106)	(0.106)
Completed university	-1.315***	-1.298***	-1.051***	-1.046***	-0.446***	-0.426***	-0.298***	-0.293***
	(0.179)	(0.179)	(0.178)	(0.178)	(0.124)	(0.123)	(0.110)	(0.110)
Employment (baseline: employed)								
Retired	0.380**	0.409**	0.332**	0.354**	-0.182	-0.147	-0.196*	-0.172*
	(0.173)	(0.172)	(0.165)	(0.165)	(0.122)	(0.118)	(0.101)	(0.099)
Not employed	0.736***	0.778***	0.694***	0.726***	0.011	0.063	-0.072	-0.036
	(0.135)	(0.135)	(0.130)	(0.131)	(0.092)	(0.091)	(0.078)	(0.077)
Self-employed	0.159	0.092	0.277	0.236	-0.098	-0.193	0.018	-0.035
	(0.181)	(0.180)	(0.176)	(0.177)	(0.130)	(0.128)	(0.108)	(0.108)
Ethnicity (baseline: White)								
Black	-0.435**	-0.483**	-0.319*	-0.355*	-0.036	-0.095	0.102	0.061
	(0.186)	(0.187)	(0.184)	(0.185)	(0.133)	(0.131)	(0.117)	(0.117)
Asian	0.123	0.099	0.032	0.019	0.065	0.033	-0.041	-0.057
	(0.183)	(0.183)	(0.178)	(0.178)	(0.141)	(0.140)	(0.120)	(0.119)
Other	0.377*	0.356*	0.332*	0.316	0.125	0.101	0.153	0.136
	(0.204)	(0.201)	(0.197)	(0.195)	(0.136)	(0.134)	(0.119)	(0.118)
Country characteristics								
Pandemic impact$_{health}$	0.001	0.001	0.001	0.001	-0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pandemic impact$_{economy}$	0.035	0.048	0.060	0.069	-0.071*	-0.055	-0.057	-0.047
	(0.055)	(0.055)	(0.060)	(0.060)	(0.038)	(0.037)	(0.039)	(0.038)
Country (baseline: Australia)								
France	-0.301	-0.486	-0.579	-0.704	0.132	-0.096	0.023	-0.121
	(0.548)	(0.551)	(0.542)	(0.543)	(0.381)	(0.370)	(0.355)	(0.350)
Germany	-0.343	-0.428	-0.211	-0.253	-0.062	-0.166	-0.250	-0.306
	(0.328)	(0.329)	(1.381)	(1.390)	(0.226)	(0.219)	(0.954)	(0.939)
South Africa	0.405	0.234	0.259	0.128	0.485***	0.277	0.583	0.438
	(0.268)	(0.271)	(0.673)	(0.683)	(0.185)	(0.180)	(0.453)	(0.444)

(*continued on next page*)

Table 4 (*continued*)

Dependent variable	Panel A: Objective financial fragility				Panel B: Subjective financial fragility			
Regression	1	2	3	4	1	2	3	4
Constant	3.192***	2.952***	2.242	2.018	4.440***	4.155***	4.907*	4.678*
	(0.481)	(0.485)	(3.970)	(4.012)	(0.332)	(0.321)	(2.719)	(2.668)
Adjusted R^2	0.172	0.180	0.226	0.229	0.118	0.148	0.374	0.385
Observations	2100	2100	2100	2100	2100	2100	2100	2100

Note: This table reports OLS regression results. For each independent variable, the top row shows the coefficient and the bottom row shows the robust standard error. ***=1%, **=5%, *=10% significance.

Table 5
Differences in financial fragility for different levels of precarious income during the COVID-19 pandemic.

Dependent variable	Panel A: Objective financial fragility						Panel B: Subjective financial fragility					
Regression	1	2	3	4	5	6	1	2	3	4	5	6
Precarious income	0.222***	0.208***	0.234***	0.213***	0.212***	0.856***	0.062**	0.071***	0.074***	0.068***	0.073***	0.316**
	(0.053)	(0.048)	(0.049)	(0.045)	(0.045)	(0.243)	(0.029)	(0.024)	(0.025)	(0.025)	(0.026)	(0.147)
Personal experiences during the pandemic												
Reduced or lost employment	0.319**	0.239**	0.233**	0.240**	0.239**	0.238**	0.294***	0.300***	0.298***	0.300***	0.300***	0.299***
	(0.144)	(0.113)	(0.112)	(0.113)	(0.113)	(0.112)	(0.089)	(0.068)	(0.068)	(0.068)	(0.068)	(0.067)
Reduced or lost employment * precarious income	-0.065						0.005					
	(0.082)						(0.050)					
COVID-19 infection	0.204*	0.237*	0.207**	0.203*	0.203*	0.195*	0.216***	0.254***	0.217***	0.215***	0.214***	0.212***
	(0.105)	(0.133)	(0.105)	(0.105)	(0.105)	(0.106)	(0.064)	(0.090)	(0.064)	(0.064)	(0.064)	(0.064)
COVID-19 infection * precarious income		-0.031						-0.037				
		(0.095)						(0.067)				
Mitigation mechanisms												
Financial literacy$_s$	-0.269***	-0.270***	-0.354***	-0.266***	-0.268***	-0.266***	-0.081***	-0.081***	-0.109***	-0.079***	-0.079***	-0.079***
	(0.046)	(0.046)	(0.057)	(0.046)	(0.046)	(0.046)	(0.028)	(0.028)	(0.037)	(0.028)	(0.028)	(0.028)
Financial literacy$_s$ * precarious income			0.064**						0.022			
			(0.032)						(0.019)			
Internal locus of control$_s$	-0.245***	-0.245***	-0.239***	-0.288***	-0.244***	-0.239***	-0.699***	-0.699***	-0.697***	-0.720***	-0.698***	-0.697***
	(0.048)	(0.048)	(0.048)	(0.060)	(0.048)	(0.048)	(0.031)	(0.031)	(0.031)	(0.038)	(0.031)	(0.031)
Internal locus of control$_s$ * precarious income				0.038						0.019		
				(0.037)						(0.023)		
Psychological resilience$_s$	-0.241***	-0.241***	-0.238***	-0.242***	-0.288***	-0.242***	-0.096***	-0.095***	-0.095***	-0.096***	-0.139***	-0.096***
	(0.050)	(0.050)	(0.050)	(0.050)	(0.065)	(0.050)	(0.032)	(0.032)	(0.032)	(0.032)	(0.039)	(0.032)
Psychological resilience$_s$ * precarious income					0.036						0.034*	
					(0.036)						(0.019)	
Household financial support	0.012	0.011	0.003	0.011	0.008	0.023	-0.012	-0.011	-0.014	-0.012	-0.014	-0.007
	(0.061)	(0.061)	(0.061)	(0.061)	(0.060)	(0.062)	(0.041)	(0.041)	(0.041)	(0.041)	(0.040)	(0.041)
Household financial support * precarious income						-0.011***						-0.004*
						(0.004)						(0.002)
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.229	0.229	0.230	0.229	0.229	0.233	0.384	0.385	0.385	0.385	0.386	0.386
Observations	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100

Note: This table reports OLS regression results. For each independent variable, the top row shows the coefficient and the bottom row shows the robust standard error. ***=1%, **=5%, *=10% significance.

depends on how precarious their household's income situation is.[18] To this end, we interact each proxy for negative shocks and each mitigator with our precarious income proxy, with several noteworthy findings. First, we find that the interaction effects of a shock with precarious income are insignificant for both objective and subjective financial fragility. This result implies that a negative economic or health shock affects all households equally, independent of their relative income.

Second, most interaction effects of mitigators with precarious income are insignificant, suggesting that households of all income levels benefit equally from these mitigators (i.e., their cognitive and non-cognitive abilities). There are, however, four situations where income precariousness matters. With respect to objective financial fragility, compared to individuals with less precarious income, individuals with a more precarious income benefit less from higher financial literacy but more from more generous government policies regarding income support and debt relief. Fig. 3 illustrates the effect of financial literacy and household financial support on objective financial fragility for three types of respondents: (i) respondents with high income precariousness measured as the 90th percentile of the in-sample income precariousness distribution; (ii) respondents with moderate income precariousness (50th percentile); and (iii) respondents with low income precariousness (10th percentile). Any difference in slopes indicates that the different income groups benefit differently from financial literacy or household financial support.

Panel A of Fig. 3 shows that, compared to individuals in households with low income precariousness, individuals in households with high income precariousness report similar objective financial fragility at low levels of financial literacy (3.9 versus

[18] Complete results showing the coefficients of all dependent variables are available in Table B3 of online Appendix B.

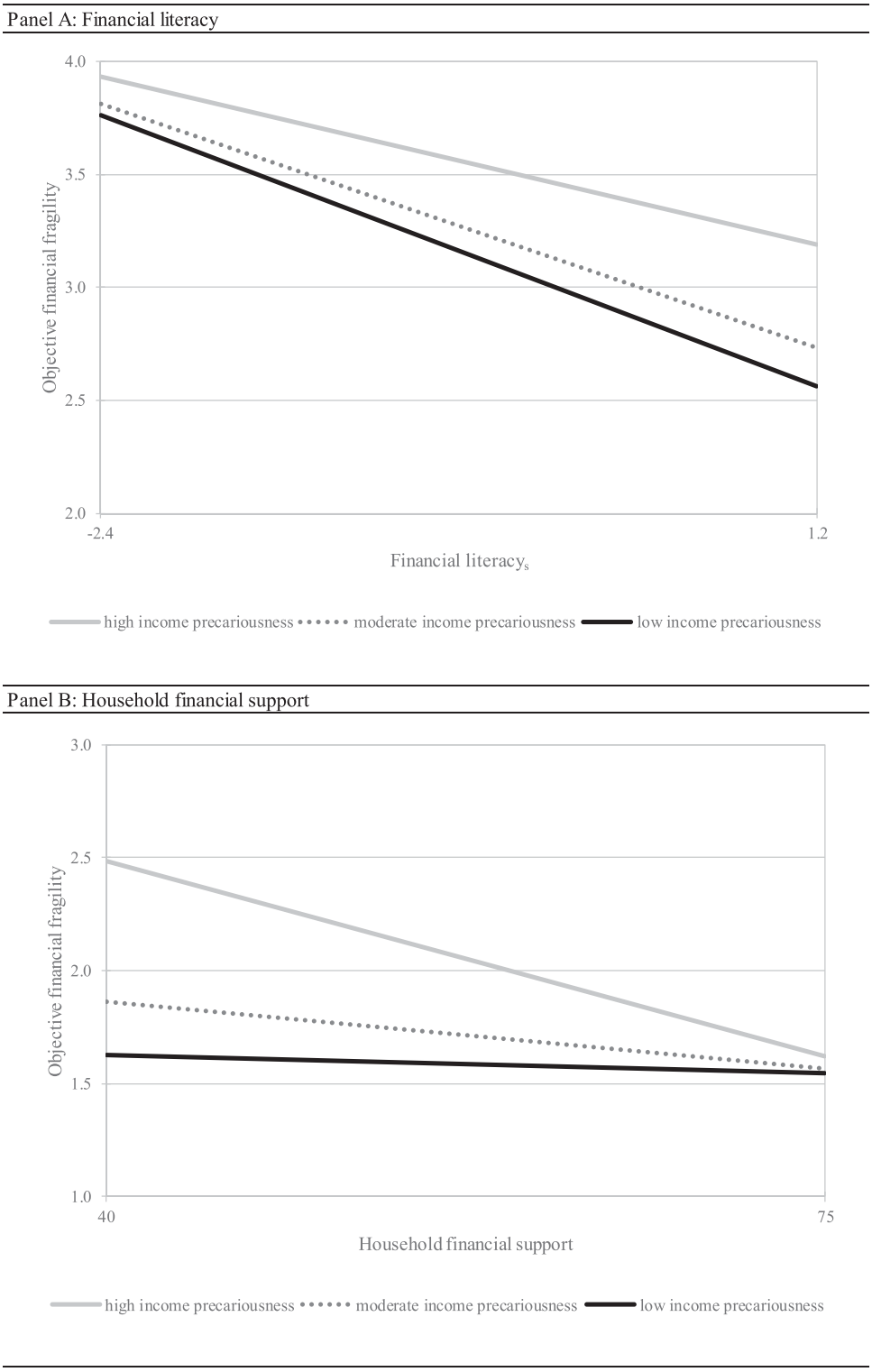

Fig. 3. The moderating role of financial literacy and government's economic support on objective financial fragility at different levels of income precariousness.
Panel A and B of this figure show the predicted objective financial fragility based on regressions 3 and 6 of Panel A in Table 5, respectively. Financial literacy and household financial support range from their in-sample minimum to maximum. High, moderate and low income precariousness reflect the in-sample 90th, 50th and 10th percentile. With the exception of financial literacy in Panel A (or household financial support in Panel B), precarious income and their interaction term, all other variables are set to their in-sample mean.

3.8). This difference, however, widens substantially (to 3.2 versus 2.6) at high levels of financial literacy. The steeper slope for individuals in households with low income precariousness indicates that they benefit more from each unit increase in financial literacy.

The relationship between household financial support provided by the government and household income precariousness is even more striking, as Panel B of Fig. 3 shows. Compared to individuals in households with low income precariousness, individuals in households with high income precariousness report higher objec-

tive financial fragility at low levels of household financial support (2.5 versus 1.6) but this difference disappears at high levels of household financial support. This suggests that government financial support policies during COVID-19 were well designed as they mostly benefited the economically weakest households and eliminated any disparity in objective financial fragility induced by previously existing income differences.

With respect to subjective financial fragility, however, the results in Panel B of Table 5 indicate that household financial support does not appear to overcome an individual's money management stress during the COVID-19 pandemic in any substantial manner. Household financial support is not directly related to subjective financial fragility and the interaction term is only marginally significant. This finding hints at the possibility of reverse causality. On the one hand, the received financial support might reduce money management stress. On the other hand, the realization that one has to accept financial support to make ends meet might heighten the perception of the precariousness of one's financial situation, which in turn creates or contributes to higher emotional stress. In combination, even substantial household financial support seems to only minimally reduce subjective financial fragility for the lowest income households. Furthermore, individuals with more precarious income benefit less from psychological resilience than individuals with less precarious income but only marginally so. This result could be explained by prior work reporting less hopefulness among low-income families (Prawitz et al., 2013) and potentially suggests that at very low income levels, subjective financial fragility is difficult to ameliorate by psychological mitigators as one's financial situation is so dire. After having established these main regression results, we present a series of robustness checks in the next section.

4.3. Robustness checks

We present several robustness checks regarding our regression specification; operationalization of our mitigators financial literacy and psychological resilience; measurement of our proxies for personal experiences during the pandemic including the severity of a respondent's COVID-19 infection; and the potential of pandemic emotions influencing assessments of objective financial fragility. We apply these robustness checks to both Tables 4 and 5. We report descriptive statistics for all new variables considered in these robustness checks in Table B4 of the online Appendix B.

First, we consider an alternative specification for the country and ethnicity fixed effects. In Tables 4 and 5, we find that neither the ethnicity of the respondent nor the country of residence separately affects objective or subjective financial fragility. However, we acknowledge that for a given ethnic group, financial fragility might differ across countries and we therefore control for country-by-ethnicity fixed effects in a robustness check. We report results in Tables B5 and B6 of the online Appendix B. While some of the country-by-ethnicity fixed effects are significant, our main findings are robust.

Second, we consider an alternative operationalization of financial literacy as a mitigator of financial fragility. Our main financial literacy proxy utilizes all five financial literacy questions of Klapper and Lusardi (2020). Based on these questions, we measure financial literacy as the number of correctly answered questions. As a robustness check, we consider only the "Big 3″ financial literacy questions from Lusardi and Mitchell (2014) which correspond to our diversification, inflation, and advanced compounding questions. As with our main proxy, we measure financial literacy by counting the number of correctly answered questions. Results are reported in Table B7 of the online Appendix B and prior findings are robust, albeit with a reduced significance level for the impact of a negative shock on objective financial fragility (see Panel A of Table B7).

Third, we consider alternative operationalizations of psychological resilience as a mitigator of financial fragility. Our main psychological resilience proxy utilizes all ten psychological resilience statements of Campbell-Sills and Stein (2007). Based on these statements, we operationalize psychological resilience as the respondent's average assessment across all ten statements. As a robustness check, we consider only those two of the statements that are most directly related to respondents' personal situation during the COVID-19 pandemic,[19] namely Statement 2 "I can deal with whatever comes" and Statement 3 "I tend to bounce back after illness or hardship." Results are in Table B8 of the online Appendix B and prior findings are robust, albeit with slightly reduced coefficient sizes and significance levels for psychological resilience compared to the baseline results of Table 4.[20] These results indicate that while these two statements are clearly related to both objective and subjective financial fragility, the other aspects of psychological resilience as captured by the remaining eight statements also contribute to an individual's financial fragility during the COVID-19 pandemic. In line with the baseline analysis of Table 5, none of the interaction effects with income precariousness reported in Panel B of Table B8 in the online Appendix B are significant.

Fourth, we consider an alternative measurement of respondents' personal experiences during the pandemic. In our main analyses of Tables 4 and 5, we consider two personal experiences: reduced/lost employment (experienced by 447 respondents or 21% of our sample) (see Table 2), and a COVID-19 infection in the household (experienced by 597 respondents or 28% of our sample). Among these, 199 respondents experienced both shocks. In a robustness check, we investigate whether such a double experience is more strongly associated with financial fragility than a single experience. We therefore differentiate between respondents who experience *only* an employment shock as indicated by a new proxy *single experience*$_{employment}$; those who experience *only* a health shock as indicated by a new proxy *single experience*$_{employment}$; and those who experience *both* shocks as indicated by a new proxy *double experience*. Results are reported in online Appendix B and prior findings are robust. Model 1 in Panels A and B of Table B9 confirms that both employment and health shocks are associated with higher objective and subjective financial fragility independent of whether they are experienced in isolation or simultaneously. Models 2 to 5 in Panels A and B of Table B9 confirm that the impact of these shocks does not vary with income precariousness. However, Model 1 also provides additional insights. That is, respondents experiencing a single shock report slightly higher objective financial fragility for reduced/lost employment than for a COVID-19 infection. However, economic and health shocks are not additive for objective financial fragility, as respondents with a double experience report the same fragility as those who experienced only an employment shock. For subjective financial fragility, however, the shocks appear to be additive, as respondents with a double experience report a higher subjective financial fragility as those who experienced only a single shock.[21] Taken together, these results suggest that the two experiences are substitutes with respect

[19] We are thankful to an anonymous reviewer for suggesting examining this particular alternative operationalization.

[20] Due to the relatively high correlation between respondents' answers for Statement 2 and 3 of 0.62 as reported in Table B1 of the online Appendix B, we cannot include both proxies in the regression simultaneously. We thus opt to create a third proxy that averages respondents' answers for Statements 2 and 3.

[21] With 0.540, the coefficient of a double experience is almost three times the magnitude of the respective coefficients for the single shocks and significantly different at the 5% level.

to objective financial fragility but complements with respect to subjective financial fragility. In other words, for respondents who experienced an employment shock, a health shock does not appear to impede their actual financial situation any further but it does increase the emotional stress associated with that actual financial situation.

Fifth, we perform a more in-depth analysis of respondents' personal experience during the pandemic regarding COVID-19 infections. In our main analyses of Tables 4 and 5, we operationalize a COVID-19 infection through a dummy variable capturing whether the respondent or a household member has a suspected or confirmed COVID-19 infection or corresponding symptoms. This proxy was motivated by the fact that only 4% of respondents report a confirmed COVID-19 infection while 28% of respondents report a confirmed or suspected COVID-19 infection or COVID-19 symptoms in their household. In a robustness check, we now study those 91 respondents who report a confirmed COVID-19 infection in more detail and who were asked additional questions on the severity of their symptoms. To do so, we create two new measures: *COVID-19 infection*$_{respondent}$ which is a dummy variable capturing whether the respondent reports a confirmed COVID-19 infection and *COVID-19 severity index*$_{respondent}$ which captures the severity of the infection. As Panel B of Table B10 of the online Appendix B reports, among the 91 respondents who report a confirmed COVID-19 infection, 15 experience no symptoms, 48 experience mild symptoms, 23 experience difficult symptoms, and 5 need hospitalization. Due to these small numbers, especially for the more severe symptoms, the *COVID-19 severity index*$_{respondent}$ pools some of these categories, taking one of four values for the whole sample of respondents: 1 = no COVID-19 infection; 2 = suspected COVID-19 infection or confirmed COVID-19 infection without symptoms; 3 = confirmed COVID-19 infection with mild symptoms; and 4 = confirmed COVID-19 infection with difficult symptoms or hospitalization. Results are in Table B11 of online Appendix B. For objective financial fragility, the marginally significant coefficient of our main proxy *COVID-19 infection* of Model 4 in Table 4 does not survive as neither the coefficient of our alternative proxy *COVID-19 infection*$_{respondent}$ nor that of the other alternative proxy *COVID-19 severity index*$_{respondent}$ is significant. For subjective financial fragility, however, the results are robust, albeit with smaller coefficient sizes and/or lower significance levels than those found in the baseline analysis results reported in Table 4. In line with the baseline analysis of Table 5, none of the interaction effects of the two alternative proxies with income precariousness are significant.

Sixth, we consider another manner in which respondents can be affected by the pandemic. Instead of focusing on the *severity* of the COVID-19 infection, we now consider the *severity* of the pandemic's impact on respondents' *daily lives*. To do so, we create four proxies based on survey questions that were answered by all respondents and thus do not suffer from the data limitations in terms of the small sample size available regarding COVID-19 symptom severity. The four proxies for COVID-19′s impact on daily life reflect the extent to which individuals experienced limitations or constraints to their functioning during the pandemic following the conceptualization and measurement of Barrett et al. (2021). In our survey, *Overall perception of restraints* is measured by respondents' average across their answers to three statements regarding their inability to perform daily activities as usual; perceived mobility restraints; and perceived restrictiveness of local public health measures (see Appendix A for details). Answer categories for each statement range from 1 = strongly disagree to 7 = completely agree, so that a higher score indicates that respondents feel more restrained in their daily functioning. Next to the overall perception of restraints, we also consider respondents' answer to each statement separately, in the spirit of examining potential heterogeneity in their effects as with the psychological resilience measure. Results are in Table B12 of the online Appendix B and prior findings are robust while noting that the effect of the severity of a COVID-19 infection is stronger than the effect of the severity of functional restraints. Models 1 and 5 in Panels A and B of Table B12 confirm that a higher overall perception of functional restraints is associated with higher objective and subjective financial fragility. Models 2 to 4 and 6 to 8 of Panel A reveal differences between objective and subjective financial fragility. While objective financial fragility is only associated with respondents' perceived restraints in their daily activities, subjective financial fragility is associated with all three categories of perceived restraints. Potentially, this pattern of results could be explained by restraints to one's daily activities being most closely connected to the ability to earn the income necessary to *factually* deal with any financial demands, while mobility and public health measures restraints might have a broader psychological impact on individuals and thus also affect their *emotional response* to financial demands. In line with the baseline analysis of Table 5, none of the interaction effects of functional restraints with income precariousness in Panel B of Table B12 are significant.

Seventh, we consider the possibility that some respondents misjudge their objective financial fragility during the COVID-19 crisis period which might affect them emotionally. In our survey, *Infection emotions* are measured by respondents' answer to the statement: "Infection by COVID-19 affects me emotionally (that is, it makes me feel furious, afraid, angry or depressed)." *Fear of infection* is measured by respondents' answer to the statement: "I am worried about being infected by COVID-19." Answer categories for each statement range from 1 = strongly disagree to 7 = completely agree, so that a higher score indicates a more negative and fragile emotional state of the respondent. The unconditional means reported in Table B13 of the online Appendix B reveal that respondents who are in a more negative emotional state indeed report higher objective financial fragility than those who are in a more positive emotional state. However, Table B14 of the online Appendix B shows that conditional upon personal experiences during the pandemic, mitigators, socio-demographics, and country characteristics, respondents' emotional state is not significantly related to their objective financial fragility. Importantly, our main results are robust to the inclusion of these additional control variables, and we conclude that accounting for respondents' emotional response to the pandemic does not change our conclusions.

5. Conclusion

Our study contributes to the existing literature on household finance by increasing our understanding of how individuals are affected by the COVID-19 crisis. To the best of our knowledge, this study is the first to examine the *joint effect* of socio-demographics, economic and health shocks, cognitive and non-cognitive abilities, and government support on *both* objective and subjective financial fragility during a *crisis period* using a sample of individuals from four *different countries*. Our results thus allow us to compare objective to subjective financial fragility; identify differences in their determinants; and generalize internationally. In doing so, we answer the call for research by Goldstein et al. (2021) for examining how the COVID-19 pandemic affected households as well as that by Brüggen et al. (2017, p. 234) for "exploring the correspondence/mismatch between objective and subjective indicators of financial well-being." The results of our study provide a number of valuable insights for the household finance literature, which can be summarized in the following three main lessons.

First, different socio-economic groups report different levels of financial fragility but the relevant socio-demographics differ for objective versus subjective financial fragility. For example, we find a positive association between being divorced and experi-

encing objective financial fragility, but not subjective financial fragility. This finding extends prior work which found that family support is negatively related with experiencing financial distress (Stevenson et al., 2020).

Second, negative economic or health shocks increase both objective and subjective financial fragility. What mitigates these adverse effects is, however, specific to the type of financial fragility. Financial literacy, internal locus of control, and psychological resilience are equally able to reduce objective financial fragility. In contrast, individuals are mainly helped by having an internal locus of control when trying to deal with subjective financial fragility. Both results indicate that subjective financial fragility is not simply the consequence of objective financial fragility but has its own dynamics. The results also help us understand why certain policies aimed at financial fragility reduction might have limited effects. For example, our results suggest that financial literacy training could be helpful to individuals when managing their objective financial fragility during a crisis as it improves the ability to manage one's household budget or change one's spending behavior. However, financial literacy plays a much smaller role in helping individuals to manage their subjective financial fragility during a crisis period as this has to do with their *emotional response* to financial stress and thus requires interventions aimed at improving psychological coping. In this regard, it is important to note that a personalized approach is required, since prior literature on the dynamics of investor beliefs during the COVID-19 pandemic showed that depending on their personal situation, there can be large differences between individuals in terms of the level of pessimism in their expectations about economic activity during this crisis period (Giglio et al., 2021).

Third, we find that government financial support in the form of income support and contract or debt relief reduces objective financial fragility for the economically weakest households. This result indicates that the governments' financial support programs for households during COVID-19 were effectively thought out because they primarily benefited households with the lowest income and removed any imbalance in objective financial fragility caused by income variations. Indeed, during the course of the pandemic, governments came to realize that providing stimulus payments in an undifferentiated way to all households across the income distribution was inefficient and adjusted their policies to specifically target low-income households (Chetty et al., 2020). This finding stands in contrast to the governments' support programs for businesses, which have been criticized for creating windfalls, inducing moral hazard, and either funding zombie firms (see e.g., Ellul et al., 2020) or subsidizing poorly performing firms that were not yet zombies but already financially unhealthy and non-viable before the pandemic (Hoshi et al., 2023).

However, despite the advantages of our approach and the contributions that we make to the household finance literature, our findings should be seen in light of the limitations of our data. That is, while our dataset has unique strengths (e.g., including measurements of psychological traits not included in publicly-available secondary data from governments or other data providers), it is not perfect. For example, while the overall level of confirmed COVID-19 infections was representative for the aggregate level *across* countries, we also found some evidence for under- and oversampling *between* different countries. Furthermore, investigating the effect of the severity of a COVID-19 infection on individuals' financial fragility proved challenging due to a relatively low number of cases to work with, given the limited overall sample size of 2100 respondents. Moreover, while the objective of our study was to examine the determinants of individuals' objective and subjective financial fragility *during* the COVID-19 pandemic, our data do not allow us to perform a pre- versus post-crisis assessment of individuals' financial fragility. In this regard, future research could leverage longitudinal publicly-available secondary data, such as the Survey of Consumer Finances (SCF), whose most recent wave was in 2019 with the 2022 wave scheduled for release in 2023.[22] However, an important limitation of the SCF is that it does not include measurements of the psychological traits that we studied as mitigators of financial fragility and data from this publicly-available survey can therefore not answer our particular research questions. Furthermore, while the SCF does include questions to gauge someone's objective financial fragility, it does not include questions to measure their subjective financial fragility.

In sum, while hardly anybody wishes for another pandemic to hit, the insights gleaned from our study will hopefully assist policymakers in being prepared to deal with similar negative shocks in the future, by highlighting the determinants and mitigators of objective and subjective financial fragility.

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Declaration of Competing Interest

None.

Data availability

The data that has been used is confidential.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jbankfin.2023.106881.

Appendix A: Variable definitions, measurement, and data sources

This Appendix A provides information on variable definitions, measurement, and data sources. Unless otherwise indicated, all data mentioned are obtained from our survey. In all tables and figures, whenever a variable name has the subscript "s", this indicates that the respective variable has been standardized to have a mean of 0 and a standard deviation of 1 for ease of interpretation.

[22] Technically, even the 2022 SCF wave is not *after* the COVID-19 pandemic, given that the WHO first declared COVID-19 a Public Health Emergency of International Concern (PHEIC) on 30 January 2020, while indicating at its emergency committee meeting of 27 January 2023 that it still considered the outbreak a PHEIC (Adam 2023).

Dependent variables

Objective financial fragility: Objective financial fragility reflects the ability to deal with unexpected expenses following Lusardi et al. (2011). Respondent's answer to the question "How confident are you that you could come up with 4000 AUD / 2000 euro / 2000 ZAR if an unexpected need arose within the next month?". Answers range from 1 (completely certain) to 7 (not at all certain).

Subjective financial fragility: Subjective financial fragility reflects current money management stress following Netemeyer et al. (2018). Average of the respondent's answers to the following 5 statements. Each statement can be assessed from 1 (does not describe me at all) to 7 (Describes me very well).

1- Because of my money situation, I feel I will never have the things I want in life
2- I am behind with my finances
3- My finances control my life
4- Whenever I feel in control of my finances, something happens that sets me back
5- I am unable to enjoy life because I obsess too much about money

Continuous independent variables

Financial literacy: Number of correct answers to the following 5 financial literacy questions. The questions for the Australian survey are shown, currency amounts are adjusted to the local currency for the other 3 countries.

1- Diversification: Suppose you have some money. Is it safer to put your money into one business or investment, or to put your money into multiple businesses or investments?
2- Inflation: Suppose over the next 10 years the prices of the things you buy double. If your income also doubles, will you be able to buy less than you can buy today, the same as you can buy today, or more than you can buy today?
3- Numeracy: Suppose you need to borrow 100 AUD. Which is the lower amount to pay back: 105 AUD or 100 AUD plus three percent?
4- Basic compounding: Suppose you put money in the bank for two years and the bank agrees to add 15 percent per year to your account. Will the bank add more money to your account the second year than it did the first year, or will it add the same amount of money both years?
5- Advanced compounding: Suppose you had 100 AUD in a savings account and the bank adds 10 percent per year to the account. How much money would you have in the account after five years if you did not remove any money from the account?

Financial literacy$_3$: Number of correct answers to 3 financial literacy questions, e.g. questions 1, 2 and 5 above.

Internal locus of control: Measure of own responsibility following Rotter (1954, 1966). Average of the respondent's answers to the following 7 statements. Each statement can be assessed from 1 (completely disagree) to 7 (completely agree). Answers to questions 3 to 7 are reversed when included in the average.

1- What happens to me in the future mostly depends on me
2- I can do just about anything I really set my mind to
3- I have little control over the things that happen to me
4- There is really no way I can solve some of the problems I have
5- There is little I can do to change many of the important things in my life
6- I often feel helpless in dealing with the problems of life
7- Sometimes I feel that I'm being pushed around in life

Psychological resilience: Measure of resilience following Campbell-Sills and Stein (2007). Average of the respondent's answers to the following 10 statements. Each statement can be assessed from 1 (never) to 7 (always).

1- I am able to adapt to change
2- I can deal with whatever comes
3- I tend to bounce back after illness or hardship
4- I can stay focused under pressure
5- I am not easily discouraged by failure
6- I try to see the humorous side of problems
7- Coping with stress can strengthen me
8- I think of myself as a strong person
9- I can achieve goals despite obstacles
10- I can handle unpleasant feelings

Psychological resilience$_2$: Respondent's answer to psychological resilience statement 2 above.

Psychological resilience$_3$: Respondent's answer to psychological resilience statement 3 above.

Psychological resilience$_{23}$: Average of the respondent's answers to psychological resilience statements 2 and 3 above.

Precarious income: Inverse of monthly net income (take-home pay) of the respondent's household in local currency divided by the country's average household net income. Winsorized at the 1% and 99% level. Source for country's average net income: Household net adjusted disposable income in USD, OECD Better Life Index, https://www.oecdbetterlifeindex.org/topics/income/ (accessed April 28, 2022). Exchange rates to convert household net adjusted disposable income from USD to local currency are obtained from OECD.Stat.

Household financial support: The financial support received by households from the government is assessed based on the Economic Support Index provided by Hale et al. (2021). For each country, this daily index ranges from 0 reflecting no support to 100 reflecting high support. The index combines two measures: First, income support measures to what extent the government is providing direct cash payments to people who lose their jobs or cannot work. The 3 categories of income support are: no income support, government is replacing less than 50% of lost salary (or if a flat sum, it is less than 50% median salary), government is replacing 50% or more of lost salary (or if a flat sum, it is greater than 50% median salary). Second, debt/contract relief measures to what extent the government is freezing financial obligations for households (e.g., stopping loan repayments, preventing services like water from stopping, or banning evictions). The 3 categories of debt/contract relief are: no debt/contract relief, narrow relief specific to one kind of contract, broad debt/contract relief. We measure household financial support as the 365-day average of the country's Economic Support Index from the survey response day t to day t-364. Source: Oxford COVID-19 Government Response Tracker (OxCGRT), https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker (accessed February 9, 2022).

Pandemic impact$_{health}$: Daily new confirmed COVID-19 cases per million people. Seven-day average from survey response day t to day t-6. Source: Our World in Data provided by Ritchie et al. (2020), https://ourworldindata.org/policy-responses-covid (accessed February 9, 2022).

Pandemic impact$_{economy}$: Cumulative return of national stock market index from January 1, 2021 to survey response day. Source: Factset, FTSE national stock market indices. Units: 1.0 = 1%.

COVID-19 severity index$_{respondent}$: Measure of the severity of the respondent's COVID-19 infection. The index ranges from 1 to 4,

with higher values indicating that the respondent suffered a more severe COVID-19 infection in terms of the associated symptoms. Note that respondents are only asked about the severity of symptoms when they indicate a confirmed COVID-19 infection.

1 = Neither a confirmed nor suspected COVID-19 infection nor symptoms.
2 = A suspected COVID-19 infection or a confirmed COVID-19 infection without symptoms.
3 = A confirmed COVID-19 infection with mild condition (like a cold) without hospitalization.
4 = A confirmed COVID-19 infection with either difficult condition without hospitalization or hospitalization without ventilation or hospitalization with ventilation.

COVID-19′s impact on daily life - Overall perception of restraints: Measure of respondent's restraints to their functioning in daily life during the pandemic following Barrett et al. (2021). Average of the respondent's answers to the following 3 statements. Each statement can be assessed from 1 = strongly disagree to 7 = completely agree. Answers to statement 1 are reversed to be in line with a higher score on any of the statements reflecting more restraints to daily functioning.

1- During the pandemic, I have been able to perform my daily activities as usual
2- During the pandemic, I have felt restrained in my mobility
3- I have perceived the public health measures related to COVID-19 in the area that I live in as restrictive

COVID-19′s impact on daily life - Perception of daily activity restraints: Reversed answer to perception of restraints statement 1 above.

COVID-19′s impact on daily life - Perception of mobility restraints: Answer to perception of restraints statement 2 above.

COVID-19′s impact on daily life - Perception of public health measures restraints: Answer to perception of restraints statement 3 above.

Infection emotions: Measure of the respondent's emotional state during the pandemic. Respondents provide an answer to the following statement: "Infection by COVID-19 affects me emotionally (that is, it makes me feel furious, afraid, angry or depressed)." Answers range from 1 (completely disagree) to 7 (completely agree).

Fear of infection: Measure of the respondent's emotional state during the pandemic. Respondents provide an answer to the following statement: "I am worried about being infected by COVID-19." Answers range from 1 (completely disagree) to 7 (completely agree).

Categorical independent variables

Reduced or lost employment: Dummy equal to 1 if the respondent stopped working (due to retirement, illness, childcare, parental leave, other reasons), was terminated, did not have contract renewed, was put on furlough or received partial unemployment benefits, continued working for reduces hours or salary, 0 if respondent's employment situation did not change.

COVID-19 infection: Dummy equal to 1 if the respondent or a household member had a confirmed or suspected COVID-19 infection or COVID-19 symptoms, 0 otherwise.

Single experience$_{employment}$: Dummy equal to 1 if *COVID-19 infection* equals 0 and *reduced or lost employment* equals 1 (e.g., the respondent experienced an employment shock but not a health shock), 0 otherwise.

Single experience$_{infection}$: Dummy equal to 1 if *COVID-19 infection* equals 1 and *reduced or lost employment* equals 0 (e.g., the respondent experienced a health shock but not an employment shock), 0 otherwise.

Double experience: Dummy equal to 1 if *COVID-19 infection* equals 1 and *reduced or lost employment* equals 1 (e.g., the respondent experienced both, a health shock and an employment shock), 0 otherwise.

COVID-19 infection$_{respondent}$: Dummy equal to 1 if the respondent had a confirmed or suspected COVID-19 infection or COVID-19 symptoms, 0 otherwise.

Female: Dummy equal to 1 if respondent is female, 0 otherwise.

Number of dependents: Groups for number of dependents the respondent has; no dependents, 1 dependent, 2 to 3 dependents, 4 to 5 dependents, more than 5 dependents.

Marital status: Marital status of respondent; single, married, divorced, widowed.

Age: Age group of respondent; 18–24 years, 25–54 years, 55–64 years, 65 years and older.

Education: Educational level completed by respondent; primary school, secondary school, university.

Employment: Current employment of respondent; employed, retired, not employed, self-employed.

Ethnicity: Ethnicity of respondent; White, Black, Asian, other.

Country: Country in which respondent resides; Australia, France, Germany, South Africa.

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