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Making Sense of Financial Vulnerability: Between Sensitivity, Resilience, and Exposure

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Making Sense of Financial Vulnerability: Between Sensitivity, Resilience, and Exposure

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Abstract

Economic uncertainty has increased globally in the previous years, affecting households and individuals in their financial lives. Policymaking bodies are confronted with the task to stem the loss of prosperity and providing help to financially vulnerable people. Empirical research uses various approaches to conceptualize financial vulnerability, whereby the respective assumptions yield important implications for derived policy measures. In this paper, a theoretical framework will be elaborated such that existing research can be interpreted and made comparable on common grounds. We understand financial vulnerability, which we define as the likelihood to fall into financial hardship, as a three-dimensional model, namely a function of (1) sensitivity, i.e., objective factors outside the immediate sphere of influence, (2) resilience, i.e., subjective capacities to cope with and to adapt to financial shocks, and (3) exposure, i.e., the probability to encounter a financial shock. With this conceptualization financial vulnerability due to structural societal inequalities can be distinguished from financial vulnerability due to unsound financial decision-making and, therefore, offers a clearer understanding of which policy measures are needed to support people in their financial lives. In this context, special emphasis is placed on the potential role of financial education. An empirical analysis using the Austrian dataset of the OECD/INFE Adult Financial Literacy Survey 2019 is included to demonstrate the applicability of our theoretical framework.

Keywords: financial vulnerability, financial resilience, financial shocks, financial hardship, financial literacy

JEL Codes: D14, I32, G53

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Non-technical summary

Recent global crises, including the COVID-19 pandemic and the war in Ukraine, have increased economic uncertainty and highlighted the issue of financial vulnerability. Research on financial vulnerability often focuses on examining who is financially vulnerable and the measures to reduce this vulnerability. However, the term financial vulnerability is used inconsistently in the literature, often lacking a thorough theoretical discussion.

This paper addresses two gaps in the literature on financial vulnerability: 1) By integrating insights from psychology and ecology, we provide a multidimensional conceptualization that clearly defines financial vulnerability and distinguishes it from related concepts like financial hardship and poverty. 2) We clarify the difference between indicators and determinants of financial vulnerability, providing a clearer insight into the factors that influence it.

We understand financial vulnerability to be the conditional likelihood of experiencing financial hardship when faced with a financial shock. We identify three dimensions of financial vulnerability: 1) Sensitivity refers to the objective financial situation of an individual, potentially characterized by income, assets, and socio-demographic factors like age and gender. 2) Resilience involves the individual's capacity to cope with financial shocks, potentially characterized by factors such as financial literacy, self-confidence, and risk propensity. 3) Exposure is the probability of encountering financial shocks, such as job loss, unexpected expenditures, long-term illness of a household member, or divorce.

In our empirical analysis, using data from the 2019 OECD/INFE International Survey of Adult Financial Literacy in Austria, we developed a financial vulnerability index and examined various potential determinants. The analysis shows that financial vulnerability is strongly linked to demographic and socio-economic factors as well as to having experienced financial shocks. While financial literacy appears to mitigate financial vulnerability, it cannot fully offset the detrimental effects of adverse socio-economic conditions and past financial shocks.

Enhancing financial literacy can potentially improve resilience to financial shocks, especially for those not in precarious situations but prone to poor financial decisions. Financial education can help these individuals manage their finances better and build financial buffers. Individuals with high resilience but high sensitivity and exposure may not benefit as much from financial education, as their financial vulnerability is largely driven by factors beyond their immediate control. For the most financially vulnerable, strengthening financial literacy alone is likely to hold only limited effectiveness. In this case, other policy tools addressing socio-economic inequalities might be required too.

We suggest that future research should focus on establishing causality between determinants and financial vulnerability, examining the empowering potential of tailored financial education interventions, and conducting cross-country analyses to understand the influence of welfare regimes, pension systems, and healthcare structures on financial vulnerability.

Taken together, this paper underscores the importance of a multidimensional approach to understanding financial vulnerability, providing a framework that can guide more effective policy responses to reduce financial vulnerability.

Introduction

The numerous crises that have struck the world within a few years, such as the pandemic and the war in Ukraine, have brought about an increased level of economic uncertainty, manifested in high inflation rates and energy costs. Many economists warn of a looming loss of prosperity and the focus on individual financial vulnerability has increased in public debates. Consequently, various policymaking bodies and institutions in the affected countries intensified their attempt to reduce financial vulnerability through a variety of measures, of which fostering financial literacy has become especially popular (OECD, 2020b). Studies on the topic of financial vulnerability mostly revolve around the question of *who* is financially vulnerable, and *through which measures* financial vulnerability may be reduced. Typically, these studies focus on income, debt burden, and assets, as well as their relationship to socio-demographic and socio-economic variables, to investigate these questions empirically (e.g., Albacete et al., 2020; Lusardi et al., 2011, 2018).

However, the focus on empirical investigations tends to prevent an in-depth theoretical examination of the meaning of *financial vulnerability* itself, leading to an unsystematic usage of the concept in the scientific literature. Reflecting on the meaning and purpose of the conceptualization of financial vulnerability is crucial since the respective understanding significantly influences several critical aspects closely associated with the conclusions drawn from an empirical study. In particular, the conceptualization has implications for the size and composition of the group considered financially vulnerable, for the supposed causes of financial vulnerability, and for the potentially derived policy recommendations to reduce financial vulnerability. Considering this, the aim of this paper is to develop a comprehensive conceptual framework of financial vulnerability that can be applied to assess the existent approaches in a plausible and coherent manner and to support future research by making the consequences of conceptual choices regarding financial vulnerability explicit.

The conceptualization we propose builds on translating the diathesis-stress model from psychology (Hammen, 2005; Ingram & Luxton, 2005; Monroe & Simmons, 1991) to individual and household finances. The model helps us to better understand the distinctiveness of financial vulnerability compared to related concepts, such as financial hardship and poverty. Disaster resilience research in the field of ecology, further, contributes to an understanding of financial vulnerability that is not merely opposed to resilience, but instead comprises multiple dimensions that can be conceptually differentiated (cf., Manyena, 2006; Miller et al., 2010; Turner et al., 2003).

Synthesizing economic-, psychological-, and ecological perspectives, we propose a theoretical framework of financial vulnerability which encompasses three dimensions, namely (1) sensitivity, (2) resilience, and (3) exposure. More precisely, we understand financial vulnerability, defined as the likelihood to fall into financial hardship, as a function of these three dimensions, allowing us to categorize potential determinants of financial vulnerability accordingly. Within the theoretical model, we argue that sensitivity describes the objective circumstances that make a person vulnerable to financial hardship, resilience is about a person's subjective capacity to proactively adapt to a financial shock and exposure refers to the probability that a person will encounter a financial shock.

To demonstrate the applicability of our concept and to identify which factors can be linked to financial vulnerability, an empirical analysis is carried out, using the Austrian dataset of the 2019 *OECD/INFE International Survey of Adult Financial Literacy* (OECD, 2020a). With the help of the

dataset, we first construct a financial vulnerability index which considers the multidimensionality of our theoretical framework and, in a second step, allows to test for various potential determinants of financial vulnerability. Our results indicate that financial vulnerability highly correlates with socio-economic variables, such as income and employment status, as well as socio-demographic variables, such as age and migration background. Moreover, having experienced certain financial shocks in the past appears to substantially increase financial vulnerability in the present. In contrast, a high level of financial literacy has a mitigating effect on financial vulnerability, albeit it cannot fully compensate for the dominant influence of socio-economic factors and prior financial shocks.

With our paper, we address two research gaps in the literature on financial vulnerability: 1) a clear definition based on theoretical grounds and 2) a convincing distinction between indicators and determinants of financial vulnerability. Our proposed multidimensional conceptualization of financial vulnerability offers a theoretical foundation to classify determinants of vulnerability investigated by researchers, practitioners, and politicians. Perceiving financial vulnerability as a function of three dimensions supports a more nuanced understanding of the investigated determinants' explanatory power, their relative effect sizes, and potential interaction effects. Financial vulnerability can be driven by high sensitivity, low resilience, high exposure, or a combination of those. Our analysis underlines the importance for policy responses to account for such differences in order to effectively reduce financial vulnerability.

The remainder of this paper is structured as follows: Section 1 reviews the existing literature on financial vulnerability and develops the conceptual framework of financial vulnerability that strives to capture all relevant semantic dimensions and makes the implications of different conceptualizations explicit. In Section 2, empirical data is used to construct a financial vulnerability index and examine potential determinants of financial vulnerability. Section 3 presents the results and Section 4 discusses the implications of our conceptualization as well as its applications for empirical research and policymaking. Section 5 concludes with a summary of the key insights and corresponding recommendations.

I. Conceptual and theoretical foundations

Regarding the literature review, we start by delineating financial vulnerability in contrast to other related and frequently used concepts to illustrate its distinctness and utility. Then, we examine the scientific literature dealing with financial vulnerability, aiming to offer an overview of the various approaches taken and an evaluation of their respective strengths and weaknesses. After the literature review, we develop a conceptual framework of financial vulnerability that should allow for a clear distinction between the concept and its determinants but still reflects its inherently multidimensional nature.

I.1 Literature review

Preliminary clarification of terms

Financial vulnerability is often associated with individuals experiencing financial hardship or poverty and is characterized by low income, lack of assets, and high debt. Also, financial vulnerability is sometimes understood as the opposite of financial well-being. Arguing that equating financial vulnerability solely with poverty or low financial well-being overlooks the complexity of an individual's financial situation, we advocate for a nuanced approach that shows how financial vulnerability is related yet distinct from these concepts.

Financial hardship and poverty both describe individuals or households facing severe economic challenges. Poverty, generally, is a chronic, long-term state of extreme deprivation where individuals cannot meet basic needs like food, shelter, and clothing, inhibiting their full participation in society. It is typically measured by income or consumption levels below a nationally defined poverty line (Smeeding, 2016). Financial hardship, in contrast, encompasses a broader spectrum of economic difficulties and refers to temporary or persistent financial difficulties that hinder individuals from sustainably meeting their financial obligations and maintaining an adequate standard of living, typically involving situations such as high debt, unexpected expenses, unemployment, or inadequate savings (Arnup et al., 2022; Nelson et al., 2019; Warren, 2015).

Vulnerability generally refers to the (predisposed) likelihood of experiencing a certain undesired situation or state (cf., Ingram & Luxton, 2005; O'Connor et al., 2019; Turner et al., 2003). In the context of personal finance, we may identify this undesired state as financial hardship²: a person that is *financially* vulnerable is vulnerable *to financial hardship*, i.e., they have an elevated likelihood of falling into a state of financial hardship (O'Connor et al., 2019). Following this understanding, being vulnerable to financial hardship is not the same as currently experiencing financial hardship. The question that remains is whether people in a state of financial hardship are still understood as financially vulnerable. Since people experiencing financial hardship are also likely to experience financial hardship in the future, we tend to answer this question affirmatively. Thus, compared to financial hardship, the group of those being financially vulnerable is larger and may also include individuals who are seemingly still doing financially well.

Financial well-being has emerged as a primary goal of policy measures addressing individuals' financial situations, particularly financial education efforts (OECD, 2019). According to the *US Consumer Financial Protection Bureau* (2015), financial well-being refers to “a state of being wherein a person can fully meet current and ongoing financial obligations, can feel secure in their financial future, and is able to make choices that allow them to enjoy life” (p. 6). While financial vulnerability and financial well-being both involve meeting financial obligations and achieving sustainable security, the critical distinction lies in financial well-being's inclusion of the ability to afford *wants*, whereas financial vulnerability focuses solely on sustainably meeting essential *needs*. This distinction is further evident in the definition of financial well-being by Brügggen et al. (2017), which emphasizes the perception of sustaining “desired living standards and financial freedom” (p. 229). Financial well-being, therefore, largely reflects individuals' aspirations and demands for their standard of living, which is highly subjective and influenced by one's social reference group (She et al., 2023). In summary, while a high level of financial vulnerability usually indicates low financial well-being, the absence of financial vulnerability alone is insufficient to ensure financial well-being.

Literature review

The literature on financial vulnerability lacks a universally accepted definition and besides financial vulnerability (e.g., Anderloni et al., 2012; Azzopardi et al., 2019; O'Connor et al., 2019), alternative terms such as financial fragility (Lusardi et al., 2011), economic insecurity (Hacker, 2018; Osberg, 2015), or financial resilience (Salignac et al., 2019) are being employed to describe

² In the following, we will, without loss of generality, refer to financial hardship instead of poverty, as financial hardship comprehends a greater variety of life situations and is not associated with precise thresholds regarding income levels or standard of living.

similar phenomena. Fernández-López et al. (2023a) synthesize the literature, identifying four criteria by which existing concepts of financial vulnerability are operationalized. First, concepts of financial vulnerability can exclusively rely on debt-related issues (e.g., Albacete et al., 2020; Azzopardi et al., 2019; Loke, 2015) or include other financial measures related to consumption or savings (e.g., Anderloni et al., 2012; Lusardi et al., 2011). Second, measures can be either objective, i.e., factors external to the individual, or subjective, i.e., factors internal to and inseparable of the individual. Third, measures are often constructed from a single item, and few have attempted to combine several items (e.g., Anderloni et al., 2012, Fernández-López et al., 2023b). Fourth, the concept of financial vulnerability is often a binary one, i.e., either a person is financially vulnerable or not, but can also be understood as graded phenomenon, i.e., there are various degrees of financial vulnerability. These conceptual choices have substantial implications for identifying and characterizing financially vulnerable individuals.

In line with defining financial vulnerability based on debt-related and objective factors, such as income, assets, and debt (Albacete et al., 2020; Azzopardi et al., 2019; Loke, 2015), standard indicators like the debt-to-income ratio and the debt-to-asset ratio are commonly employed by scholars and central banks to assess households' ability to meet loan commitments and the risk of credit defaults (Albacete et al., 2020)³. Pursuing a more sophisticated approach, Hacker and colleagues (2014, 2018) define “one of the most fundamental elements of economic security” as “the degree to which individuals experience and are protected against hardship-causing economic losses” (Hacker et al., 2014, p. S6), underscoring the necessity of having a financial buffer as well as the unequal exposure to financial shocks. Building on that, Hacker distinguishes between income and asset poverty, regarding the former to be insufficient to fully capture economic security and, therefore, concluding that only asset poor individuals can be potentially labelled as “economically vulnerable”. This shows that financial vulnerability does not necessarily need to comprehend the poor but instead those at risk of falling into financial hardship. Within this understanding we identify the crucial components that make up financial vulnerability, namely (i) the probability of encountering a financial shock, (ii) the intensity of this shock, and the (iii) financial buffer available to protect oneself (Osberg, 2015; Hacker, 2018). Taken together, this understanding speaks for a conceptualization of financial vulnerability as a graded phenomenon.

In general, measuring financial vulnerability with objective indicators offers the advantage of regular and standardized data collection across countries, enabling longitudinal and cross-sectional comparisons. Additionally, in the context of financial market stability, these objective values often hold greater significance than individuals' subjective perceptions of their situation. Nevertheless, this approach lacks consideration of individual circumstances and important contextual factors. For instance, certain individuals with low income may possess a supportive financial network, potentially reducing their financial vulnerability. Conversely, high-income individuals may have substantial financial obligations or a particularly extravagant lifestyle, which is not necessarily reflected by an income-to-debt ratio. Overall, employing subjective indicators helps to adopt a more actor- and context-oriented approach of conceptualizing and operationalizing financial vulnerability.

To address the non-directly observable characteristics of individuals, such as their social environments, personal preferences, and capabilities, a subjective approach can directly enquire

³ Different measures of indebtedness are commonly used by central banks to study the vulnerability of households. This is reasonable since central banks are interested in maintaining financial stability and, therefore, monitor credit risks stemming from the household sector (Ampudia et al., 2014; Enzinger et al., 2022; Fessler et al., 2017).

about individuals' current ability to manage financial affairs or their capacity to withstand specific financial shocks, such as job loss or a car repair. Such approach redefines the distinction between determinants of financial vulnerability and its measurements, in the sense that income, debt, and available assets are understood as explanatory variables rather than indicators. Lusardi et al. (2011) use a single question to measure financial vulnerability, asking respondents if they can come up with \$2,000 in 30 days, while Anderloni et al. (2012) employ multiple items capturing various aspects, including the ability to make ends meet and to afford essential needs. Both studies find that income, wealth, and debt strongly affect a person's level of financial vulnerability, but factors like gender, household composition, and financial literacy, are significant predictors too (Anderloni et al., 2012; Lusardi et al., 2011). Similar to Anderloni et al. (2012), Fernández-López et al. (2023b) use multiple items to construct a continuous measure of financial vulnerability relate to debt and consumption capacities, also accounting for the perception of the individual on their financial situation. In their study, the authors find that self-perceived financial knowledge is negatively associated with financial vulnerability. Lusardi et al. (2011) underscore that financial vulnerability is not exclusively concerning the poor, as many individuals considered "middle class" are also likely to fall into hardship when facing an unexpected expense or loss of income. Taken together, these insights point into the direction of a multidimensional conceptualization of financial vulnerability, which extends beyond income, wealth, and debt alone.

With the shared objective of integrating individuals' perceptions and capacities into the conceptual framework of financial vulnerability, O'Connor et al. (2019) propose to understand financial vulnerability in terms of an objective and a subjective dimension. Besides the objective dimension which encompasses external factors such as assets and emergency savings, the subjective dimension involves assessing individuals' attitudes, perceptions, and knowledge regarding their financial situation. Accounting for both dimensions, financial vulnerability is highest for individuals with low financial awareness and confidence (indicating high subjective vulnerability) along with limited financial resources (indicating high objective vulnerability). Further expanding this notion, Salignac et al. (2019) identify four components of financial vulnerability: economic resources, financial resources, financial knowledge and behavior, and social capital. In addition to objective and subjective factors, this approach explicitly considers factors related to the institutional and social environment of the individual, such as access to financial services or assistance in case of emergencies. Both these frameworks once again shift the conceptual understanding of financial vulnerability, conceiving factors such as lack of financial awareness, limited oversight of financial obligations, or a limited financial support network not merely as determinants but as integral aspects of the concept itself.

The approaches by Lusardi et al. (2011), Anderloni et al. (2012), and Fernández-López et al. (2023b) essentially promote an understanding of financial vulnerability as being (un)able to mobilize enough money to compensate for an income or expenditure shock of average size in addition to supporting one's own existence. As this conceptualization is very precise and narrow, it is not difficult to distinguish between financial vulnerability, on the one hand, and its determinants, on the other hand. However, compared to the "objective" approaches to financial vulnerability, via combinations of income, debt, and wealth measures, these approaches can more credibly reflect the influence of perceptions and capabilities internal to the individual and, thereby, better account for the complexity of an individual's financial situation. The approach, advocated by O'Connor et al. (2019) and Salignac et al. (2019), suggests combining objective and subjective components of financial vulnerability into a single measure that is indicative of a person's likelihood of falling into or of already being in a state of financial hardship. Due to the attempt of

capturing every facet of financial vulnerability, these conceptual frameworks make it more difficult to distinguish between the determinants of financial vulnerability and the concept itself, when analyzing who is financially vulnerable and why. We need to acknowledge, that the argumentation why factors like financial literacy or social capital should be constitutive elements of financial vulnerability, i.e., of the concept itself, seems to be based essentially on the fact that these factors highly correlate with the likelihood of falling into financial hardship, which gives the impression of a circular argument.

Examining the existing literature reveals two research gaps: 1) The conceptualization of financial vulnerability is often made implicitly, focusing on the measurements without extensively discussing the theoretical embeddedness. In other words, a comprehensive theoretical discussion concerning the conceptual understanding of financial vulnerability and, hence, a clear definition is missing. 2) There exists an ambiguity in literature between indicators and determinants of financial vulnerability. Accordingly, we aim to contribute to the literature in two ways: 1) The preceding discussion shows that studying financial vulnerability means to study the likelihood of experiencing financial hardship, thus, financial vulnerability is neither static nor an entirely inherent characteristic of an individual or household. Instead, it is actor- as well as context-dependent and can change dynamically. Therefore, we provide a theoretical foundation for understanding financial vulnerability as a graded phenomenon, for conceptualizing its multidimensional nature, and for employing measures that integrate various objective and subjective financial items related to debt, consumption, and savings (Fernández-López et al., 2023a). 2) With respect to the determinants, we use our theoretical conceptualization to differentiate between the variable being explained, namely financial vulnerability, and potential explanatory variables.

1.2. Defining financial vulnerability and its determinants

As a starting point, we trace the concept of vulnerability back to the scientific disciplines in which it was originally coined, namely psychology and ecology (Manyena, 2006; Waller, 2001). We apply insights from these fields to our conceptual framework of financial vulnerability, attempting to ensure coherency and applicability.

Vulnerability in the context of personal finances

In psychology, the concept of vulnerability is closely related to the diathesis-stress model, originally used to explain the trajectory of psychological disorders. According to this model, vulnerability is to be understood as a predisposition of an individual that if a corresponding stressor or amount of stress is encountered leads to a psychopathological condition (Hammen, 2005; Ingram & Luxton, 2005; Monroe & Simmons, 1991). On a general level, vulnerability can be defined as the likelihood to experience a negative outcome due to exposure to a stressor, which directly reflects how vulnerability as a concept is used throughout a variety of disciplines (Cutter, 1993; O'Connor, et al., 2019; Turner et al., 2003). In this definition, vulnerability is distinct from the stressor itself as well as from the potentially occurring undesired outcome. Whether the encounter with a stressor does lead to the undesired outcome depends on the intensity of the stressor as well as on the degree of vulnerability (currently) inherent to the individual. Less vulnerable individuals can generally bear more intensive stressors without experiencing the undesired outcome than more vulnerable ones.

Applying this basic conceptualization of vulnerability to the financial situation of an individual, we need to specify what is meant by “stressor” and “undesired outcome”. In the realm of personal financial matters, (unexpected) income- and expenditure shocks in all their possible diversity can be regarded as stressors. For instance, losing one’s job or a costly repair of the car (usually) put stress on one’s personal financial situation. Regarding the undesired outcome, similarly to O’Connor et al. (2019), we may employ the term of *financial hardship* to describe a state in which a person struggles to support their own livelihood. To complete the transfer from the psychological diathesis-stress model to the context of personal financial matters, this means that the question whether a *financial shock* (stressor) leads to *financial hardship* (undesired outcome), depends on a person’s *financial vulnerability*. To visualize this transfer, Figure 1 depicts financial vulnerability according to the diathesis-stress model.

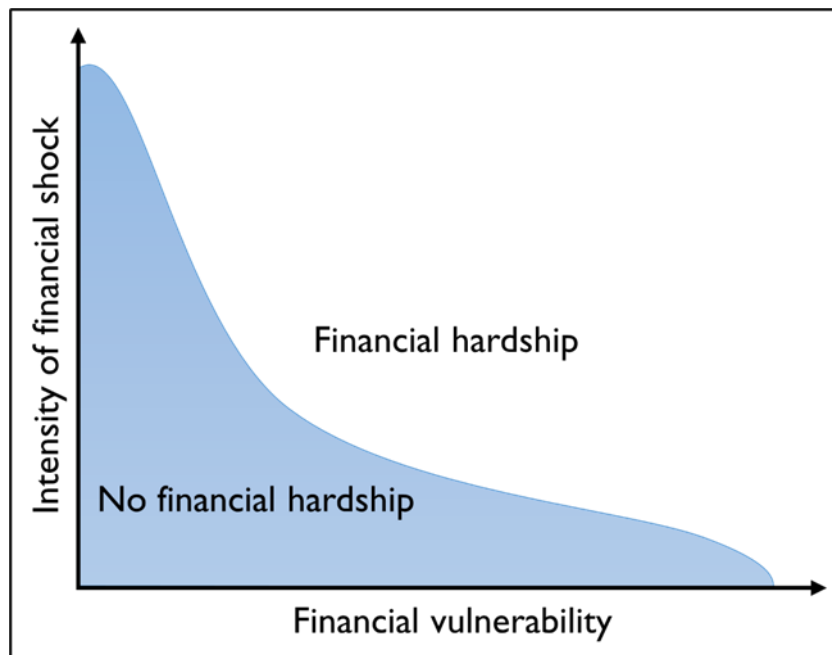


Figure 1. Illustration of the diathesis-stress model applied to the context of personal finances.

Note that an understanding of financial vulnerability analogous to the diathesis-stress model is in line with O’Connor et al. (2019) who state that “financial vulnerability is the risk of falling into hardship [...] rather than a situation of living in a certain state of poverty or need. This means that anyone, regardless of wealth or income, can be vulnerable” (p. 422). Like discussed in Subsection 1.1, we, therefore, refrain from equating financial vulnerability with financial hardship and define financial vulnerability as *the (conditional) likelihood to experience financial hardship (in case of a financial shock)*. Accordingly, the relative *absence* of financial vulnerability indicates a state in which an individual has the capacity to deal with a financial shock without slipping into financial hardship. Specifying this statement further, we argue that handling a financial shock is equivalent to being able to come up with the amount of money necessary to compensate for the respective unexpected expenditure or income loss.

Definition 1: Financial vulnerability is the (conditional) likelihood to experience financial hardship (in case of a financial shock).

Typically, individuals turn to financial buffers or insurances to deal with financial shocks.⁴ However, if these primary remedies are not available, people also mobilize money by borrowing from family and friends, or taking out a loan, which in many cases allows them to avoid financial hardship at least temporarily (Lusardi et al., 2011). Still, people who need to borrow money to compensate for a financial shock might be more prone to experience financial hardship in the future than people who can rely on their savings. These gradations in handling a financial shock underline that financial vulnerability is a question of degree and not of zero or one (O'Connor et al., 2019).

The three dimensions of financial vulnerability

Our analysis of the scientific literature (cf., Hacker, 2018; O'Connor et al., 2019; Salignac et al., 2019) indicates that financial vulnerability is either equated with or explained by one or a combination of three dimensions, which we will refer to as (1) *sensitivity*, (2) *resilience*, and (3) *exposure*. In our attempt of a holistic conceptual framework, we understand financial vulnerability as a function of precisely these three dimensions.

<p>Proposition 1: Financial vulnerability is a function of sensitivity, resilience, and exposure.</p>
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In the following paragraphs we develop the argument that financial vulnerability is determined by one's sensitivity, reflecting the 'objective situation' of a person, one's resilience, being the current capacity of a person to act and cope with a financial shock, and one's degree of exposure, being the likelihood to experience a financial shock.⁵ With the help of this concept, we further try to classify potential determinants of financial vulnerability on theoretical grounds. This in turn allows to better understand the potential effects and limits of policy measures addressing financial vulnerability, whether they aim to mitigate sensitivity, strengthen resilience, or minimize the degree of exposure. We begin by clarifying the relationship between vulnerability and resilience, which is crucial to demonstrate the inherent multidimensionality of our concept.

Resilience

Dimension

The conceptual origins of the term vulnerability can be traced back to ecology, where a discussion revolves around the relationship between vulnerability and resilience in the context of the more frequent occurrence of natural disasters due to climate change (Hutter & Lorenz, 2010; Manyena, 2006; Miller et al., 2020). The central question within this debate is whether resilience is the mere opposite of vulnerability and, therefore, the two terms are "two sides of the same equation on a continuum" (Manyena, 2006, p. 440) or whether resilience is a capacity possibly related to but not the opposite of vulnerability.

When examining how the term resilience is typically employed, we notice its central proactive component and the emphasis on taking action by (actively) coping with and adapting to a stressor

⁴ Before drawing on financial buffers and insurances, people usually decrease their consumption levels. However, we assume that curbing consumption will be insufficient and not timely enough to compensate for severe financial shocks.

⁵ Throughout the literature vulnerability, sensitivity, resilience, and exposure are not only used to describe the state of an individual but can also concern bigger entities, such as households, social groups, societies, and even entire economies or ecosystems. Corresponding to our research interest, we situate our conceptual framework of financial vulnerability at the level of the individual. However, we do not want to imply that the used concepts are generally restricted to this entity.

or its potential occurrence. Resilience describes the subjective capacities when facing a financial shock, which also includes the ability to learn from and to adjust to respective challenges (Hutter & Lorenz, 2010; Keck & Sakdapolrak, 2013). If a lack of vulnerability is the same as resilience, then reducing vulnerability lies solely within the sphere of influence and the responsibility of the individual (or entity in focus). However, we can easily think of situations in which actors are less vulnerable to a stressor but not because they are more resilient.

For instance, a hailstorm potentially destroying the entire harvest can be an existential financial shock to a farmer. Conversely, this event is unlikely to detrimentally impact the financial situation of an office worker. Still, within this context, it would be misleading to describe the former as more resilient than the latter. This example shows that financial vulnerability is influenced by factors lying beyond an individual's immediate control and not fully determined by resilience, i.e., by the active capacity to adapt. By equating the absence of vulnerability with resilience, one would risk insinuating that those who are vulnerable are “not resilient enough” and, therefore, to blame for their vulnerability. Refraining from this view, we conclude that, despite being conceptually related, vulnerability and resilience are not the mere opposite ends of a spectrum.

Following the line of reasoning presented above, we conclude two things: First, since being more resilient usually implies being less vulnerable but being less vulnerable does not essentially imply being more resilient, resilience can be understood as a *dimension* of (financial) vulnerability. Second, resilience, although being related to the concept of vulnerability, is not able to fully explain a person's degree of vulnerability, which is why further dimensions must be considered.

Definition 2: The resilience dimension comprehends the subjective capacities to cope with and adapt to a financial shock.

Note that our definition of the resilience dimension is similar to O'Connor et al.'s (2019) conceptualization of subjective financial vulnerability, which refers to the “self-assessed attitudes, opinions, and perceptions that increase one's likelihood of experiencing financial hardship” (p. 422) and, thus, to the subjective capacities individuals are equipped with.

Determinants

According to the definition, an individual can proactively influence their resilience via their personal capacities, which also means that any determinates of resilience need to be within control of the individual, at least to a certain degree. At this point, recent financial education efforts all around the globe to reduce financial vulnerability among the population come to mind (OECD, 2020b). If financial literacy is a determinant of financial vulnerability (e.g., Anderloni et al., 2012; Lusardi et al., 2011; Fernández-López et al., 2023b), which is an empirical question, then we argue that it will operate on the dimension of resilience since financial literacy can be related to an individual's capacities to proactively deal with financial shocks. Other potential determinants of the resilience dimension, for instance, could be self-confidence or risk propensity, which also impacts the way an individual acts when facing a financial shock.

Sensitivity

Dimension

Following Turner et al. (2003), we can identify another dimension of vulnerability as sensitivity. In contrast to resilience, the sensitivity dimension of an individual concerns their objective situation, which they cannot or at least not easily change in the short run. In the context of financial

vulnerability, it indicates the gravity of the consequences triggered by a (hypothetical) financial shock. Differentiating between sensitivity and resilience is again in line with the conceptualization of O'Connor et al. (2019) who distinguish between objective and subjective financial vulnerability. Objective financial vulnerability captures “the capital resources a consumer has at their disposal to prevent them from risk of financial hardship” (p. 423) and is, therefore, comparable to our sensitivity dimension of financial vulnerability.

Definition 3: The sensitivity dimension comprehends the long-term objective circumstances and characteristics (moderating the negative impact of a financial shock).

Determinants

The objective (financial) situation in which individuals find themselves, is strongly associated with socio-economic variables such as income, debt burden, and amount of assets. As we have seen in Section 1, these variables are often regarded as the primary determinants of financial vulnerability or are even used to categorize someone as financially vulnerable (Albacete et al., 2020; Azzopardi et al., 2019; Loke, 2015). Socio-demographic variables, such as gender, age, and migration background, can also be considered potential determinants of the sensitivity dimension of vulnerability, as they are related to social inequalities (Witteveen, 2020).

That it is meaningful to differentiate between the dimension of resilience and sensitivity and, therefore, also between their potential determinants, should be demonstrated by the following consideration: A person with a high income might be less sensitive to a financial shock than a person with a low income since, from a purely objective point of view, it is probably easier to meet basic needs and save money with a high income than if the income is almost entirely needed to meet basic needs. However, whether a person has a high or low income is not necessarily an indicator of their subjective capacity to cope with a financial shock, i.e., their resilience. This is why a low-income person living within their income and regularly setting aside small amounts of money can be judged more resilient than a high-income person preferring to consume their income timely and neglecting saving. Therefore, neglecting resilience would mean to risk mistaking financial vulnerability for poverty and, thereby, underestimating the prevalence of financial *vulnerability* in society. Neglecting sensitivity would leave out material- and social-inequalities and, thereby, suggesting that individuals are entirely self-responsible for their vulnerability.

Regarding debt burdens, it seems natural to ask whether it is not a question of personal responsibility instead of an objective circumstance, especially considering that there are various forms of debt, including consumer credits. Acknowledging the subjective component, we argue that debt burdens can be related to the resilience dimension, in the sense that they might result from unsound financial decisions but also from necessary or sound ones. However, owing debts are a circumstance which cannot be changed easily in the short run, which is why we regard them to be, in the first place, related to the sensitivity dimension. As one can see, the assignment of each determinant to a specific dimension often depends on temporal perspective and complex interactions, adding a certain dynamism to the conceptual framework.

Exposure

Dimension

So far, we have neglected that the individual likelihood of experiencing a financial shock tends to be unequally distributed among the population, pointing to a third dimension of financial vulnerability. As Hacker (2018) already points out: “Similar households with the same level of liquid wealth could experience very different levels of security based on their exposure to economic risks” (p. 209). Vulnerability to financial hardship increases with the degree of exposure to a financial shock due to the potential cumulative impact of repeated instances of such shocks, which may constantly deplete savings and make it more difficult to build up a buffer (cf., Lusardi et al., 2011; Thomas, 2013).

<p>Definition 4: The exposure dimension equals the probability of encountering a financial shock.</p>
--

We typically understand financial shocks as events having immediate negative consequences for one’s financial situation. Generally, financial shocks can be categorized as either income- or expenditure shocks. Examples of income shocks include job loss, a sudden work limiting disability, or a change in the family composition (Acs et al., 2009; Elliott et al., 2013). Expenditure shocks can, for instance, concern a broken car, damages of the home due to an environmental disaster, or instantly needed medical support after an accident (Bufe et al., 2022; Sun et al., 2022). However, there may be “shocks” or life events that do not (only) yield immediate and punctual negative effects on one’s financial situation but instead represent long-term financial burdens. For instance, consider a person who is suffering from long-covid or the birth of a child with disability. At first, one might have the possibility to go on paid sick leave or to receive support from social security. However, after a while, if there is no full recovery for the long-covid patient leading to reduced working hours or the child with disability needs additional support, detrimental financial consequences accumulate and may lead to financial hardship. Therefore, the term financial shock should not only be understood in a narrow sense, as it can comprehend events that, while not necessarily being perceived as negative, may imply lasting financial stress for those affected.

Determinants

Differentiating between dimension and determinants regarding exposure is less clear than when examining resilience and sensitivity. It is important to consider the various forms and causes of financial shocks, leading to unequal degrees of exposure. Exposure to financial shocks can be influenced by “internal” and “external” factors. Examples for the former may include the chosen educational path and profession, the decision to have children, questions of work-sharing within a partnership, whether you rent or buy a home, and the type of mortgage you choose. These examples already hint at the circumstance that the resilience dimension in form of making sound financial decisions may also reduce financial vulnerability by lowering one’s exposure to a specific financial shock. The external factors, on the contrary, are not resulting from individual decisions. They often concern personal characteristics associated with social and legal discrimination, e.g., gender, age, or citizenship, but may also include aspects related to labor law and welfare regimes, which are particularly relevant when conducting inter-country comparisons. A prominent financial shock for which the probability is structurally unevenly distributed and influenced by internal and external factors alike, is job loss. Depending on the employment relationship (whether temporary or permanent), the economic sector, the specific occupation, and personal

characteristics (e.g., gender, age, health condition), individuals are likely to have a very different probability of losing their main source of income, which may crucially affect their financial vulnerability.⁶

All three dimensions

Considering all three dimensions of financial vulnerability allows for a detailed picture of *who* is likely to fall into financial hardship by providing the opportunity to classify empirically identified determinants of financial vulnerability on a dimensional level. This classification can help to understand how various determinants operate and impact an individual’s financial situation. Figure 2 illustrates our conceptual framework.

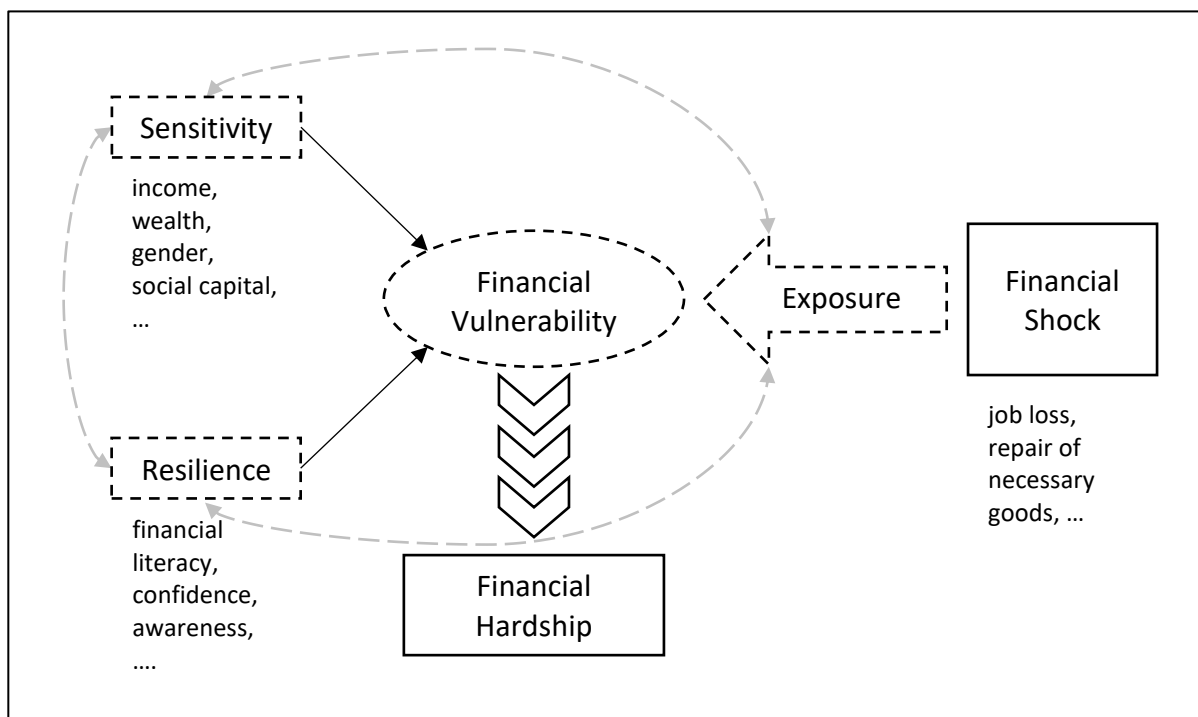


Figure 2. Conceptual framework of financial vulnerability.

Having discussed the three dimensions separately should make it comprehensible why we understand financial vulnerability as the conditional likelihood of falling into financial hardship due to the exposure to a financial shock (Definition 1) and why we postulate financial vulnerability to be a function of all three dimensions (Proposition 1). However, we refrain from further functional specifications, but it is important to note that despite their conceptual distinctness, all three dimensions are prone to be strongly interrelated and influencing each other. It is often, though not always, the case that a beneficial situation, i.e., one that potentially indicates less financial vulnerability in one dimension, is associated with a potentially desirable state in another

⁶ Acs et al. (2009) show that the distribution function of experiencing an income-shock is U-shaped with respect to family-income. In other words, lowest-income and highest-income families have the highest probability to experience a substantial loss of income. Fully returning to the previous income level is more likely for the lowest-income than for the highest-income families. This finding underlines the possibility that high-income families with a lavishing lifestyle can be financially vulnerable too, and not only on the dimension of resilience but also on the exposure dimension. It is important to note, that the authors only examine families with children, which is why it should not be ruled out, that the family constellation might also play a role in the probability of an income shock. Nevertheless, Elliott et al. (2013) find that low-income children have a higher probability of living through an income shock, than high-income children. Furthermore, their results indicate that ethnicity might also play a role with respect to exposure.

dimension. For instance, wealthy individuals with high income (decreased sensitivity) also tend to display high levels of financial literacy (increased resilience) (see e.g., Berham et al., 2012; Monticone, 2010; Wagner, 2019), whereas people with low income (increased sensitivity) frequently work in precarious jobs and, thus, are more exposed to an income shock due to job loss (increased exposure) (see e.g., Lariau & Liu, 2022; McKnight et al., 2016).

The discussion throughout this section already conveys a notion of which potential determinants belong to which dimension and how these determinants might contribute to a person's degree of financial vulnerability. The sensitivity dimension could primarily comprehend a person's socio-economic characteristics, such as the level of income or amount of assets, and a person's socio-demographic characteristics, such as age or gender.⁷ In a broader sense, social capital as well as environmental and macro-level factors, such as quality of existing financial infrastructure, the degree of urbanization, or generosity of the respective welfare regime, may also be included in the sensitivity dimension (cf., Salignac et al., 2019), as they also cannot or not easily be changed or improved by the affected individual alone. Conversely, resilience refers to the internal capacity of the individual comprehending a person's awareness and confidence in financial matters and, consequently, also their level of financial literacy, which expresses itself in knowledge, attitudes, and behaviors. Finally, the degree of exposure strongly depends on the forms and causes of financial shocks. Income shocks can be conceived as the probability to lose one's job while the degree of exposure to expenditure shocks might be captured by variables concerning the operating- and depreciation-time of commodities necessary for everyday-life.

2. Empirical application

To what extent the three dimensions influence a person's financial vulnerability and in how far the dimensions differ in their relative weight is an empirical question. Previous studies already provide respective empirical evidence on key determinants and their impact (e.g., Anderloni et al., 2012; Fernández-López et al. 2023b; Loke, 2017; Lusardi et al., 2011). In the current section, we add to this research by the means of an empirical data analysis, which should illustrate the application of our conceptual framework. Our approach exhibits similarities to the operationalization used by Fernández-López et al. (2023b), Anderloni et al. (2014) and Lusardi et al. (2011). In the sense of our proposed framework, this allows for a suitable distinction between financial vulnerability and its potential determinants. To make sure that the established dimensions, i.e., the categories for its determinants, can be effectively used to explain financial vulnerability, we will settle for an index that incorporates multiple perceptions of an individual's financial situation, attempting to reflect subtle differences regarding the perceived risk of falling into financial hardship.

2.1. Data

For the exemplary data analysis that addresses the crucial question, *who* is vulnerable and *why*, we make use of the Austrian dataset of the 2019 OECD/INFE International Survey of Adult Financial Literacy, which provides us with a total sample of 1418 observations.⁸ For our intended purpose, the main advantage of the chosen data source is the comparatively detailed information on the

⁷ It could further be the characteristics of the parents, like demonstrated by Elliott et al (2013).

⁸ Since the data has been collected before the outbreak of the COVID-19 pandemic, it does, perhaps, not accurately reflect the current financial situation of the Austrian population. However, we can assume that the fundamental patterns regarding predictors of financial vulnerability exhibit a certain consistency and are, therefore, still relevant in 2023.

financial situation of individuals, allowing us to create a financial vulnerability *index* (see Subsection 3.2).

Regarding potential determinants of financial vulnerability, the dataset includes socio-demographic variables, such as gender and migration background, as well as socio-economic variables, such as household income, existence of debt, and ownership of securities. Like discussed, we regard these variables in the first instance as potential determinants of the sensitivity dimension, but, in addition, they can partly be the results of personal (financial) decisions, i.e., resilience, and can also influence the risk of encountering a financial shock, i.e., exposure. Moreover, the dataset allows us to assess respondents' levels of financial literacy which we assume to be an important determinant of the resilience dimension. Based on a selected number of variables from the dataset and with the help of the OECD/INFE toolkit for measuring financial literacy, several scores can be calculated that capture three components of financial literacy, namely financial *knowledge*, financial *attitude*, and financial *behavior* (OECD, 2018). Financial knowledge is measured by counting the correct answers to questions that cover the fundamentals of financial concepts like inflation, compound interest, and the risk-reward relationship. The financial attitude score captures the degree to which people are long-term oriented and have a positive attitude towards saving. To calculate the financial behavior score information on three main areas is considered: (1) active saving and long-term planning, (2) comparing prices and products to make considered buying decisions, and (3) keeping track of expenses (OECD, 2020a).⁹

Due to non-sufficient data, we cannot examine the influence of variables that are directly indicative of the exposure to (specific) financial shocks in our analysis. Measuring the unequal distribution of exposure to income- and expenditure shocks can be a complex task and requires specific data, which are rarely collected (Hacker, 2018, pp. 206ff.). However, note that the specific construct of our financial vulnerability index implicitly considers past and anticipated exposure to financial shocks. Additionally, several variables employed as explanatory variables may be interpreted as partly exerting their effects by influencing the degree of exposure to financial shocks. Acknowledging the limitations of our analysis that we can neither identify exclusive determinants of the exposure dimension nor estimate their effect sizes, we still assume that everyone has a non-zero probability of experiencing a financial shock.

2.2. The financial vulnerability index

Following the approaches of Anderloni et al. (2012) and Fernández-López et al. (2023b), we construct a financial vulnerability index that should reflect the (“objective”) sensitivity dimension, the (“subjective”) resilience dimension, and the exposure dimension of financial vulnerability. Regarding the selection of the variables for this index, we took the official results of the OECD/INFE survey (2020) as a starting point, which explicitly classifies certain items as “elements of financial resilience” (p. 35). Contrary to our approach, however, the OECD understands resilience to be the mere positive counterpart of vulnerability (OECD, 2021). Still, judged on the basis of the outlined conceptual framework, these items rather pertain to the overarching concept of financial *vulnerability*, with most questions addressing perceived challenges in meeting financial obligations and mobilizing funds to counteract potential financial shocks. Therefore, even though the choice of label does not align with our approach, the listed items are potentially well-suited for measuring financial vulnerability in correspondence with our

⁹ For more details, see Appendix B.

understanding. The nine selected items encompass: keeping control over money, taking care with expenditures, the availability of financial cushions, coping with a financial shortfall, planning individual finances, and fraud awareness.

Table 1. Variables for the financial vulnerability index and weighted proportions.

And if you, personally, faced a major expense today – equivalent to your own monthly income – would you be able to pay it without borrowing the money or asking family or friends to help?	
- Yes (= 0)	73.85%
- No (= 1)	19.43%
Not specified	6.72%
Some people set themselves financial goals, such as paying university fees, buying a car or becoming debt free. Do you (personally, or with your partner) have any financial goals?	
- Yes (=0)	51.57%
- No (=1)	46.66%
Not specified	1.77%
Sometimes people find that their income does not quite cover their living expenses. In the last 12 months, has this happened to you, personally?	
- Yes (= 1)	81.81%
- No (= 0)	13.95%
Not specified	4.24%
If you lost your main source of income, how long could you continue to cover your living expenses, without borrowing any money or moving house?	
- Less than a week (= 5)	3.22%
- At least a week, but no one month (= 4)	10.18%
- At least one month, but not three months (= 3)	23.48%
- At least three months, but not six months (= 2)	21.45%
- Six months or more (= 1)	31.43%
Not specified	10.24%
Thinking about financial products and services in general, in the last 2 years, have you experienced scam, fraud or other irregularities?	
- Yes (= 1)	15.47%
- No (= 0)	84.53%
I tend to worry about paying my normal living expenses.	
- Always (= 5)	3.55%
- Often (= 4)	7.18%
- Sometimes (= 3)	18.91%
- Rarely (= 2)	29.85%
- Never (= 1)	37.19%
Not specified	3.31%
I have money left at the end of the month.	
- Always (= 1)	21.48%
- Often (= 2)	22.33%
- Sometimes (= 3)	27.57%
- Rarely (= 4)	19.03%

Table 1. Variables for the financial vulnerability index and weighted proportions.

- Never (= 5)	7.73%
Not specified	1.85%
<hr/>	
I am concerned that my money won't last.	
- Completely (= 5)	5.21%
- Very well (= 4)	17.93%
- Somewhat (= 3)	17.79%
- Very little (= 2)	28.21%
- Not at all (= 1)	27.34%
Not specified	3.52%
<hr/>	
I am just getting by financially.	
- Completely (= 5)	9.55%
- Very well (= 4)	26.77%
- Somewhat (= 3)	20.23%
- Very little (= 2)	19.45%
- Not at all (= 1)	19.78%
Not specified	4.22%

Note: questions were originally phrased in German.

From a theoretical perspective, it can be argued that the selected items comprehend the different dimensions of vulnerability to varying degrees. For instance, people who agree that they are just getting by financially can be disadvantaged by objective factors and/or lack subjective coping capacities. Another item explicitly asking about having fallen victim to a scam is likely a question of exposure and resilience (awareness). Several questions address all three dimensions: Having had problems with and/or currently having concerns about making ends meet might not only be indicative of an individual's financial sensitivity and resilience but also their exposure to income (e.g., job loss) or expenditure shocks. Selecting multiple items that capture many nuances of financial vulnerability should ensure that the financial vulnerability index reflects objective circumstances, subjective capacities and exposure to financial shocks alike. The list of items considered for our financial vulnerability index is displayed in Table 1.

Since financial vulnerability is a question of degree and the selected questions cover different aspects, we settle for a Principal Component Analysis (PCA) to construct the *financial vulnerability index*. Strictly speaking, PCA assumes continuous variables with a linear relationship, whereas in our case we deal with five ordinal and four binary variables. However, Kolenikov & Angeles (2004, 2009) have demonstrated that PCA can be extended to accurately handle ordinal variables by employing a polychoric correlation matrix, which estimates the correlations between the latent continuous variables underlying the observed ordinal variables. Fortunately, in our case, also the four binary variables can be considered ordinal in nature, i.e., one option inherently indicates a higher degree of financial vulnerability, which is why the procedure of calculating the polychoric correlations can also be meaningfully applied here. Before conducting the PCA, all variables were recoded, such that higher values indicate higher vulnerability than lower values (cf., Table 1).

Table 2. Principal component analysis based on polychoric correlation matrix.

Variables	PC1	PC2	PC 3
Expenditure shock	0.627	0.153	0.153
Financial goal	0.015	0.478	0.478
Making ends meet	0.647	0.276	0.276
Income shock	0.799	-0.024	-0.081
Fallen victim to fraud	0.117	0.742	0.742
Worry about making ends meet	0.77	-0.066	-0.019
Have money left	0.761	-0.126	-0.126
Concern that money won't last	0.831	-0.087	-0.091
Just getting by	0.735	-0.161	-0.161
SS loadings	3.868	1.239	0.936
Proportion of explained variance	0.430	0.125	0.104
Cumulative proportion	0.430	0.555	0.659

The PCA reveals that the first component explains approximately 52% of the total variance, while the other components account for only between 3% and 14%. Upon closer examination of the loadings within the first component, given in Table 2, it becomes evident that seven out of nine variables exhibit similarly high statistical importance and align in the same direction. The remaining two variables, related to falling victim to fraud and having a long-term financial goal, hardly load on this component. Therefore, we exclude these two variables and only use the remaining seven variables to create our financial vulnerability index. To compute the index value for a specific observation, the sum is taken over all corresponding variables multiplied by their respective component loadings. The resulting index values are rescaled to a range from 0 (minimum financial vulnerability) to 10 (maximum financial vulnerability) to facilitate interpretability.

The frequency distribution of the financial vulnerability index is graphically displayed in Figure 3 and the corresponding descriptive statistics are summarized in Table 3.¹⁰ To be representative of the Austrian population, the sample has been weighted with post-stratification weights. As one might expect, the distribution is right-skewed meaning that most individuals display low levels of vulnerability, and the number of individuals decreases with increasing vulnerability levels. This is also reflected by the low median value of 3.15, where 18.4% of the weighted sample-population display an index value below 1 and only 3.7% a value of 8 or higher.¹¹

¹⁰ Note that the number of observations is lower compared to the total sample due to missing responses in survey questions used to construct the financial vulnerability index.

¹¹ We do not claim that our index is the most suitable one to indicate financial vulnerability in general, but we believe that it is appropriate to demonstrate our conceptual framework and its applicability. Considering a multi-country setting, for instance, would require an index which ensures comparability across countries.

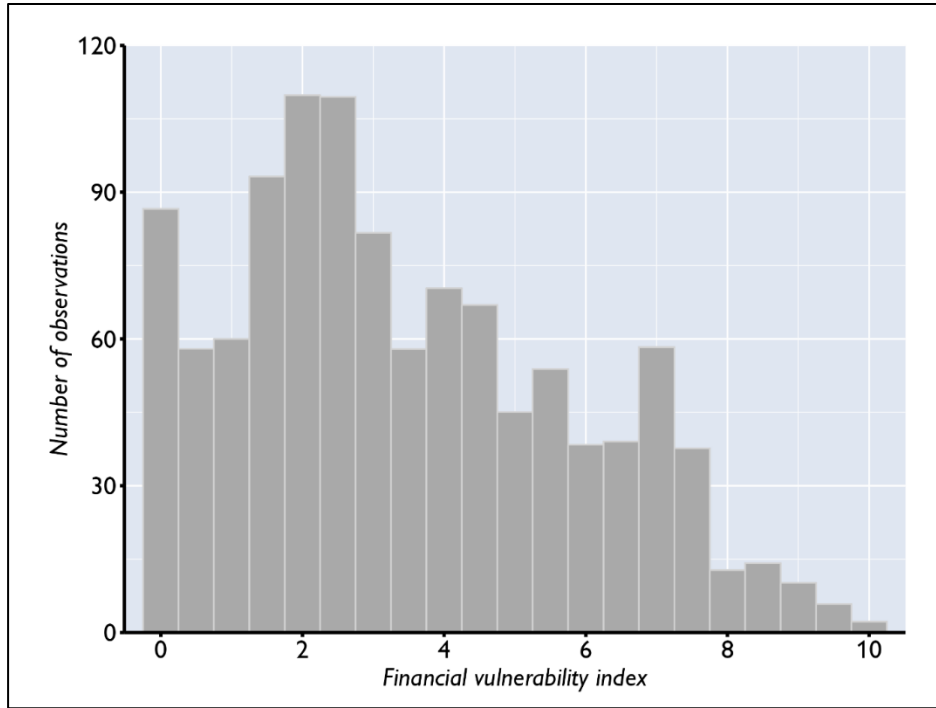


Figure 3. Weighted frequency distribution of financial vulnerability index.

Table 3. Descriptive statistics of financial vulnerability index.

Variable	N	Mean	St. Dev.	Median	Min	Max
Financial Vulnerability Index	1140	3.19	2.37	2.72	0	10

Additionally, as robustness checks, we utilized Nonlinear Principal Component Analysis and Multiple Correspondence Analysis to construct the financial vulnerability index, using the R package Gifi (v0.4-0, Mair et al., 2022).¹² These methodologies, tailored for non-continuous variables, yielded results highly similar to our PCA-based index. The financial vulnerability indices generated by all three methodologies demonstrated highly similar distributions, and an almost perfect Pearson correlation coefficient of above 0.99. This high degree of correlation strengthens the reliability of our findings across different statistical approaches.

2.3 Identifying determinants of financial vulnerability

Having created our dependent variable, the financial vulnerability index, we can now conduct an Ordinary Least Squares (OLS) linear regression analysis. This allows us to conduct an empirical proof-of-concept to verify whether and to what extent all three dimensions exert significant influence on a person's financial vulnerability and how the associated determinants differ in terms of effect size. We employ a stepwise modelling strategy, estimating four OLS regression models in sequential steps to build up to a full model. Each model introduces a new set of variables particularly associated with either the sensitivity, the resilience, or the exposure dimension to examine their incremental effects on financial vulnerability. The full regression model has the following structure:

¹² For details on these methods see Gifi (1990) and De Leeuw et al. (2017).

$$\begin{aligned}
FVI_i &= \alpha + \\
&(1) \beta_1 * SD_i + \\
&(2) \beta_2 * Income_i + \beta_3 * Debt_i + \beta_4 * Securities_i + \\
&(3) \beta_5 * FinLit_i + \beta_6 * Risk_i + \\
&(4) \beta_7 * FinShock_i + \epsilon_i
\end{aligned}$$

Building on the base model including only socio-demographic variables¹³ (SD_i), the second model additionally introduces economic variables like household income ($Income_i$) or debt situation ($Debt_i$), which mainly belong to the sensitivity dimension of financial vulnerability.¹⁴ Within this dimension individuals tend to have little or no room to autonomously improve their situation on the short- or medium-run. For holding debt, we distinguish between collateralized and uncollateralized debt, as these types of debt yield different implications. We also include a binary variable to indicate whether a person has investments in stocks, bonds, or mutual funds ($Securities_i$).

The financial literacy variables ($FinLit_i$), in contrast, capture potential determinants almost exclusively belonging to the resilience dimension of financial vulnerability, i.e., (beneficial) knowledge, attitudes, and behaviors that, in theory, every person can learn and adopt. Put differently, the financial literacy score is indicative of aspects that lie within the capacity of the individual actor. Financial risk propensity ($Risk_i$) is another potential determinant of financial vulnerability that can be attributed to the resilience dimension and is thus also considered in the subsequent regression analyses.

Albeit we have no data on the individual probability of future job loss or impending income shocks, in additional questions respondents were asked whether their household has experienced a selected number of common financial shocks ($FinShock_i$), such as unemployment, an unexpected major expense, or divorce, in the past. Clearly, in the context of our theoretical framework, the corresponding variables fall under the exposure dimension: On the one hand, these past experiences serve as proxies for future exposure to financial shocks, as they frequently indicate a predisposition to future disruptions and offer valuable insight into a household's risk profile. On the other, they help reveal how financial vulnerability is shaped by past financial shocks. These variables are added to the model in the final step to build up to the full model, allowing for a comprehensive assessment of all dimensions of financial vulnerability.

The intercept, i.e., the predicted value of FVI_i if all explanatory variables are set to zero (numeric variables) or their base level (categorical variables), is denoted by α , while β_k ($k = 1, \dots, 7$) denote regression coefficients or vectors of regression coefficients, and ϵ_i the residual estimation error.¹⁵ To account for potential biases due to the heteroscedasticity resulting from the skewed distribution of the data, the OLS regression model is run with robust standard errors to prevent overconfidence in the results.

¹³ The descriptive statistics for all explanatory variables used in the regression analyses is detailed in Table A.1 in the Appendix.

¹⁴ Due to non-sufficient data, we do not have any information on personal wealth or amount of owned assets, which we assume to be important determinants of the sensitivity dimension and, therefore, should be taken into account if available.

¹⁵ The error term is a residual variable which accounts for the lack of fit, i.e., it also captures the explanatory power of unknown influential factors besides the tested independent variables. Since we do not have any potential determinants exclusive to the exposure dimension and no variable on wealth to include in our regression model, the error term might also capture variance to be explained by these factors.

3 Results

3.1 Descriptive analyses

While regression analysis can identify correlations between the financial vulnerability index and proposed determinants¹⁶, it has inherent limitations in capturing the full scope of the underlying distribution of the data. Particularly, when aiming to understand *who* is financially vulnerable, examining bivariate or trivariate correlations of demographic and socioeconomic variables with financial vulnerability is more intuitive than interpreting correlations under the *ceteris paribus* condition, which requires the consideration of a multitude of variables. Therefore, we decided to additionally include a brief descriptive analysis to illuminate how financial vulnerability is distributed among the variables considered.

Examining financial vulnerability across various sociodemographic characteristics, we find notable disparities (see Table A.2 in the Appendix). Gender-wise, females have a slightly higher financial vulnerability (mean FVI of 3.3) compared to males (3.08). Age is a significant factor, with younger individuals (16-29) showing the highest vulnerability (4.24), which declines with increasing age. Education inversely affects vulnerability; those with only compulsory education experience the highest vulnerability (4.16), which decreases with higher educational levels. Employment status is also crucial, as those not working report the highest vulnerability (5.08), whereas self-employed individuals have the lowest (2.31). Those born outside Austria also display substantially higher levels of financial vulnerability (4.52) than people without migration background (3.06). Lower household income correlates with higher financial vulnerability, with the lowest income bracket exhibiting the highest financial vulnerability scores (4.36). The presence of uncollateralized debt (4.22), past unexpected financial expenses (5.16), or a divorce are also highly indicative of financial vulnerability (5.04). Crucially, financial literacy plays a protective role; higher scores in financial knowledge, behavior, and attitudes are associated with lower financial vulnerability.

Next, we specifically focus on the influence of household income and financial literacy levels on financial vulnerability. Both these variables were chosen for a more in-depth examination as they are assumed to play a key role within their respective dimension. Employing a grouped stacked bar chart gives us an idea about the interrelation between the sensitivity and resilience dimension with respect to financial vulnerability. Moreover, it allows us to discern certain subgroups and estimate their prevalence within the total population.

Figure 4 displays the total number of observations for different degrees of financial vulnerability with respect to the level of financial literacy for each of the three available household income groups. To enable data visualization the financial vulnerability index as well as the financial literacy¹⁷ score was divided into four categories of roughly equal size based on the respective quartiles. Examining Figure 4, we see a strong association between household income and financial literacy: People with relatively low financial literacy scores can be found much more frequently among those having a household income (HHI) below EUR 2,000 compared to those having a household income of EUR 3,300 or more. Consequently, there is only a small but still notable number of people that either have a low income but an above median financial literacy score or a high income but a below median financial literacy score. Within each income group, however,

¹⁶ Although a regression analysis does not yield insights into causal relations, it can support our claims regarding which factors determine vulnerability by revealing which factors at least correlate with financial vulnerability.

¹⁷ For those specifically interested how financial literacy is distributed among the considered variables, Table A.3 in the Appendix provides a comprehensive overview.

we find a negative relationship between financial literacy and financial vulnerability. Comparing the relative proportion of the least and less vulnerable groups between those in the lower half of the financial literacy distribution and those in the upper half, we find that the resulting difference is (with 20+ percentage points) particularly striking for the middle-income category.

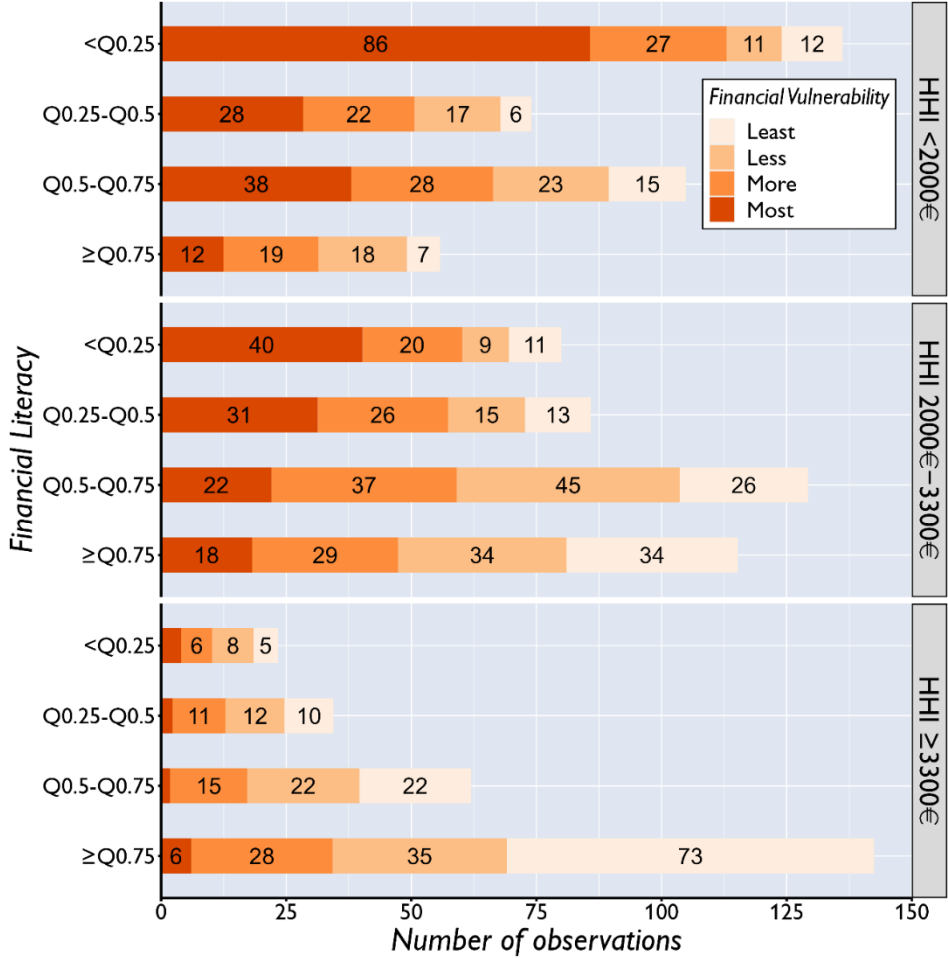


Figure 4. Weighted distribution of financial vulnerability by financial literacy across household income levels.

3.2 Regression analyses

The results of the regression analysis are presented in Table 4¹⁸ in form of four models: Model 1, comprehends only sociodemographic variables, Model 2 additionally includes a set of economic variables, Model 3 introduces financial literacy variables, and Model 4 variables indicative of a past financial shock. Comparing the four models helps to analyze whether and how each of the sets of variables associated with either the sensitivity (Model 2), the resilience (Model 3) or the exposure dimension (Model 4) have a distinct and independent influence on financial vulnerability. To better compare the estimates within a model in terms of their effect size, the three financial literacy scores as well as the age variables were standardized.¹⁹

¹⁸ Note again that the number of observations is lower compared to the total sample due to missing values for the financial vulnerability index and certain explanatory variables.

¹⁹ Accordingly, these coefficients display the effect of a one standard deviation increase of the respective variable on the financial vulnerability index.

Table 4. OLS regressions with robust standard errors.

Variables	Model 1	Model 2	Model 3	Model 4
Gender (female)	0.051 (0.140)	-0.095 (0.129)	-0.079 (0.120)	-0.067 (0.117)
Age (stdzd.)	0.388 (0.480)	0.424 (0.448)	0.660* (0.399)	-0.055 (0.426)
Age squared (stdzd.)	-1.301*** (0.476)	-1.195*** (0.453)	-1.366*** (0.407)	-0.552 (0.425)
Education				
(Reference: compulsory school)				
Apprenticeship, vocational school	-0.657*** (0.247)	-0.261 (0.239)	-0.033 (0.212)	-0.055 (0.205)
Upper secondary, school-leaving certificate	-1.553*** (0.287)	-0.639** (0.281)	-0.120 (0.256)	-0.174 (0.250)
University, technical college	-1.906*** (0.279)	-0.885*** (0.284)	-0.348 (0.264)	-0.387 (0.267)
Family and household status				
(Reference: single)				
Partnership	-1.007*** (0.157)	0.439** (0.202)	0.483** (0.190)	0.577*** (0.187)
Partnership with children	-0.797*** (0.195)	0.838*** (0.247)	0.786*** (0.228)	0.777*** (0.244)
Single with children	-0.328 (0.413)	0.922*** (0.331)	1.140*** (0.303)	0.554 (0.340)
Other	-0.891** (0.407)	0.575 (0.393)	0.457 (0.352)	0.287 (0.358)
Occupation				
(Reference: employed)				
Self-employed	-0.531** (0.250)	-0.095 (0.263)	0.045 (0.240)	-0.017 (0.234)
Retired	0.747*** (0.243)	0.394* (0.239)	0.301 (0.226)	0.152 (0.214)
Other, not working	1.493*** (0.327)	1.255*** (0.299)	1.106*** (0.269)	0.762*** (0.261)
Born outside Austria	1.086*** (0.248)	0.893*** (0.237)	0.884*** (0.221)	0.658*** (0.218)
Urbanization				
(Reference: <3,000 inhabitants)				
3,000 to <15,000 inhabitants	0.432** (0.186)	0.464*** (0.168)	0.458*** (0.157)	0.265 (0.164)
15,000 to <100,000 inhabitants	0.599*** (0.221)	0.445** (0.203)	0.383** (0.185)	0.360** (0.180)
100,000 to <1,000,000 inhabitants	0.403* (0.221)	0.266 (0.204)	0.244 (0.198)	0.060 (0.189)
> 1,000,000 inhabitants (Vienna)	0.604*** (0.211)	0.530*** (0.189)	0.419** (0.181)	0.293* (0.178)
Household income				
(Reference: <EUR 2,000)				
EUR 2,000 - <EUR 3,300		-1.448***	-1.291***	-1.280***

Table 4. OLS regressions with robust standard errors.

Variables	Model 1	Model 2	Model 3	Model 4
>EUR 3,300		(0.209)	(0.195)	(0.189)
		-2.634***	-2.307***	-2.211***
Collateralized debt		(0.269)	(0.247)	(0.263)
		0.212	0.408**	0.326*
Uncollateralized debt		(0.198)	(0.194)	(0.191)
		0.606***	0.554***	0.324*
Securities		(0.204)	(0.186)	(0.175)
		-0.847***	-0.519***	-0.576***
Financial knowledge score (stdzd.)		(0.143)	(0.137)	(0.134)
			-0.366***	-0.323***
Financial behavior score (stdzd.)			(0.068)	(0.067)
			-0.461***	-0.383***
Financial attitude score (stdzd.)			(0.064)	(0.064)
			-0.206***	-0.180***
Risk seeking			(0.063)	(0.062)
			-0.452	-0.614
Past unemployment			(0.403)	(0.469)
				0.382*
Unexpected low income				(0.207)
				0.647***
Long-term illness				(0.225)
				0.252
Unexpected costs for child care				(0.188)
				0.495***
Unexpected major expense				(0.172)
				0.187
Divorce				(0.123)
				1.019***
				(0.212)
Constant	3.650***	3.802***	3.423***	3.226***
	(0.288)	(0.274)	(0.252)	(0.247)
AIC	4979.3	4460.5	4338.3	4250.3
Observations	1,139	1,068	1,068	1,068
Adjusted R2	0.239	0.378	0.447	0.493

Note: *p<0.1; **p<0.05; ***p<0.01.

In Models 1 to 3 we find a significant and substantive negative effect for age squared while the linear term remains insignificant. This indicates that financial vulnerability peaks among the youngest individuals and decreases quadratically from there, reaching its lowest levels among the elderly. This is likely to be associated with the likelihood of acquiring a at least a limited amount of wealth through saving a share of one's income, which increases as one's professional career continues, as well as the increasing likelihood of inheritances. However, as soon as the variables on financial shocks are introduced, this effect becomes insignificant. Thus, it appears that adverse the experience of financial events tends to override the gradual improvements in the economic situation associated with age.

Unsurprisingly, the ‘usual suspects’ – household income and unemployment – yield the strong correlation with financial vulnerability. A household income of above EUR 3,300 per month is associated with an above two-point decrease in financial vulnerability. Conversely, an unemployed person displays, *ceteris paribus*, a financial vulnerability index about one-point higher than their employed counterpart.

The results indicate that household composition significantly affects financial vulnerability, and this impact should be interpreted carefully, as the coefficients change considerably across the four models. Initially, being in a partnership or a partnership with children is associated with lower vulnerability scores compared to single households. However, once household income is introduced, this effect reverses – understandably, as with income held constant, a single household faces fewer financial demands than a multi-member household. In Models 2 and 3, we observe the largest positive effect for single parents, with an approximately one-point increase in financial vulnerability. However, this effect becomes insignificant in Model 4, where financial shock variables are introduced. This shift suggests that the elevated financial vulnerability of single parents largely results from their heightened exposure to financial shocks, particularly divorce.

When examining whether an individual currently has debt, we see that for collateralized and uncollateralized debt alike there is a moderate positive effect of roughly the same size when looking at Model 4. This may seem counterintuitive as collateralized loans are typically used for buying one’s main residence while uncollateralized debt, which is used for consumption goods, does not include an equally valuable equivalent. Here, it is important to consider that collateralized debt usually comprise a multiple of the amount of uncollateralized debt (Fessler et al., 2021). A loan secured by one’s main residence typically amounting to EUR 50,000 having the same effect as a EUR 3,000 consumer loan, therefore, is in line with the idea that consumer credit is a comparably strong predictor of financial vulnerability. Still, it is not surprising that debt puts a strain on one’s budget and requires a stable as well as sufficiently high income for a certain period of time.

The coefficient for holding financial securities displays a statistically significant negative correlation with financial vulnerability. Being potentially associated with many variables we did not directly observe, this variable is above all highly indicative of wealth, as the likelihood of holding securities increases drastically with wealth (Fessler et al., 2021).

For the groups typically labelled vulnerable due to structural societal inequalities, namely women and people with migration background, i.e., born outside Austria, only for the latter the coefficients point substantially in the expected positive direction while also displaying statistical significance. Even when controlling for major confounding variables such as household income, employment status, debt, financial shocks, etc., migration background remains significantly related to financial vulnerability. In contrast, within the scope of our financial vulnerability measure, we find no evidence that women are *per se* more financially vulnerable than men.

Looking at the potential explanatory power of the financial literacy variables, it is encouraging to find that financial knowledge, (prudent) financial behavior and (forward looking) financial attitude display a significant negative correlation, which implies that financial literacy might help to counteract financial vulnerability. In terms of the effect size there are subtle differences between the three components of financial literacy. With a decrease in the financial vulnerability index of between -0.461 (Model 3) and -0.383 (Model 4) for a one-standard deviation increase in the respective score, the coefficient for financial behavior, is about 1.2-times larger than the one for financial knowledge and more than twice as large than the one for financial attitude. There is no

significant effect of financial risk propensity on financial vulnerability. Consequently, financial behavior and financial knowledge stick out as the most relevant among the determinants associated with the resilience dimension of financial vulnerability.

Turning to the exposure dimension, we examine the influence of financial shocks the respondents' households experienced in the past ten years on their current financial vulnerability. We find that past periods of unemployment slightly increase financial vulnerability (0.382), while unexpected low income significantly heightens it (0.647). The more pronounced effect of low income suggests that while unemployment may be a temporary setback, a sustained lower income within a household (including one's own) could represent a more enduring issue, thereby exerting a more significant and lasting detrimental impact on financial vulnerability. Unexpected childcare costs also notably raise financial vulnerability at about the same size (0.495). However, the impact of a major unexpected expense is not significant (0.187) and, therefore, of lesser importance than frequently attributed in political discourse. Divorce is with a coefficient of 1.019 by far the strongest predictor of financial vulnerability among the financial shocks, likely due to the financial repercussions of asset splits, the costs of litigation and separate households as well as childcare support payments.

The full model (Model 4) is able to explain 0.493 of the variance in the financial vulnerability index, which can be considered high given that we have no data on key variables like the asset situation. Comparing Models 1 to 4, we can see that the overall explanatory power, indicated by the R-squared value, increases with every set of variables introduced. Thereby, we demonstrate that our theoretical model of financial vulnerability comprehending sensitivity, resilience, and exposure, also holds up an empirical examination. With the stepwise inclusion of the variables across the regression models, we can partially observe modifications in the effect sizes of some variables. The increase in the coefficient for collateralized debt and for financial securities once the financial literacy variables are included (see Model 2 and 3) suggests that people having collateralized debt or securities also tend to be more financially literate and are, therefore, less financially vulnerable. Notably, the effect of the educational level, while having a comparatively strong predictive power in Model 1, becomes partly insignificant and less substantive in Model 2, in which we control for financial knowledge, attitude, and behavior. This suggests that fostering financial competence through financial education interventions might be one part of the answer to counteract inequalities of financial vulnerability resulting from differences in levels of formal education.

To ensure the robustness of our results, we conducted additional checks. First, we ran separate logit and ordered logit regressions for each variable that forms the financial vulnerability index (see Table A.4 in the Appendix). Notwithstanding minor differences, regressing the individual factors on the independent variables yields results similar to those obtained using the composite index. Second, we categorized the continuous financial vulnerability index into tertiles, quartiles, and quintiles, then performed ordered logit regressions for each categorization (see Table A.5 in the Appendix). This approach revealed some deviations from the OLS regression results, and the different categorizations affected the outcomes in certain cases. Specifically, the variables for holding collateralized or uncollateralized debt and securities did not consistently display the significant effects found in the OLS models. In contrast, the variable for financial risk-seeking, which was insignificant in the OLS regression, showed a significant negative coefficient in two of the three ordered logit regressions. Similarly, the positive effects of migration background and financial shocks – except for divorce – showed mixed robustness across models.

4. Discussion

When interpreting the results, it is important to bear in mind that our empirical analysis of financial vulnerability employed a cross-sectional approach. While this kind of analysis can provide a snapshot of individuals' current financial situation, it falls short when it comes to establishing causal inferences. Therefore, we cannot make statements about why and how financial vulnerability came about or altered over time, as this would require longitudinal data. In addition, a cross-sectional analysis does also not allow to fully disentangle the probable interrelationships between the different dimensions of financial vulnerability, which may be particularly relevant in the medium- and long run.

Looking at the results in the light of our conceptualization, our empirical analysis seems to indicate that the sensitivity and the exposure dimension of financial vulnerability offer more potential than the resilience dimension to reveal determinants of financial vulnerability albeit not all potential determinants could be considered. The empirical results suggest that in the short run financial vulnerability more strongly correlates with one's objective circumstances and characteristics, such as income, debt, wealth, and migration background, as well as to exposure to financial shocks, such as divorce, than with one's subjective capability to adapt, including financial literacy. However, comparing individuals with high financial literacy scores to those with low ones, we find that increasing resilience through financial education might be able to compensate for the undesirable effects of high sensitivity and exposure to a certain degree.

Financial education measures to increase resilience might be particularly effective to reduce financial vulnerability among those who are objectively not in a precarious situation, i.e., people with regular employment and sufficient income, but who are prone to unsound financial decision making. As we have explained, despite displaying low sensitivity and exposure to financial shocks, people still can be financially vulnerable due to insufficient awareness and/or financial literacy levels, which could lead to problems living within one's means and building up adequate financial buffers. Although this group is not typically the first one to be thought of when it comes to financial vulnerability, their risk of financial hardship due to a lack of resilience should not be underestimated (cf., Lusardi et al., 2011; O'Connor et al., 2019).

When looking at the most financially vulnerable individuals, i.e., those with high sensitivity, little resilience and high exposure to financial shocks, our empirical results let us assume that the power of financial literacy to reduce financial vulnerability might be limited. Learning and adopting financially beneficial knowledge, attitudes, and behaviors may help individuals to manage their money more efficiently but, especially in the short run, might not make up for the detrimental effects of a precarious and low-income employment situation. After all, the focus of financial literacy frequently lies on *preventing* these financial problems rather than dealing with them once they are present. We do, however, not rule out that strengthening resilience through financial education interventions might also reduce certain areas of sensitivity and exposure in the medium- and long-run. Financial literacy might, for instance, foster the building of emergency savings, lead to efficient debt management, or even influence income trajectories, all of which can, over a sufficient period of time, (re)stabilize the objective economic circumstances (see e.g., Wang et al., 2022). To address structural inequalities with regards to financial vulnerability resulting from socio-demographic characteristics, like age or migration background, financial education interventions may in some cases be able to contribute through enhancing self-efficacy and self-empowerment of these vulnerable groups in financial matters. Approaches aiming at reducing sensitivity and exposure through strengthening resilience may be particularly effective among

young individuals whose major financial decisions are still ahead of them. However, it should be acknowledged that lacking financial literacy is not the root cause of all forms of financial vulnerability, as socio-economic conditions and structural problems also play major roles in this complex question.

A practical difficulty that arises when trying to increase the resilience of people with high financial sensitivity and exposure, e.g., by financial education efforts, is the state of permanent stress associated with having difficulties making ends meet or being afraid to lose one's source of income. This stress frequently implies that people in financially challenging circumstances are generally disinclined to participate in financial education activities at all (see e.g., Bruhn et al., 2013). Moreover, they may hold the belief that they cannot derive significant benefits from these interventions, which may indeed be justified considering the cost-benefit analysis of acquiring financial literacy for different social groups (Lusardi et al., 2017; Son & Park, 2019). Additionally, even when financially struggling individuals are willing to improve their financial literacy, they are likely to struggle to adopt beneficial financial knowledge, attitudes, and behaviors, since the stress they experience adversely affects the ability to process new information and to act in a reflective manner (Berker et al., 2016; Gershoff, 2007; Moore et al., 2021; Schwabe & Wolf, 2010). Consequently, financial education efforts will face considerable hurdles to substantially impact and help people struggling to support their livelihood.

Finally, it is also possible that people have a high level of resilience but still exhibit high sensitivity and exposure. In this case, financial vulnerability is caused by objective circumstances lying largely beyond individual responsibility, e.g., unemployment, accidents, or caring duties. Since financial education interventions unfold their impact by the means of bolstering resilience, they will offer the least benefit to this social group.

5. Conclusion

The main objective of this research paper is to provide a conceptual framework that attempts to incorporate all crucial dimensions of financial vulnerability. So far, the scientific literature is characterized by a heterogeneous understanding and utilization of financial vulnerability, whereby its theoretical foundation is often not sufficiently discussed. However, having a clear understanding of financial vulnerability is not only relevant for researchers but also for policymakers who aspire to reduce financial vulnerability in the society.

We develop the conceptual framework by synthesizing the existing approaches with the economic literature and by drawing from the conceptualizations of vulnerability in psychology and ecology. More specifically, our conceptualization uses the diathesis-stress model from psychology and applies it to individual and household finances. In our derived understanding, financial vulnerability is the probability of encountering financial hardship. This definition implies that financial vulnerability and financial hardship are two distinct concepts that should not be used interchangeably. People who appear to be in a favorable financial situation when looking at objective indicators, like income, although not being poor can still be financially vulnerable due to problematic behaviors, like "living from paycheck to paycheck" or excessive consumerism, which can be understood as symptoms of lacking financial awareness and literacy.

Based on the discussed grounds, we identify three key dimensions – sensitivity, resilience, and exposure – that collectively shape financial vulnerability in the sense that financial vulnerability is considered a function of these three dimensions. The sensitivity dimension encompasses the objective circumstances that contribute to financial vulnerability and cannot or at least not easily

be changed in the short run. Indicators of material prosperity, like income or wealth, but also socio-demographic characteristics, like gender or migration background, which might be associated with structural social inequalities, can be seen as potential determinants of the sensitivity dimension of financial vulnerability. The resilience dimension encompasses the subjective capacities to cope with and to adapt to financial shocks. Potential determinants of this dimension can be financial literacy, comprehending knowledge, attitude, and behaviors, but also self-confidence, awareness, or social competence. Individuals with high resilience are, under otherwise same circumstances, better equipped to manage their finances, build savings, and navigate adverse financial events than individuals with low resilience. The exposure dimension encompasses the probability of encountering a financial shock, such as job loss.

The proposed conceptual framework is neither meant to be rigid in its application, nor does it want to dismiss any approaches that do not meet the framework's claims. Above all, we want to contribute to the existing research on financial vulnerability by providing *guidance* for researchers, practitioners, and policy makers dealing with financial vulnerability and by enabling comparison as well as classification of various approaches and frameworks. Conceiving of financial vulnerability as a multidimensional concept helps to better understand which dimensions and, thereby, which kinds of determinants a specific approach addresses as well as which aspects of financial vulnerability certain types of measurement tools can capture and which not. Besides offering a tool to classify existing research, our conceptual framework is also meant to assist researchers in their own conceptualization and operationalization process when conducting empirical studies on financial vulnerability. With the proposed concept and the empirical analysis of this study, we want to motivate more awareness to reflect on the consequences of conceptual choices on the results of a study and their interpretation. Especially, one should bear in mind that different conceptualizations of financial vulnerability might highlight certain financially vulnerable groups while potentially neglecting others.

The results of our empirical analysis indicate that individual's *current* financial vulnerability is primarily related to their sensitivity, i.e., objective factors such as income, employment status, or migration background, as well as exposure to financial shocks, and secondarily related to their resilience, i.e., subjective adaptability. Yet, the primary role of financial resilience may be to promote rational financial decisions and behaviors that prevent high sensitivity and exposure to financial shocks in the first place. However, the cross-sectional analysis we conducted does not allow us to draw any conclusions in this regard.

Overall, comprehensive policy responses should include financial education interventions but acknowledge that solely increasing financial literacy cannot fully address the complexity of reducing financial vulnerability. Regarding the effectiveness of increasing financial literacy, we suggest differentiating between various financially vulnerable groups, since financial literacy is particularly effective for those people who display comparatively low financial sensitivity and exposure but lack financial awareness and literacy. For the most financially vulnerable group, characterized by high financial sensitivity and exposure but low financial resilience, the potential of financial education interventions to alleviate financial vulnerability is constrained, which is why they should be accompanied by other policy tools.

Based on our conceptual framework, there are several avenues for future research. While the results of our study only reveal correlations between potential determinants and financial vulnerability, a more thorough analysis will be needed to demonstrate causality. Such in-depth analysis of the underlying mechanisms linking certain demographic characteristics to financial

vulnerability might further help to inform policy responses that directly address the causes of financial vulnerability instead of its symptoms. Building on that, we suggest to empirically examine the empowering-potential of financial education interventions specifically tailored to the needs of various financially vulnerable groups. Finally, a cross-country analysis considering the role of diverse welfare regimes, pension systems, and healthcare structures might provide valuable insights on how these aspects influence financial vulnerability.

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Appendix A. Additional statistics and analyses

Table A.1. Descriptive statistics of explanatory variables.

	%	Cumulative %
Gender		
Male	48.20	48.20
Female	51.80	100.00
Age		
Mean	49.08	
Standard deviation	18.20	
Education		
Compulsory school	14.58	14.58
Apprenticeship, vocational school	57.22	71.81
Upper secondary, school-leaving certificate	15.78	87.59
University, technical college	12.41	100.00
Family and household status		
Single	31.28	31.28
Partnership	34.94	66.22
Partnership with children	21.36	87.58
Single with children	5.69	93.27
Other	6.73	100.00
Occupation and employment status		
Employed	53.36	53.36
Self-employed	5.34	58.70
Retired	28.38	87.08
Other, not working	12.92	100.00
Born outside Austria		
Yes	8.52	8.52
No	91.17	99.69
Not specified	0.31	100.00
Urbanization		
< 3,000 inhabitants	30.64	30.64
3,000 to <15,000 inhabitants	26.05	56.68
15,000 to <100,000 inhabitants	10.70	67.38
100,000 to <1,000,000 inhabitants	11.24	78.63
> 1,000,000 inhabitants	21.37	100.00
Household income (net per month)		
< EUR 2,000	33.27	33.27
EUR 2,000 - <EUR 3,300	35.42	68.69
≥ EUR 3,300	22.98	91.67
Not specified	8.33	100.00
Collateralized debt		
Yes	10.50	10.50
No	88.98	99.48
Not specified	0.52	100.00
Uncollateralized debt		
Yes	10.60	10.60
No	89.04	99.65
Not specified	0.35	100.00
Securities		

Table A.1. Descriptive statistics of explanatory variables.

	%	Cumulative %
Yes	20.14	20.14
No	79.34	99.48
Not specified	0.52	100.00
Financial knowledge score		
Mean	5.32	
Standard deviation	1.64	
Financial behavior score		
Mean	5.98	
Standard deviation	1.70	
Financial attitude score		
Mean	3.10	
Standard deviation	0.82	
Risk seeking		
Yes	13.57	13.57
No	86.43	100.00
Past unemployment		
Yes	18.86	18.86
No	81.14	100.00
Unexpected low income		
Yes	13.58	13.58
No	86.42	100.00
Long-term illness		
Yes	14.51	14.51
No	85.49	100.00
Unexpected costs for child care		
Yes	13.02	13.02
No	86.98	100.00
Unexpected major expense		
Yes	34.39	34.39
No	65.61	100.00
Divorce		
Yes	10.50	10.50
No	89.50	100.00

Note: the number of observations equals 1,418. For the calculation of percentages, means and standard deviations survey weights are employed.

Table A.2. Financial vulnerability and sociodemographic characteristics.

	Share (%)	Mean FVI
Gender		
Male	48.2	3.08
Female	51.8	3.3
Age group		
16-29	18.35	4.24
29-44	23.83	3.56
45-59	28.06	2.94
60+	29.76	2.5
Education		
Compulsory school	14.58	4.16
Apprenticeship, vocational school	57.22	3.29
Upper secondary, school-leaving certificate	15.78	2.74
University, technical college	12.41	2.33
Family and household status		
Single	31.28	3.72
Partnership	34.94	2.41
Partnership with children	21.36	3.25
Single with children	5.69	4.32
Other	6.73	3.66
Occupation and employment status		
Employed	53.36	3.25
Self-employed	5.34	2.31
Retired	28.38	2.6
Other, not working	12.92	5.08
Born outside Austria		
Yes	8.52	4.52
No	91.17	3.06
Urbanization		
< 3,000 inhabitants	30.64	2.82
3,000 to <15,000 inhabitants	26.05	3.09
15,000 to <100,000 inhabitants	10.7	3.4
100,000 to <1,000,000 inhabitants	11.24	3.25
> 1,000,000 inhabitants	21.37	3.57
Household income (net per month)		
EUR <2,200	33.27	4.36
EUR 2,000 - <EUR 3,300	35.42	3.17
>EUR 3,300	22.98	1.81
Collateralized debt		
Yes	10.5	2.75
No	88.98	3.24
Uncollateralized debt		
Yes	10.6	4.22
No	89.04	3.06
Securities		
Yes	20.14	1.76
No	79.34	3.58
Financial knowledge score		

Table A.2. Financial vulnerability and sociodemographic characteristics.

	Share (%)	Mean FVI
<Q0.25	14.71	4.24
Q0.25-<Q0.5	29.24	3.78
Q0.5-<Q0.75	27.76	3.21
≥Q0.75	28.29	2.28
Financial behavior score		
<Q0.25	14.71	4.24
Q0.25-<Q0.5	11.71	4.02
Q0.5-<Q0.75	17.53	3.63
≥Q0.75	56.05	2.73
Financial attitude score		
<Q0.25	14.71	4.24
Q0.25-<Q0.5	11.71	4.02
Q0.5-<Q0.75	17.53	3.63
≥Q0.75	56.05	2.73
Risk seeking		
Yes	3.7	3.16
No	96.3	3.19
Past unemployment		
Yes	18.86	5.08
No	81.14	2.73
Unexpected low income		
Yes	14.51	3.48
No	85.49	3.14
Long-term illness		
Yes	13.02	3.58
No	86.98	3.13
Unexpected costs for child care		
Yes	34.39	3.38
No	65.61	3.09
Unexpected major expense		
Yes	13.58	5.16
No	86.42	2.85
Divorce		
Yes	10.5	5.04
No	89.5	2.97

Note: the number of observations equals 1,418. For the calculation of percentages and means survey weights were employed. The relative proportions were calculated against the total sample. Thus, for variables with missing values the percentages do not sum up to 100%.

Table A.3. Financial literacy and sociodemographic characteristics.

	Share (%)	Mean FLS
Gender		
Male	48.20	14.61
Female	51.80	14.19
Age group		
16-29	18.35	13.55
29-44	23.83	14.66
45-59	28.06	14.92
60+	29.76	14.21
Education		
Compulsory school	14.58	12.52
Apprenticeship, vocational school	57.22	14.23
Upper secondary, school-leaving certificate	15.78	15.62
University, technical college	12.41	15.77
Family and household status		
Single	31.28	13.85
Partnership	34.94	14.98
Partnership with children	21.36	14.73
Single with children	5.69	14.10
Other	6.73	13.01
Occupation and employment status		
Employed	53.36	14.72
Self-employed	5.34	16.12
Retired	28.38	14.17
Other, not working	12.92	12.81
Born outside Austria		
Yes	8.52	13.88
No	91.17	14.46
Urbanization		
< 3,000 inhabitants	30.64	14.22
3,000 to <15,000 inhabitants	26.05	14.57
15,000 to <100,000 inhabitants	10.70	14.55
100,000 to <1,000,000 inhabitants	11.24	14.55
> 1,000,000 inhabitants	21.37	14.25
Household income (net per month)		
EUR <2,200	33.27	13.42
EUR 2,000 - <EUR 3,300	35.42	14.51
>EUR 3,300	22.98	15.90
Collateralized debt		
Yes	10.50	15.88
No	88.98	14.22
Uncollateralized debt		
Yes	10.60	14.37
No	89.04	14.40
Securities		
Yes	20.14	16.28
No	79.34	13.92
Financial vulnerability index		

Table A.3. Financial literacy and sociodemographic characteristics.

	Share (%)	Mean FLS
<Q0.25	18.24	15.82
Q0.25-<Q0.5	19.67	15.31
Q0.5-<Q0.75	19.90	14.85
≥Q0.75	21.58	12.78
Risk seeking		
Yes	3.70	13.98
No	96.30	14.41
Past unemployment		
Yes	18.86	13.11
No	81.14	14.69
Unexpected low income		
Yes	14.51	14.18
No	85.49	14.43
Long-term illness		
Yes	13.02	15.24
No	86.98	14.26
Unexpected costs for child care		
Yes	34.39	14.67
No	65.61	14.25
Unexpected major expense		
Yes	13.58	13.27
No	86.42	14.57
Divorce		
Yes	10.50	13.63
No	89.50	14.48

Note: the number of observations equals 1,418. For the calculation of percentages and means survey weights were employed. The relative proportions were calculated against the total sample. Thus, for variables with missing values the percentages do not sum up to 100%.

Table A.4. Logit and ordered logit regressions of each factor of the financial vulnerability index.

Variables	Expenditure shock	Not covering costs	Losing income	Worrying about costs	Just getting by	Not having money left	Money won't last
Gender (female)	-0.163 (0.197)	-0.087 (0.236)	-0.095 (0.131)	0.014 (0.122)	-0.047 (0.117)	-0.120 (0.119)	-0.049 (0.122)
Age (stdzd.)	0.555 (0.604)	0.364 (0.666)	-0.560 (0.449)	0.449 (0.476)	-0.064 (0.455)	0.054 (0.428)	1.198*** (0.441)
Age squared (stdzd.)	-1.000 (0.654)	-1.045 (0.740)	-0.212 (0.455)	-0.834* (0.494)	-0.081 (0.486)	-0.406 (0.434)	-1.690*** (0.471)
Education							
(Reference: compulsory school)							
Apprenticeship, vocational school	-0.807*** (0.270)	-0.392 (0.335)	-0.373* (0.202)	0.055 (0.214)	-0.118 (0.200)	-0.230 (0.212)	0.163 (0.221)
Upper secondary, school-leaving certificate	-0.472 (0.358)	-0.208 (0.406)	-0.744*** (0.251)	-0.078 (0.260)	-0.346 (0.268)	-0.234 (0.264)	0.181 (0.266)
University, technical college	-0.793* (0.413)	0.083 (0.438)	-0.962*** (0.274)	-0.246 (0.276)	-0.667** (0.304)	-0.492* (0.275)	-0.263 (0.277)
Family and household status							
(Reference: single)							
Partnership	0.467 (0.303)	0.160 (0.326)	0.388* (0.221)	0.286 (0.226)	0.373* (0.193)	0.239 (0.211)	0.361* (0.207)
Partnership with children	0.306 (0.389)	0.459 (0.437)	0.498* (0.267)	0.519** (0.264)	0.718*** (0.240)	0.377 (0.253)	0.715*** (0.244)
Single with children	1.352*** (0.449)	0.147 (0.553)	0.565 (0.367)	0.083 (0.307)	0.544* (0.323)	-0.077 (0.324)	0.650** (0.323)
Other	0.566 (0.503)	0.242 (0.564)	0.226 (0.394)	-0.431 (0.419)	0.543 (0.377)	0.390 (0.404)	0.331 (0.415)
Occupation							
(Reference: employed)							
Self-employed	0.076 (0.567)	-0.511 (0.642)	0.183 (0.307)	-0.194 (0.254)	0.007 (0.266)	0.177 (0.259)	-0.012 (0.252)

Table A.4. Logit and ordered logit regressions of each factor of the financial vulnerability index.

Variables	Expenditure shock	Not covering costs	Losing income	Worrying about costs	Just getting by	Not having money left	Money won't last
Retired	-0.066 (0.339)	0.142 (0.424)	0.214 (0.244)	-0.115 (0.226)	0.246 (0.225)	-0.275 (0.214)	0.222 (0.239)
Other, not working	0.413 (0.308)	1.305*** (0.304)	0.564** (0.264)	0.152 (0.250)	0.438* (0.244)	0.780*** (0.277)	0.313 (0.264)
Born outside Austria	0.002 (0.303)	0.617* (0.320)	0.246 (0.226)	0.546*** (0.205)	0.591*** (0.214)	0.381** (0.192)	0.930*** (0.210)
Urbanization							
(Reference: <3,000 inhabitants)							
3,000 to <15,000 inhabitants	-0.340 (0.296)	0.233 (0.307)	0.469** (0.190)	-0.043 (0.172)	0.148 (0.170)	-0.010 (0.162)	0.276 (0.170)
15,000 to <100,000 inhabitants	0.224 (0.320)	0.057 (0.387)	0.306 (0.211)	0.220 (0.200)	0.193 (0.191)	0.616*** (0.185)	0.031 (0.184)
100,000 to <1,000,000 inhabitants	-0.041 (0.301)	-0.250 (0.366)	0.204 (0.202)	-0.100 (0.187)	0.098 (0.174)	-0.248 (0.190)	0.151 (0.189)
> 1,000,000 inhabitants (Vienna)	0.474* (0.273)	-0.366 (0.347)	0.512*** (0.185)	-0.113 (0.205)	0.034 (0.192)	0.329* (0.187)	-0.284 (0.199)
Household income							
(Reference: <EUR 2,000)							
EUR 2,000 - <EUR 3,300	-1.028*** (0.275)	-1.079*** (0.309)	-0.962*** (0.218)	-0.978*** (0.212)	-0.871*** (0.188)	-0.623*** (0.212)	-0.871*** (0.205)
>EUR 3,300	-1.674*** (0.394)	-2.484*** (0.498)	-1.698*** (0.303)	-1.654*** (0.280)	-1.776*** (0.273)	-1.423*** (0.275)	-1.939*** (0.266)
Collateralized debt	0.247 (0.378)	-0.071 (0.469)	0.607*** (0.201)	0.139 (0.191)	0.214 (0.200)	0.374* (0.215)	-0.012 (0.207)
Uncollateralized debt	0.664** (0.303)	0.729** (0.308)	0.122 (0.214)	0.190 (0.185)	0.155 (0.176)	0.467** (0.183)	0.222 (0.182)
Securities	-1.432*** (0.405)	-0.132 (0.383)	-1.014*** (0.192)	-0.268* (0.162)	-0.785*** (0.160)	-0.625*** (0.152)	-0.512*** (0.153)

Table A.4. Logit and ordered logit regressions of each factor of the financial vulnerability index.

Variables	Expenditure shock	Not covering costs	Losing income	Worrying about costs	Just getting by	Not having money left	Money won't last
Financial knowledge score (stdzd.)	-0.215** (0.099)	-0.237** (0.102)	-0.361*** (0.074)	-0.370*** (0.076)	0.062 (0.061)	0.068 (0.074)	-0.277*** (0.066)
Financial behavior score (stdzd.)	-0.249** (0.100)	-0.563*** (0.116)	-0.336*** (0.069)	-0.056 (0.069)	-0.133** (0.066)	-0.448*** (0.063)	-0.111* (0.062)
Financial attitude score (stdzd.)	-0.232** (0.096)	-0.189 (0.120)	-0.222*** (0.072)	-0.149** (0.075)	-0.123* (0.068)	-0.171** (0.074)	-0.013 (0.072)
Risk seeking	-1.167* (0.672)	0.262 (0.499)	-1.031* (0.529)	0.065 (0.421)	-0.711 (0.479)	-0.674* (0.392)	-0.249 (0.454)
Past unemployment	0.654** (0.279)	0.298 (0.288)	0.166 (0.199)	0.287 (0.208)	0.202 (0.197)	-0.007 (0.201)	0.142 (0.191)
Unexpected low income	0.138 (0.312)	0.595* (0.324)	0.668*** (0.234)	0.580*** (0.220)	0.453** (0.208)	0.359* (0.212)	0.642*** (0.194)
Long-term illness	0.505* (0.272)	0.367 (0.315)	0.248 (0.183)	0.319* (0.189)	0.101 (0.181)	0.354* (0.191)	0.414** (0.183)
Unexpected costs for child care	0.012 (-0.350)	0.297 (-0.386)	0.294 (-0.216)	0.157 (0.180)	0.303 (0.194)	0.804*** (0.202)	0.444** (0.193)
Unexpected major expense	-0.159 (-0.221)	-0.269 (-0.253)	0.118 (-0.141)	0.418*** (0.127)	0.258** (0.128)	0.379*** (0.126)	0.277** (0.122)
Divorce	0.983*** (-0.279)	1.101*** (-0.301)	0.699*** (-0.231)	0.642*** (0.210)	0.453** (0.199)	0.616*** (0.220)	0.451** (0.201)
AIC	1032.20	759.06	2756.59	3050.72	3556.08	3465.30	3328.92
Observations	1,228	1,260	1,194	1,249	1,245	1,274	1,251
Adjusted pseudo-R2	0.21	0.31	0.43	0.27	0.25	0.32	0.30

Note: *p<0.1; **p<0.05; ***p<0.01.

Table A.5. Ordered logit regressions for categorized financial vulnerability index.

Variables	FVI in tertiles	FVI in quartiles	FVI in quintiles
Gender (female)	-0.163 (0.197)	-0.087 (0.236)	-0.095 (0.131)
Age (stdzd.)	0.555 (0.604)	0.364 (0.666)	-0.560 (0.449)
Age squared (stdzd.)	-1.000 (0.654)	-1.045 (0.740)	-0.212 (0.455)
Education			
(Reference: compulsory school)			
Apprenticeship, vocational school	-0.807*** (0.270)	-0.392 (0.335)	-0.373* (0.202)
Upper secondary, school-leaving certificate	-0.472 (0.358)	-0.208 (0.406)	-0.744*** (0.251)
University, technical college	-0.793* (0.413)	0.083 (0.438)	-0.962*** (0.274)
Family and household status			
(Reference: single)			
Partnership	0.467 (0.303)	0.160 (0.326)	0.388* (0.221)
Partnership with children	0.306 (0.389)	0.459 (0.437)	0.498* (0.267)
Single with children	1.352*** (0.449)	0.147 (0.553)	0.565 (0.367)
Other	0.566 (0.503)	0.242 (0.564)	0.226 (0.394)
Occupation			
(Reference: employed)			
Self-employed	0.076 (0.567)	-0.511 (0.642)	0.183 (0.307)
Retired	-0.066 (0.339)	0.142 (0.424)	0.214 (0.244)
Other, not working	0.413 (0.308)	1.305*** (0.304)	0.564** (0.264)
Born outside Austria	0.002 (0.303)	0.617* (0.320)	0.246 (0.226)
Urbanization			
(Reference: <3,000 inhabitants)			
3,000 to <15,000 inhabitants	-0.340 (0.296)	0.233 (0.307)	0.469** (0.190)
15,000 to <100,000 inhabitants	0.224 (0.320)	0.057 (0.387)	0.306 (0.211)
100,000 to <1,000,000 inhabitants	-0.041 (0.301)	-0.250 (0.366)	0.204 (0.202)
> 1,000,000 inhabitants (Vienna)	0.474* (0.273)	-0.366 (0.347)	0.512*** (0.185)
Household income			
(Reference: <EUR 2,000)			

Table A.5. Ordered logit regressions for categorized financial vulnerability index.

Variables	FVI in tertiles	FVI in quartiles	FVI in quintiles
EUR 2,000 - <EUR 3,300	-1.028*** (0.275)	-1.079*** (0.309)	-0.962*** (0.218)
>EUR 3,300	-1.674*** (0.394)	-2.484*** (0.498)	-1.698*** (0.303)
Collateralized debt	0.247 (0.378)	-0.071 (0.469)	0.607*** (0.201)
Uncollateralized debt	0.664** (0.303)	0.729** (0.308)	0.122 (0.214)
Securities	-1.432*** (0.405)	-0.132 (0.383)	-1.014*** (0.192)
Financial knowledge score (stdzd.)	-0.215** (0.099)	-0.237** (0.102)	-0.361*** (0.074)
Financial behavior score (stdzd.)	-0.249** (0.100)	-0.563*** (0.116)	-0.336*** (0.069)
Financial attitude score (stdzd.)	-0.232** (0.096)	-0.189 (0.120)	-0.222*** (0.072)
Risk seeking	-1.167* (0.672)	0.262 (0.499)	-1.031* (0.529)
Past unemployment	0.654** (0.279)	0.298 (0.288)	0.166 (0.199)
Unexpected low income	0.138 (0.312)	0.595* (0.324)	0.668*** (0.234)
Long-term illness	0.505* (0.272)	0.367 (0.315)	0.248 (0.183)
Unexpected costs for child care	0.012 (0.350)	0.297 (0.386)	0.294 (0.216)
Unexpected major expense	-0.159 (0.221)	-0.269 (0.253)	0.118 (0.141)
Divorce	0.983*** (0.279)	1.101*** (0.301)	0.699*** (0.231)
AIC	1811.34	2344.92	2781.80
Observations	1,068	1,068	1,068
Adjusted pseudo-R2	0.40	0.44	0.45

Note: *p<0.1; **p<0.05; ***p<0.01.

Appendix B. Financial literacy questions

The OECD/INFE identifies three components of financial literacy: financial knowledge, financial behavior and financial attitude. Each component is measured separately through a selected number of questions, the answers to which determine the respective score. The total financial literacy score is the sum of the three components. For detailed information regarding the computation of the financial literacy scores, as well as the precise questions used for the determining the financial behavior score, see the OECD/INFE Toolkit from 2018. For the Austrian Survey of Financial Literacy 2019 questions were originally phrased in German.

Financial knowledge score²⁰ (0 to 7 points)

1. Imagine that five brothers are given a gift of EUR 1,000 in total and have to share the money equally. Now imagine that the brothers have to wait for one year to get their share of the EUR 1,000 and inflation stays at 2%. In one year's time will they be able to buy: (a) more with their share of the money than they could today, (b) the same amount, or (c) less than they could buy today? *(correct: c)*
2. You lend EUR 25 to a friend one evening and he gives you EUR 25 back the next day. How much interest has he paid on this loan? *(correct: 0)*
3. Imagine that you put EUR 100 into a no fee savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made? *(correct: 102 EUR)*
4. And how much would be in the account at the end of five years? (a) More than EUR 110, (b) exactly EUR 110, (c) less than EUR 110, (d) It is impossible to tell from the information given. *(correct: a)*
5. Are following statements (a) true or (b) false?
 - An investment with a high return is likely to be high risk. *(correct: a)*
 - High inflation means that the cost of living is increasing rapidly. *(correct: a)*

²⁰ The financial knowledge score is equal to the total number of correctly answered question in a quiz. Answer options such as "Don't know" or "Refused to answer" are omitted.

- It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares. (correct: a)

*Financial behavior score*²¹ (0 to 9 points)

1. Keeping track of money in the short term.
2. Actively saving (in any form).
3. Not having borrowed to make ends meet.
4. Having sought advice from independent sources.
5. Having sought advice (at least) from non-independent sources.
6. Closely watching personal financial affairs.
7. Making considered purchases.
8. Paying bills on time.
9. Setting long-term financial goals.

*Financial attitude score*²² (1 to 5 points)

1. Disagreement with: “I find it more satisfying to spend money than to save it for the long term”.
2. Disagreement with “Money is there to be spent”.
3. Disagreement with “I tend to live for today and let tomorrow take care of itself”.

The *Financial Literacy Score* is the sum of the three previous scores, which implies that the components are not equally weighted.

²¹ As the calculation of the financial behavior score relies on multiple questions and their combinations, only the kinds of financially prudent behaviors that eventually make up the scores are summarized.

²² To evaluate their financial attitudes respondents are asked to what extent they (dis)agree with the three listed statements, ranging from 1 (completely agree) to 5 (completely disagree). The financial attitude equals the average response across all statements.

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