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Economic hardship in households in the EU during the COVID-19 pandemic

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Οικονομικές δυσκολίες σε νοικοκυριά στην ΕΕ κατά τη διάρκεια της πανδημίας COVID-19

Μαρία Ηλιοφώτου και Νικολέττα Πασιουρτίδου

ΠΕΡΙΛΗΨΗ

Παρά τα πρωτοφανή μέτρα στήριξης που εφαρμόστηκαν στις χώρες της Ευρωπαϊκής Ένωσης για τον μετριασμό των οικονομικών επιπτώσεων της κρίσης του COVID-19, υπάρχουν ενδείξεις από μικροδεδομένα ότι τα νοικοκυριά υπέστησαν αυξημένες οικονομικές δυσκολίες κατά τη διάρκεια της πανδημίας. Το άρθρο διερευνά τους παράγοντες που σχετίζονται με οικονομικές δυσκολίες σε νοικοκυριά στην Ευρωπαϊκή Ένωση, με τη χρήση στοιχείων από την Έρευνα Εισοδήματος και Συνθηκών Διαβίωσης (EU-SILC). Εξετάζονται διαφορετικοί δείκτες που αντανακλούν οικονομικές δυσκολίες οι οποίοι βασίζονται στις υποκειμενικές απόψεις των νοικοκυριών. Αναλύονται μεταβλητές που αποτυπώνουν ευθέως οικονομικές δυσκολίες, δηλαδή μείωση του καθαρού εισοδήματος του νοικοκυριού την περίοδο 2020 – 2021 και απώλεια εισοδήματος το 2020 που αποδίδεται ειδικά στην κρίση COVID-19 από το νοικοκυριό. Αναλύονται επίσης και άλλοι δείκτες που αντικατοπτρίζουν οικονομικές δυσκολίες στα νοικοκυριά, όπως οι καθυστερήσεις στην πληρωμή σημαντικών εξόδων που αφορούν την κύρια κατοικία, π.χ. ενοίκιο ή δόση στεγαστικού δανείου. Εκτιμώνται οι επιπτώσεις δημογραφικών και κοινωνικοοικονομικών χαρακτηριστικών στην πιθανότητα του νοικοκυριού να έχει βιώσει οικονομικές δυσκολίες.

Η ανάλυση δείχνει ότι το προφίλ απασχόλησης των μελών του νοικοκυριού αποτελεί βασικό παράγοντα που επηρεάζει την πιθανότητα οικονομικών δυσκολιών. Τα νοικοκυριά ήταν πιο πιθανό να αντιμετωπίσουν οικονομικές δυσκολίες κατά τη διάρκεια της πανδημικής κρίσης εάν ορισμένα από τα μέλη τους παρουσίαζαν οποιοδήποτε από τα ακόλουθα χαρακτηριστικά: άνεργοι, αυτοαπασχολούμενοι, απασχολούμενοι στον τομέα δραστηριοτήτων παροχής καταλύματος και υπηρεσιών εστίασης, ή εργαζόμενοι στην παροχή υπηρεσιών ή ως πωλητές. Επιπλέον, τα νοικοκυριά εργάσιμης ηλικίας ήταν περισσότερο εκτεθειμένα στις δυσμενείς οικονομικές επιπτώσεις της κρίσης του COVID-19 σε σχέση με ηλικιωμένα νοικοκυριά. Τα νοικοκυριά με μεταναστευτικό υπόβαθρο, τα πολυάριθμα νοικοκυριά και εκείνα με προβλήματα υγείας παρουσίασαν αυξημένη πιθανότητα οικονομικών δυσκολιών. Ανάμεσα σε χώρες της Ευρωπαϊκής Ένωσης, η Κύπρος και, σε μικρότερο βαθμό, η Ελλάδα, η Ρουμανία, η Βουλγαρία και η Μάλτα αναδείχθηκαν ως οι πιο ευάλωτες στην κρίση της πανδημίας.

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Economic hardship in households in the EU during the COVID-19 pandemic[‡]

Maria Eliophotou* and Nicoletta Pashourtidou

Abstract

Despite the unprecedented support measures implemented across EU countries to mitigate the economic effects of the COVID-19 crisis, evidence from microdata suggests that households suffered heightened economic hardship during the pandemic. This paper investigates the factors associated with economic hardship in households in the EU during the COVID-19 crisis, using data from the European Union Statistics on Income and Living Conditions (EU-SILC). Different indicators of economic hardship based on households' subjective opinions are considered. Variables that directly capture economic difficulties, namely a decrease in household net income during the period 2020 – 2021, and income loss in 2020 specifically attributed to the COVID-19 crisis by the household are examined. Other indicators that reflect economic distress in households such as arrears with mortgage or rental payments are also considered. The effects of a wide range of personal and household characteristics on the probability of economic hardship in households are estimated. The analysis shows that the employment profile of household members is a key factor influencing the probability of economic hardship. Households were more likely to face economic distress during the COVID-19 crisis if some of their members exhibited any of the following characteristics: unemployed, self-employed, employed in the hospitality sector, or employed as service or sales workers. Furthermore, working-age households were more exposed to the adverse economic effects of the COVID-19 crisis than old-age ones. Households with a migratory background, larger households, and those with health problems experienced increased likelihood of economic distress. Across EU countries, Cyprus and, to a lesser extent Greece, Romania, Bulgaria and Malta emerged as the most vulnerable to the pandemic crisis.

Keywords: Household income, economic hardship, financial distress, EU-SILC data, COVID-19.

[‡] This paper is based on data from Eurostat, European Union Statistics on Income and Living Conditions (EU-SILC), 2021 operation (Version 7). The responsibility for all conclusions drawn from the data lies entirely with the authors.

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1. Introduction

Empirical evidence suggests that the economic effects of the COVID-19 pandemic extend far beyond the immediate contraction in aggregate income and consumption in 2020. Despite the unprecedented policy support to cushion the economic impact of the pandemic on households and businesses, empirical evidence for the EU and the US points to significant household/individual income declines during the COVID-19 recession, which are regressive (e.g., Almeida et al. 2021; Larrimore et al. 2022). Moreover, the COVID-19 crisis is likely to have exacerbated inequalities in relation to various dimensions such as income, the labour market, economic sectors, gender, education and mental health, with possible long-lasting effects (e.g., Blundell et al. 2022; Stantcheva 2022). However, research based on internationally comparative data regarding the economic impact of the pandemic on individuals and/or households is still developing (Khetan et al. 2022). One aspect of the crisis that has raised concerns is the possible effect of the pandemic and the associated lockdowns on the ability of households and/or individuals to cope with their financial obligations due to changes in income and/or employment status. In this context, the economic vulnerability of countries has been investigated, with reference to the financial distress of households, manifested in the percentage of households in arrears with utility bills, rent or mortgage payments (e.g., Gortz et al. 2023; Mikolai et al. 2020).

The aim of the paper is to investigate the factors associated with economic hardship in households in the EU during the COVID-19 crisis, using data from the European Union Statistics on Income and Living Conditions (EU-SILC). We consider different indicators of economic hardship based on households' subjective opinions. First, we examine variables that directly capture economic difficulties, namely a decrease in household net income during the period 2020 – 2021, and income loss in 2020 specifically attributed to the COVID-19 crisis by the household. Second, indicators that reflect economic distress in households and have been used in the literature are also studied; these indicators relate to arrears on mortgage or rental payments. Specifically, we estimate the effects of a wide range of personal and household characteristics on the probability of economic hardship in households. Special attention is given to how the likelihood of economic hardship varies across EU countries and how Cyprus compares to its EU peers; there is evidence that Cyprus has shown increased socioeconomic vulnerability to the COVID-19 crisis compared to other EU countries (e.g., Brzyska and Szamrej-Baran 2021; Marti and Puertas 2021).

Some works in the literature compute rankings to assess the socioeconomic vulnerability of countries to the COVID-19 pandemic (e.g., Brzyska and Szamrej-Baran

2021; Marti and Puertas 2021). Cyprus ranks among the five most economically vulnerable countries in the EU, based on the COVID-19 vulnerability index by Brzyska and Szamrej-Baran (2021), which assesses the impact of the pandemic on health, population and work, and the economy and businesses. Moreover, Cyprus ranks quite low (23 out of 29 European countries) in its response capacity with respect to the socioeconomic dimension of the pandemic, as reflected in indicators on poverty, financial difficulties, and the popularity of working from home before the pandemic (see, e.g., Marti and Puertas 2021).

Our results show that the employment profile of household members is a key factor influencing the probability of economic hardship. Households were more likely to face economic distress during the COVID-19 crisis, if some of their members exhibited any of the following characteristics: unemployed, self-employed, employed in the hospitality sector, or employed as service or sales workers. Furthermore, working-age households were more exposed to the adverse economic effects of the COVID-19 crisis than old-age ones. Households with a migratory background, larger households, and those with health problems experienced increased likelihood of economic distress. Across EU countries, Cyprus and, to a lesser extent, Greece, Romania, Bulgaria and Malta emerged as the most vulnerable to the pandemic crisis in our analysis.

The paper contributes to the understanding of the economic impact of the pandemic in households in the EU. The findings could be useful for evaluating the effectiveness of the policy response to the COVID-19 crisis across EU countries. They could also contribute to the development of new policies for addressing the longer-term impact of the pandemic both on a national and an international level, particularly in designing measures targeted to specific demographic and socioeconomic groups. Moreover, the findings are of particular interest to policymakers in Cyprus, as evidence reveals that households in Cyprus were more likely than similar households in other EU countries to experience economic hardship during the pandemic crisis. The increased likelihood of difficulties among Cypriot households extended beyond income losses in the pandemic years, as it also involved arrears on rental or mortgage payments. Distress in the form of arrears with key housing payments could have far-reaching consequences, involving the housing market, the banking sector, macroeconomic stability, and social cohesion, especially if a wave of mortgage defaults is triggered.

Section 2 provides a review of the literature on the economic impact of the pandemic. Section 3 describes the data. Section 4 presents the estimation results on the effects of various factors on the probability of economic hardship. Section 5 provides the conclusions of the study.

2. Literature review

Several studies have attempted to investigate the effect of the COVID-19 pandemic on household and/or individual income, with reference to those more vulnerable to the economic effects. In an investigation of income inequalities at the time of the pandemic, Stantcheva (2022) found that the poorest households were more exposed to unemployment shocks and experienced a decrease in their wealth, while high-income households increased their savings. These effects are likely to persist, resulting in long-term wealth inequalities. Evidence to support this finding is based on a number of studies in different countries, most of which are European (Almeida et al. 2021; Clark et al. 2021; Li et al. 2020; O' Donoghue et al. 2020; Martinez-Bravo and Sanz 2021; Palomino et al. 2020). In an analysis of the effect of the pandemic on household disposable income in the European Union, Christl et al. (2022) reported a large drop in market incomes for most EU countries, which was more pronounced for poorer households. The transmission of the shock to disposable income was eased significantly through tax-benefit systems.

In the United Kingdom, Angelopoulos et al. (2021) used a Bewley model in order to examine the effect of the pandemic on wealth accumulation of UK households. The crisis was modelled as an increase in labour income risk, a drop in mean income and an upper bound on consumption as witnessed in the pandemic lockdown period. The authors based their study on a short- and long-term recession scenario with a recovery in 2024 and 2027, respectively. For both scenarios, the increase in wealth inequalities persisted over time with two main drivers of inequality: The first was the labour income shock, which had a greater impact on low-income households, leading to a decrease in savings. The second relates to restrictions in consumption, which enabled high-income households to increase their savings. In an analysis of UK household-level health and socioeconomic vulnerabilities associated with the COVID-19 crisis, Mikolai et al. (2020) found that different dimensions of vulnerabilities intersected for many households. Financial and employment insecurities were especially common among single-parent households and working-age adult households with children. It must be noted that research on inequality and the COVID-19 crisis in the United Kingdom has pointed to a decline in disposable income inequality, which was associated with job-support programs and an expanded welfare system (Blundell et al. 2022). However, Stantcheva (2022) cautions that statistics pointing to declining income inequality for this period may be misleading in that the decrease could constitute a short-term phenomenon resulting from policy responses.

Adams-Prassl et al. (2020) examined the inequality of the distributions of job and income losses based on the type of employment held and on individual characteristics for the United Kingdom and the United States. They found that younger individuals and individuals without a university education were more likely to experience drops in income. Moreover, workers who were not able to work from home, were more likely to lose their job. In Norway, the financially vulnerable were more likely to suffer from a disproportionate pandemic effect (Alstadsæter et al. 2020). Cziriak (2022) reported that during the second wave of the pandemic in Germany, one in three households exhibited evidence of financial fragility in that they were unable to cover an unexpected expense of 2000 euros. Those most at risk included individuals with children, tenants, the unemployed or those with marginal employment as well as those with lower levels of income, wealth and education.

In an examination of exposure to COVID-related risks in the European Union, Bossavie et al. (2021) found that immigrant workers faced greater exposure to both income and health shocks associated with the pandemic in comparison to their native-born peers. This was especially the case for workers from lower-income countries in Eastern Europe or from countries outside the European Union. Additional factors appear to have increased the exposure to income and employment shocks during the COVID-19 pandemic. Young graduates were more likely to face problems in securing employment in many countries (Lambovska et al. 2021).

The pandemic has resulted in greater interest in the investigation of factors associated with financial vulnerability. In the context of the pandemic crisis, Midões and Seré (2022) used data from the ECB Household Finance and Consumption Survey (HFCS) to analyse financial vulnerability in seven EU countries. They found that about one in five individuals were vulnerable to a three-month income shock. Factors associated with greater vulnerability included being younger, a single parent, a woman and being born outside the EU.

Clark et al. (2021) used panel data from the COME-HERE survey in order to investigate income inequality during the pandemic in four European countries (France, Germany, Italy and Spain). They found that the negative impact was greater for some households, with the self-employed being more adversely affected. In an analysis of welfare resilience at the onset of the pandemic in four European countries (Belgium, Italy, Spain and the UK), Cantó et al. (2022) reported that around 40% of those affected by an earnings shock lived in a family with children. Of these, a high percentage ranging from 25% to 41% referred to individuals who were the only earners in the family. They reached the conclusion that the effects of the pandemic were asymmetric,

affecting some families more than others, despite government compensation policies and measures. Additional evidence from Belgium points to the pandemic-associated economic shock predominantly affecting employees with low wages (Marchal et al. 2021). There were differences in income effects based on whether they were estimated at the individual or the household level. At the individual level, those who had the largest decrease in disposable income were more likely to be highly educated, living in couples without children, and property owners. At the household level, the highest incomes losses were more likely for single people and tenants.

In Italy, Gallo and Raitano (2023) investigated the effects of the pandemic on income distribution in Italy. They used a static microsimulation model based on a link between EU-SILC 2017 data and INPS records. Based on the findings, market incomes largely decreased for both individual workers and households as a result of social distancing measures linked to the pandemic. The drop in labour income was greater for those in the poorest quantiles. However, emergency benefits were found to be effective in cushioning potential major increases in income poverty and inequality levels. Despite the effectiveness of policy measures, they draw attention to the risk of future increases in market and disposable income inequality after the end of the pandemic emergency.

Gambacorta et al. (2022) highlight the need of examining the expenditure side of households during the pandemic crisis in addition to the income side. Specifically, they draw attention to the expenditure side of European households, with reference to the share of household income constrained by major recurring payments used to meet rent and debt obligations.

In Cyprus, data on the economic impact of the COVID-19 pandemic point to a sizable effect based on the findings of the 1st and 2nd SHARE Corona Survey (Theodoropoulos and Voucharas 2021). Specifically, about one in three respondents lost their job, which is the highest rate after France and Greece. About 54% of respondents stated that they met their financial obligations with great or some difficulty.

Overall, existing studies on the economic impact of the COVID-19 pandemic point to several findings, which include the following: First, the pandemic had a dramatic effect on the income and the labour market outcomes of individuals and/or households in Western countries. This impact was cushioned to a great extent by policy interventions and associated fiscal measures. However, there is legitimate concern that the measures may have provided only short-term relief, especially to the more vulnerable groups. Second, the effect of the pandemic differed considerably based on individual and/or household characteristics. Those affected more severely were more likely to be

poor, single parents, in a family with children, self-employed, and the only earners in the family. Younger individuals and individuals without a university education were more likely to experience a decrease in income. Gender emerged as an important factor in relevant research as some studies found a negative effect on women's labour market outcomes (Adams-Prassl et al. 2020; Brodeur et al. 2021). Even though several studies have dealt with the impact of the pandemic on income and labour market outcomes, the degree to which COVID-19 was perceived as the main reason for income decreases by individuals and/or households has not been widely investigated.

3. Data

In this section, we describe the database used in the analysis, discuss some data limitations, and present descriptive statistics that outline some of the consequences of the COVID-19 crisis for the financial situation of households in EU countries.

3.1 Optional EU-SILC variables on change in household income

The data are obtained from Eurostat's European Union Statistics on Income and Living Conditions (EU-SILC), 2021 operation (Version 7). The EU-SILC survey collects cross-sectional and longitudinal data on income, poverty, social exclusion and other living conditions, which are comparable across European countries; the survey is carried out every year using a representative sample of the country's population that lives in private households.¹ Information is collected on a wide range of topics that cover, among others, person and household characteristics, health, labour market participation, living conditions, housing, income, and household debt. Information is obtained at individual (persons aged 16 and over) and household levels, depending on the topic.

The analysis in this paper uses cross-sectional data from EU countries covering the survey years 2020 and 2021.² The EU-SILC cross-sectional database includes an optional variable, collected in 2020 and 2019, on the change in household income compared to the previous year. As from 2021, this variable has been included in the core survey module and collected annually. The qualitative question on the change in income refers to the net total income of the household in the past 12 months, and allows three reply options namely, "increased", "remained more or less the same" and "decreased". Moreover, in the 2020 EU-SILC data, there is another optional variable

¹ The EU-SILC survey started in 2004 for the 15 EU member states (except Germany, the Netherlands and the United Kingdom) plus Estonia, Norway and Iceland; over the years, new member states and candidate countries have started the implementation of the survey. More information on EU-SILC is available at: <https://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions>

² In the descriptive analysis that follows, data from the 2019 survey are used for comparison purposes.

on whether the change in household income occurred as an impact of the COVID-19 crisis. The above variables are used as dependent variables in the investigation of factors associated with income changes during the pandemic crisis. As these variables are optional, the analysis is limited to a subset of EU countries with available data.

Table 1 presents the percentage of households that reported a decrease in their income compared to the previous year; the percentages are shown for the year before the COVID-19 pandemic (2019) and for the pandemic years (2020, 2021). The table also gives an idea of data availability across EU countries, which is especially sparse in 2020. For comparison purposes, Table 1 shows the annual percentage change in Gross Domestic Product (GDP), at current market prices, obtained from National Accounts. For most countries, the percentages of households that saw a decrease in household income rose significantly in 2020, as the countries' economies contracted sharply. In 2021, the European economies returned to growth, but the percentage of households that experienced income losses remained significantly elevated compared to the percentages registered before the pandemic. In 2020, the largest percentage of households that perceived a decline in income was registered in Cyprus; the percentage in Cyprus rose from 13% in 2019 to 39% in 2020. In 2021, Cyprus recorded again the highest proportion of households that reported income reductions (25%), followed by Greece (23%).

Figure 1 summarises the results of the optional EU-SILC question on whether the change in household income in 2020 occurred as an impact of the COVID-19 crisis. The graph shows the number of households that attributed the income decrease to the pandemic, as a percentage of all households that reported a change in their income in 2020 vis-à-vis 2019. Based on the countries with available data, it is evident that the pandemic played a key role in income contraction in 2020, as the vast majority of households that experienced income changes in 2020 attributed the decrease to the COVID-19 crisis. Out of those households that saw their incomes change in 2020, a significant percentage, ranging from 27% in Poland to 69% in Cyprus, ascribed the contraction in their income to the COVID-19 crisis.

TABLE 1
Change in household income and percentage change in GDP

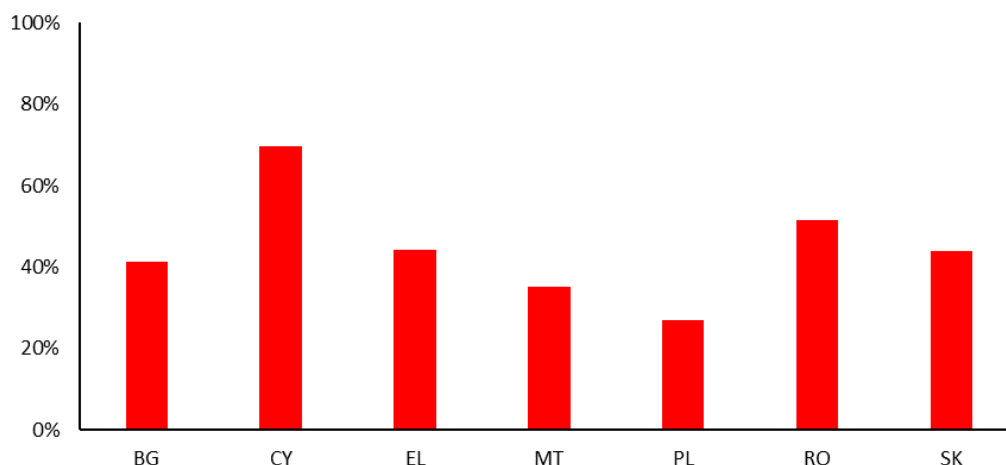
Country	Country code	Percentage of households that reported a decrease in income			Gross Domestic Product (current prices), percentage change		
		EU-SILC			National Accounts		
		2019	2020	2021	2019	2020	2021
Austria	AT	13%	18%*	21%*	3.1	-4.1	6.4
Belgium	BE	9%	10%	9%	4.0	-3.7	10.2
Bulgaria	BG	8%	18%*	16%*	9.5	0.1	15.3
Cyprus	CY	13%	39%*	25%*	6.9	-4.7	12.9
Czech Republic	CZ	NA	NA	13%	6.9	-4.3	10.4
Germany	DE	8%	NA	12%*	3.2	-2.0	6.3
Denmark	DK	NA	NA	16%	2.4	0.6	10.2
Estonia	EE	NA	NA	17%	7.8	-1.9	13.6
Greece	EL	6%	22%*	23%*	2.1	-10.0	10.0
Spain	ES	11%	NA	17%*	3.5	-10.2	9.2
Finland	FI	NA	NA	18%	2.7	-0.8	5.4
France	FR	NA	NA	22%	3.1	-4.9	8.0
Croatia	HR	NA	NA	12%	5.5	-9.4	15.7
Hungary	HU	7%	NA	NA	7.7	-5.9	11.7
Ireland	IE	NA	NA	20%	8.8	5.3	15.7
Italy	IT	6%	NA	10%*	1.4	-7.5	9.7
Lithuania	LT	NA	NA	14%	7.6	1.9	13.2
Luxembourg	LU	NA	NA	11%	3.8	3.4	12.1
Latvia	LV	NA	NA	22%	4.9	-1.5	10.8
Malta	MT	8%	22%*	20%*	9.5	-6.5	14.5
Netherlands	NL	16%	NA	15%	5.0	-2.0	9.3
Poland	PL	NA	14%	NA	6.7	-1.2	9.5
Portugal	PT	10%	17%*	16%*	4.5	-6.5	7.7
Romania	RO	3%	22%*	5%*	8.8	-1.6	9.6
Sweden	SE	NA	NA	16%	1.3	0.8	12.5
Slovenia	SI	8%	9%*	12%*	5.9	-3.2	11.1
Slovakia	SK	NA	20%	NA	5.1	-1.0	7.3
Average		8%	17%*	15%*	3.6	-3.9	8.7

Source: EU-SILC, Eurostat (Annual National Accounts) and authors' calculations.

Notes: In the case of EU-SILC data, "Average" represents the percentage computed from all countries with available data in the EU-SILC database; in the case of National Accounts "Average" represents the annual percentage change of GDP measured across the 27 EU countries. The symbol "*" denotes that the null hypothesis of equal percentages in 2020 (or 2021) and 2019 is rejected at the 1% significance level. The abbreviation "NA" denotes that the relevant data are not available in the EU-SILC database.

FIGURE 1

Decrease in household income in 2020 attributed to the COVID-19 crisis



Source: EU-SILC and authors' calculations.

Note: For the country codes, see Table 1.

Based on the above results on households' subjective opinions, it seems that the COVID-19 crisis had a particularly adverse effect on income perceptions in Cyprus, which is not fully reflected in GDP data. Other economies, with similar characteristics to the Cypriot economy, for example countries heavily reliant on tourism, such as Greece and Malta experienced a sharper contraction in nominal GDP in 2020 than Cyprus. However, households' opinions on income were more negative in Cyprus compared to perceptions recorded elsewhere. Thus, drawing on the recent literature we explore other aspects of households' financial conditions that may reflect difficulties during the pandemic. Such aspects relate to a household's ability to meet its financial obligations, particularly for items that form a large share of the household budget, for example rent or mortgage payments.

3.2 EU-SILC variables on financial hardship in households

The reduction in household income as a result of exogenous shocks is a direct measure of financial distress. A reduction in income limits a household's ability to make payments for goods and services, leading to financial distress. Unlike qualitative data on income change, quantitative information on household income is available with a delay with respect to the survey year. However, the EU-SILC survey regularly collects timely information on the capacity of households to cover main expenses, such as rent, mortgage, utility bills and hire purchase instalments. Next, we explore some EU-SILC variables that assess households' ability to fulfil financial obligations, and that function as indicators of financial distress (see, e.g., Anderloni et al. 2012; Gortz et al. 2023; Kuhnen and Melzer 2018).

More specifically, the EU-SILC survey collects data on whether households have been in arrears (i.e. unable to pay on time due to financial difficulties) on rent or mortgage payments for their main dwelling in the past 12 months. The respondents are given three reply options “yes, once”, “yes, twice or more” and “no”.

The percentages of households that were in arrears with rent or mortgage payments twice or more within 12 months are shown in Table 2, for the years during the pandemic and for 2019 as a benchmark. Moreover, for mortgagors, Table 2 shows the percentage of households that were late on their payments more than once within 12 months. On average, the percentage of households in arrears with rent or mortgage payments is low, and the pandemic crisis pushed the percentage up only in a limited number of countries. Before the pandemic (2019), Greece, Bulgaria and Cyprus were associated with the largest percentages of households in arrears, significantly deviating from the average. In 2020, the percentages of households in rent or mortgage arrears changed very little in most EU countries, except for Spain and Greece, where the percentage rose, and Bulgaria, Romania and Slovakia, where the percentage declined. In 2021, the proportion of households in arrears increased noticeably in Romania and Cyprus, while it declined significantly in Greece. In 2021, Romania, Cyprus and Spain ended up with a much higher percentage of households in arrears than that before the pandemic.

Focusing on the households that pay mortgage, the percentage of those in arrears in Cyprus, Romania and Spain registered a significant increase in 2021 compared to the year before the pandemic. Cyprus, followed by Greece, experienced the highest percentage of households with mortgage arrears in 2021, while the remaining countries registered considerably lower percentages. Cyprus and Greece are the only countries in which the arrears problem among households seems to be driven by mortgagors rather than renters.

The above results reveal that households in some EU countries have faced increased financial distress during the pandemic years, while in many other countries in the EU the indicators examined were broadly at their pre-pandemic levels by 2021. We therefore check the evolution of another qualitative, routinely collected EU-SILC variable that reflects households' perceptions of their financial condition.

TABLE 2
Arrears on mortgage or rental payments

Country code	Percentage of households in arrears on mortgage or rental payments (twice or more in the past 12 months)			Percentage of households in arrears on mortgage payments (twice or more in the past 12 months)		
	2019	2020	2021	2019	2020	2021
AT	2%	2%	2%	1%	2%	1%
BE	2%	2%	2%	1%	1%	0%
BG	11%	6%	7%	9%	6%	4%
CY	9%	8%	13%*	11%	11%	18%*
CZ	1%	2%	2%	0%	1%	1%
DE	0%	1%*	1%*	0%	1%	1%*
DK	2%	1%	1%	1%	1%	1%
EE	2%	1%	2%	1%	1%	2%
EL	16%	19%	13%*	25%	17%*	14%*
ES	5%	10%*	9%*	4%	5%*	6%*
FI	4%	5%	4%	2%	2%	1%
FR	5%	6%*	6%	2%	2%	1%
HR	6%	5%	7%	6%	4%	5%
HU	6%	5%	5%	4%	5%	5%
IE	8%	7%	8%	5%	4%	4%
IT	4%	5%*	5%*	2%	2%	2%
LT	5%	4%	1%*	5%	2%	1%*
LU	2%	2%	1%	0%	1%	0%
LV	6%	6%	5%	1%	2%	3%
MT	4%	4%	3%	1%	2%	2%
NL	2%	1%	1%	1%	0%	0%*
PL	2%	2%	NA	1%	1%	NA
PT	3%	3%	4%	2%	2%	3%
RO	8%	5%	15%	NA	0%	5%
SE	1%	2%	2%	0%	0%	0%
SI	6%	6%	6%	4%	2%	2%
SK	8%	3%*	NA	5%	2%*	NA
Average ¹	3%	4%	4%	2%	2%	2%

Source: EU-SILC and authors' calculations.

Notes: For the country codes, see Table 1. "Average" represents the percentage computed from all countries with available data in the EU-SILC database. The symbol "*" denotes that the null hypothesis of equal percentages in 2020 (or 2021) and 2019 is rejected at the 1% significance level. The abbreviation "NA" denotes that the relevant data are not available in the EU-SILC database.

Table 3 shows the percentage of households that replied that they were able to make ends meet (i.e. pay for the usual necessary expenses of the household) with difficulty or with great difficulty. The COVID-19 crisis affected very little the proportion of households that face financial distress, as the percentage stayed the same or declined in 2020 in most EU countries. In 2020, the percentage increased the most in Malta and Romania, by four and three percentage points, respectively. In 2021, the percentage in most countries was lower than or very close to its pre-pandemic level, while the

percentage for Malta recorded the largest increase vis-à-vis 2019 (three percentage points).

TABLE 3
Ability to make ends meet

Country code	Percentage of households that make ends meet with great difficulty or with difficulty		
	2019	2020	2021
AT	12%	10%*	10%*
BE	20%	18%*	17%*
BG	53%	46%*	40%*
CY	35%	26%*	25%*
CZ	14%	13%	12%*
DE	6%	6%	7%*
DK	10%	10%	9%
EE	12%	10%*	10%*
EL	69%	70%*	70%*
ES	21%	22%	21%*
FI	7%	7%	7%
FR	17%	18%	16%*
HR	39%	37%	31%*
HU	28%	28%	26%*
IE	17%	16%	15%*
IT	22%	23%*	24%*
LT	22%	20%*	15%*
LU	10%	12%	9%*
LV	29%	27%*	23%*
MT	12%	16%*	15%*
NL	12%	9%*	7%*
PL	18%	18%	NA
PT	26%	21%*	21%*
RO	34%	37%*	30%*
SE	8%	7%	7%
SI	20%	20%	14%*
SK	30%	30%	NA
Average	18%	20%	18%

Source: EU-SILC and authors' calculations.

Notes: For the country codes, see Table 1. "Average" represents the percentage computed from all countries with available data in the EU-SILC database. The symbol "*" denotes that the null hypothesis of equal percentages in 2020 (or 2021) and 2019 is rejected at the 1% significance level.

Nevertheless, this percentage exhibits a large variation across countries, ranging from 6% in Germany to 69% in Greece in 2019, and from 7% in some northern EU countries to 70% in Greece in 2021. Despite the small change in the percentage of households that faced difficulty in making ends meet during the pandemic crisis, countries with a much higher percentage than the average are associated with a high proportion of

households that fell into rent or mortgage arrears during the recent crisis. Countries with economic vulnerabilities before the pandemic, mirrored in relatively high percentages of households that make ends meet with difficulty and who are late on mortgage or rent payments, reported relatively high shares of households that perceived a decrease in income because of the COVID-19 crisis.

Although the EU-SILC survey collects detailed data on individuals' and households' income, the data refer to the year preceding the survey, and the most recent income reference period in the EU-SILC release used in the analysis is 2020.³ Thus, the optional, qualitative variable on the change in household income is more suitable for exploring the factors driving difficulties in the financial situation of households in 2020 and 2021, triggered by the pandemic crisis. The variables on mortgage and rental arrears are also used as dependent variables in the analysis to further explore the impact of various factors on the economic situation of households, as arrears data reveal increased financial distress during the pandemic crisis in some EU countries, most notably Cyprus.

4. Estimation results

In this section, we use binary response models to examine how demographic, socioeconomic and health-related factors affected the probability of financial hardship for households in the EU over the period 2020 and 2021. We employ alternative variables that reflect financial hardship, as discussed in the previous section, namely households' perceptions of a decrease in their disposable income, as well as rent or mortgage arrears for the main dwelling.

4.1 The model

The dependent variable, y , is binary, taking the value one if the household experienced financial hardship, and zero otherwise. Let x denote a vector of K explanatory variables, i.e. $x = (1, x_2, \dots, x_K)$, that includes household characteristics. The probability that one of the two outcomes occurs given the exogenous characteristics is expressed as follows:

$$P(y = 1|x) = F(x\beta) \tag{1}$$

³ Evidence from quantitative EU-SILC variables on income shows that in 2020 the median disposable household income before social transfers declined or stalled in most countries that experienced a recession in 2020. However, social transfers supported incomes in 2020, as the median disposable household income including transfers registered a smaller decline or a small increase compared to the median disposable income without the transfers.

where $x\beta = \beta_1 + \beta_2x_2 + \dots + \beta_Kx_K$ and $F(x\beta)$ denotes a cumulative distribution function, so that the response probabilities lie between zero and one.⁴ In the empirical application, the function $F(\cdot)$ takes the form of the standard normal distribution, so equation (1) gives rise to the probit model.

As equation (1) is a non-linear regression model, the marginal (or partial) effect of characteristic x_i on the response probability does not only depend on parameter β_i (as in the linear model) but varies with the values of all characteristics (vector x). The marginal effect when x_i is a continuous variable is given by

$$\frac{\partial P(y=1|x)}{\partial x_i} = f(x\beta) \beta_i \quad (2)$$

where $f(\cdot)$ is the standard normal density, corresponding to the choice of $F(\cdot)$. If x_K is a dummy variable that takes on the values one and zero (e.g. whether the household resides in an urban area), the marginal effect of a change in the binary variable x_K becomes

$$\Delta P(y = 1|x) = F(\beta_1 + \beta_2x_2 + \dots + \beta_K) - F(\beta_1 + \beta_2x_2 + \dots + \beta_i1 + \dots + \beta_{K-1}x_{K-1}) \quad (3)$$

The marginal effect is evaluated for each observation in the data and then the average of the individual marginal effects is computed. The parameters of the probability model in equation (1) are estimated using the maximum likelihood method. The standard errors of the estimated marginal effects are obtained using the delta method (see, for example, Wooldridge, 2002, ch. 15).

The effects of various demographic, socioeconomic and health-related factors on the probability of financial difficulties in households in Europe during the pandemic are estimated using probit models. The probit models are estimated using different dependent variables that indicate whether a household experienced some form of economic hardship in 2020 and 2021. The different dependent variables employed in the empirical analysis are summarised in Table 4.

⁴ Since y is a random variable that takes only two values (one or zero), the expected value of y is given by $E(y|x) = P(y = 1|x) = F(x\beta)$.

TABLE 4
Dependent variables in probit models

Dependent variable (y)	$y = 1$	$y = 0$
Change in net total income of the household compared to previous year	Decrease	Otherwise (no change or increase)
Decrease in household income due to the COVID-19 crisis (provided income changed)	Yes	No
Arrears on mortgage or rental payments for the main dwelling in the past 12 months	Yes, twice or more	Otherwise (no or only once)

4.2 Change in household income

Table 5 presents the marginal effects of various characteristics on the probability of a perceived decrease in income (second and third columns). In addition, Table 5 shows the marginal effects on the probability of a decrease in income specifically attributed to the COVID-19 crisis (last column). The set of characteristics considered includes demographic, socioeconomic and health-related variables for the household as a whole and/or for the household representative, i.e. the person responsible for responding to the survey questions concerning the household. If the dependent variable is available for both 2020 and 2021, we allow the estimated effects to differ between the two years.

Looking at the effects on the probability of a perceived income decrease (second and third columns), we can see that the susceptibility of households to income losses during 2020 and 2021 is closely linked to the employment profile of household members. This result is not surprising, as the lockdowns impacted, among other things, individuals' access to workplace, affecting different economic activities to a varying degree (e.g. complete shutdown, remote working, business as usual). Yet, during the pandemic crisis, governments implemented fiscal measures to support businesses and employment in adversely affected sectors.

The size of the household (number of people) positively affects the probability of income loss, but the age composition of household members also matters. The presence of older members and, to a smaller degree, the presence of school-age children lower this probability.

TABLE 5
Marginal effects of characteristics, decrease in household income

	Decrease in income		Pandemic-induced decrease in income
	2020	2021	2020
<i>Housing tenure [outright owner]</i>			
Owner paying mortgage	0.0048(0.0047)	0.0051(0.0048)	0.0278**(0.0119)
Tenant paying rent at market rate	0.0133**(0.0051)	0.0106**(0.0053)	0.0277**(0.0136)
Subsidised renter or free accommodation	-0.0101*(0.0053)	-0.0062(0.0054)	-0.0194(0.0123)
Household in urban area	0.0095***(0.0032)	0.0032(0.0034)	0.0519***(0.0076)
Household with migratory background	0.0320***(0.0121)	0.0010(0.0113)	0.1155*(0.0629)
Number of people in household	0.0246***(0.0028)	0.0184***(0.0030)	0.0258***(0.0056)
Number of household members aged 0 to 5	-0.0103***(0.0052)	-0.0091*(0.0055)	-0.0446****(0.0106)
Number of household members aged 6 to 14	-0.0264****(0.0041)	-0.0167****(0.0043)	-0.0257****(0.0086)
Number of household members aged 15 to 19	-0.0232****(0.0048)	-0.0186****(0.0051)	-0.0342****(0.0104)
Number of household members aged 70+	-0.0501****(0.0048)	-0.0631****(0.0052)	-0.0424****(0.0109)
Self-employed household members	0.1128****(0.0045)	0.1344****(0.0047)	0.2145****(0.0094)
Household members with temporary main job	0.0238****(0.0034)	0.0216****(0.0043)	-0.0041(0.0071)
Household members with part-time main job	0.0279****(0.0044)	0.0386****(0.0048)	-0.0159(0.0111)
<i>Economic activity of household members</i>			
Agriculture, forestry & fishing	-0.0407****(0.0057)	-0.0518****(0.0069)	-0.0125(0.0113)
Industry	-0.0129****(0.0043)	-0.0281****(0.0047)	0.0334****(0.0088)
Construction	-0.0058(0.0058)	-0.0300****(0.0064)	0.0481****(0.0124)
Wholesale & retail trade	-0.0040(0.0043)	-0.0156****(0.0047)	0.0385****(0.0092)
Transportation & storage	0.0105(0.0064)	0.0123*(0.0069)	0.0845****(0.0134)
Accommodation & food service activities	0.0703****(0.0055)	0.0904****(0.0060)	0.1900****(0.0135)
Information & communication	-0.0342****(0.0090)	-0.0546****(0.0100)	-0.0061(0.0202)
Financial & insurance activities	-0.0478****(0.0091)	-0.0698****(0.0097)	-0.0425***(0.0200)
Real estate, professional & other business activities	-0.0110***(0.0054)	-0.0206****(0.0057)	0.0525****(0.0119)
Public administration & defence	-0.0555****(0.0056)	-0.0627****(0.0060)	-0.0664****(0.0126)
Education	-0.0500****(0.0057)	-0.0573****(0.0062)	-0.0205(0.0130)
Human health & social work activities	-0.0403****(0.0056)	-0.0575****(0.0061)	-0.0452****(0.0129)
Other services	0.0000(0.0067)	0.0036(0.0069)	0.0996****(0.0167)
<i>Health status of household members</i>			
Chronic illness/condition	-0.0027(0.0028)	0.0024(0.0029)	-0.0253****(0.0065)
Very bad or bad self-perceived health	0.0039(0.0039)	-0.0008(0.0042)	-0.0285****(0.0096)
Limitation in activities due to health problems	0.0180****(0.0030)	0.0142****(0.0032)	0.0166***(0.0069)
Household representative: female	0.0040(0.0032)	0.0040(0.0034)	-0.0045(0.0076)
<i>Household representative: age [70+]</i>			
20 to 29	0.0274***(0.0118)	-0.0002(0.0127)	0.0148(0.0259)
30 to 39	0.0301****(0.0098)	0.0059(0.0105)	0.0728****(0.0220)
40 to 49	0.0308****(0.0092)	0.0099(0.0099)	0.0918****(0.0209)
50 to 59	0.0258****(0.0088)	0.0069(0.0095)	0.0583****(0.0203)
60 to 69	0.0043(0.0077)	-0.0003(0.0084)	0.0252(0.0179)

TABLE 5 continued

	Decrease in income		Pandemic-induced decrease in income
	2020	2021	2020
<i>Household representative: activity status [retired]</i>			
Unemployed	0.1634***(0.0072)	0.1778***(0.0076)	0.1426***(0.0174)
At work	0.0502***(0.0064)	0.0596***(0.0068)	0.1200***(0.0139)
Other, inactive	0.0324***(0.0071)	0.0388***(0.0078)	0.0580***(0.0153)
<i>Household representative: education [tertiary]</i>			
Primary	-0.0102(0.0065)	-0.0162***(0.0068)	0.0096(0.0158)
Lower secondary	0.0031(0.0060)	0.0053(0.0062)	0.0364***(0.0149)
Upper secondary	0.0052(0.0048)	0.0068(0.0049)	0.0125(0.0109)
Post-secondary non-tertiary	0.0279***(0.0085)	0.0288***(0.0091)	0.0068(0.0169)
<i>Household representative: occupation [professionals]</i>			
Armed forces occupations	0.0062(0.0170)	-0.0464***(0.0204)	-0.0299(0.0459)
Managers	0.0138*(0.0074)	0.0106(0.0076)	0.0225(0.0171)
Technicians & associate professionals	-0.0009(0.0063)	0.0075(0.0065)	0.0233(0.0144)
Clerical support workers	0.0030(0.0068)	-0.0092(0.0072)	0.0208(0.0158)
Service & sales workers	0.0151***(0.0062)	0.0148***(0.0064)	0.0459****(0.0139)
Skilled agricultural, forestry & fishery workers	-0.0177***(0.0084)	-0.0137(0.0092)	-0.0352*(0.0199)
Craft & related trades workers	-0.0064(0.0068)	0.0018(0.0072)	0.0143(0.0153)
Plant & machine operators & assemblers	0.0068(0.0075)	0.0049(0.0080)	0.0196(0.0166)
Elementary occupations	-0.0066(0.0071)	-0.0088(0.0076)	0.0031(0.0166)
<i>Household representative: consensual union [none]</i>			
Consensual union on a legal basis	-0.0084***(0.0039)	-0.0028(0.0042)	0.0152*(0.0087)
Consensual union without a legal basis	-0.0001(0.0070)	0.0074(0.0073)	0.0323*(0.0186)
<i>Country [EL, 2020]</i>			
AT	-0.0221****(0.0060)	0.0273***(0.0134)	NA
BE	-0.0890****(0.0061)	-0.0728****(0.0136)	NA
BG	-0.0044(0.0056)	0.0008(0.0132)	0.0631****(0.0137)
CY	0.1098****(0.0070)	0.0676****(0.0137)	0.2145****(0.0157)
EL	0.0000	0.0389****(0.0129)	0.0000
MT	0.0200****(0.0070)	0.0380****(0.0141)	-0.0262*(0.0143)
PL	NA	NA	-0.0713****(0.0109)
PT	-0.0196****(0.0050)	0.0081(0.0135)	NA
RO	0.0266****(0.0053)	-0.1436****(0.0141)	0.1392****(0.0121)
SK	NA	NA	0.0316(0.0200)
Number of observations	110412		15681
Percent of correctly classified	84%		75%
Log pseudolikelihood value	-43293		-7997
Pseudo R-squared	0.1258		0.2205

Notes: The table shows the marginal effects of characteristics obtained from the estimation of probit models by the maximum likelihood method; the corresponding standard errors based on the delta method are shown in parentheses. The symbols “*”, “**” and “***” denote statistical significance of marginal effects at the 10%, 5% and 1% level, respectively. The characteristics shown in squared brackets are used as the reference cases. The probit model for the probability of a perceived decrease in income is estimated by pooling the available observations from the 2020 and 2021 EU-SILC surveys, while allowing the effects of characteristics to differ between the two years. For the country codes, see Table 1.

Renters who pay market rate rents are associated with a higher probability of an income decline than homeowners. Moreover, households that resided in urban areas and those with a migratory background were more likely to experience income losses only in 2020, as these effects turned insignificant in 2021.

Age effects are statistically significant only for 2020. In 2020, households with representatives aged less than 60 were more likely to report a decrease in their income than those with older representatives. More importantly, in both years, the probability of a decrease in income is significantly higher for households with unemployed representatives than for those with representatives in retirement or at work. Across activity statuses, households with retired representatives, were the least likely to perceive a decline in their incomes.

Apart from unemployment, self-employment also raises the probability of a perceived income decline significantly. Likewise, a household's vulnerability to adverse income changes increases when there are household members whose main job is on a temporary (i.e. contract of limited duration) or part-time basis.

As the number of household members in employment goes up, the probability of a decrease in income tends to fall, regardless of the sector of economic activity. The only exception is employment of household members in accommodation and food service activities which significantly increases the probability of income losses in both 2020 and 2021, as this sector was the hardest hit during the pandemic crisis.

Looking at the education attainment of the household representative, the results show that only households with post-secondary (but not tertiary) education were adversely affected. No evidence that links lower education attainment with a higher probability of perceived income losses is found. Only very few occupation categories influence the probability of an income decline significantly. In both years, service and sales workers were more vulnerable to a decrease in income than other occupation categories. On the other hand, skilled agricultural workers are linked to a significantly lower probability of an income decrease than other categories in 2020, while armed forces occupations reduce the probability in 2021.

Only one out of the three health-related variables included in the model is found to significantly affect the probability of income loss. Households with members who felt that their usual activities had been hampered because of a health problem were more likely to perceive an income reduction.

A household's country affects the probability of a decrease in income significantly, and the estimated effects vary across countries as well as between the two years. In 2020,

households in Cyprus were associated with the largest probability of perceived income loss, followed by those in Romania and Malta; at the other end, households in Belgium were the least likely to report a decline in their income. In 2021, despite improvements in macroeconomic conditions, the probability of a perceived decline in household income increased compared to 2020 in some countries (Greece, Malta, Austria, Portugal), while households in Cyprus remained the most likely to perceive a decrease in their income.

Next, we focus on the effects of characteristics on the probability of a decrease in household income in 2020, when the decrease is specifically attributed to the COVID-19 crisis (Table 5, last column). The probability of a pandemic-induced decrease in income is generally influenced by the same characteristics as the probability of a perceived income decrease; some differences are observed with respect to the effects of housing tenure status, employment profile, education, and some health-related variables.

The probability of an income decrease because of the COVID-19 crisis is significantly higher not only for renters, as in the case of the probability of a decrease in income, but also for mortgagors. The presence of household members with a temporary or part-time main job does not seem to significantly impact the probability of pandemic-induced income loss, although temporary work and part-time employment increase the vulnerability of households to negative income shocks in general. The COVID-19 crisis significantly increased the probability of a reduction in household income for workers in the majority of economic sectors, most notably in contact-intensive sectors. Households with members employed in accommodation and food service activities, transportation, or the arts, entertainment and other personal services were the most likely to see their incomes decline as a result of the pandemic crisis. Across occupation categories, service and sales workers were the most susceptible to pandemic-induced income declines.

The presence of members with health-related problems in the household significantly increases the probability of pandemic-induced income loss only when members' usual activities were limited because of health issues. When household members reported suffering from chronic illnesses or provided a self-assessment of bad health, the probability is significantly lower, suggesting that the pandemic crisis did not result in a higher income vulnerability for households whose members had pre-existing health conditions.

Lower secondary education is associated with a higher probability of a pandemic-induced decrease in income than other education levels. While post-secondary (non-tertiary) education is linked to a higher probability of a decrease in income than other education categories, income losses due to the COVID-19 crisis were more likely for households with lower education.

Across countries with available data, households in Cyprus were the most likely to view the decrease in their income in 2020 as the result of the pandemic crisis. Households in Cyprus followed by those in Romania and Bulgaria emerged as the most vulnerable, as they were more likely than similar households in other EU countries to both perceive a decrease in their income in 2020 and attribute the decline to the COVID-19 crisis.

Other characteristics that significantly increase the probability of a decrease in income, such as residence in urban areas, migratory background, self-employment, and unemployment are also found to lead to a higher probability of a pandemic-induced decrease in income. Finally, households with older members (over 70 years old) were less likely to report a pandemic-induced decrease in their income than those with members of working age.

4.3 Economic hardship reflected in other variables

Next, we investigate how the various demographic, socioeconomic and health-related factors considered above influence the probability of economic hardship, using measures other than households' subjective assessments of income change. Economic or financial hardship arises when households' ability to meet payments, particularly for important components of the household budget, is limited. We focus on the ability of households to fulfil financial obligations relating to rent or mortgage during the COVID-19 crisis, to estimate the likelihood of economic hardship in EU countries.

Table 6 presents the marginal effects of characteristics on the probability that a household fell into arrears of rent or mortgage payments twice or more within a year. The results in Table 6 are based on households that pay rent (at market or subsidised rate) or mortgage for their main dwelling and therefore exclude households that are outright owners. However, the results in Table 6 are obtained from data that cover a larger set of countries than the estimates in Table 5. As the years 2020 and 2021 were marked by a considerable deviation from the normal functioning of the economy, the effects of characteristics on the probability may exhibit variations between the two years and are therefore allowed to vary.

Compared to subsidised renters, owners with a mortgage as well as renters at market rate are associated with a lower probability of arrears. Households with a migratory

background were more likely to be late on their rent or mortgage payments, particularly in 2020. The effects of the number of household members are positive and significant only for 2021, while only the number of school-age members tends to increase the probability of arrears for 2020. Households with older members are associated with a lower probability of overdue payments in both years. However, when members face health problems the likelihood of arrears rises.

The employment profile of household members significantly affects the probability of arrears in both years. More specifically, the presence of self-employed in the household and of members employed on a temporary or part-time basis (in their main job) increases the probability of arrears. Households whose members are in employment face a lower risk of falling into arrears, irrespective of the sector of economic activity. However, employment in accommodation and food services is not found to significantly reduce the probability of arrears in 2020, while it has only a weak negative effect in 2021. This finding reflects financial difficulties experienced by households with members employed in the hospitality sector, because of the lockdowns and travel restrictions implemented during the COVID-19 crisis.

The age of household representative does not yield significant effects on the probability of arrears during the pandemic period. There is some evidence that households with young representatives (less than 30 years old) were less likely than those with older representatives to fall behind on their payments in 2020. Nevertheless, other characteristics of the household representative such as activity status, education, occupation and marital status significantly influence the probability of rent or mortgage arrears. A household whose representative is unemployed faces a much higher risk of arrears than a household with a retired representative. Households with representatives at work are also linked to an increased probability of arrears compared to those with retired representatives, but they are not as exposed to arrears as households with unemployed representatives. The probability of rent or mortgage arrears is significantly higher for lower levels of education, particularly when the household representative attained only primary education. Relatedly, almost all occupation categories are associated with a higher probability of arrears than the category of professionals, which typically entails a high level of education attainment.

TABLE 6
Marginal effects of characteristics, arrears on mortgage or rental payments

	Arrears on mortgage or rental payments, twice or more	
	2020	2021
<i>Housing tenure [Subsidised renter]</i>		
Owner paying mortgage	-0.0172***(0.0024)	-0.0175***(0.0022)
Tenant paying rent at market rate	-0.0058***(0.0023)	-0.0072***(0.0022)
Household in urban area	-0.0008(0.0015)	-0.0006(0.0014)
Household with migratory background	0.0102***(0.0039)	0.0058*(0.0034)
Number of people in household	0.0015(0.0015)	0.0074***(0.0013)
Number of household members aged 0 to 5	0.0023(0.0023)	-0.0030(0.0020)
Number of household members aged 6 to 14	0.0075***(0.0019)	-0.0010(0.0016)
Number of household members aged 15 to 19	0.0061***(0.0022)	0.0023(0.0019)
Number of household members aged 70+	-0.0185***(0.0038)	-0.0222***(0.0036)
Self-employed household members	0.0138***(0.0023)	0.0196***(0.0020)
Household members with temporary main job	0.0122***(0.0013)	0.0175***(0.0017)
Household members with part-time main job	0.0097***(0.0019)	0.0093***(0.0017)
<i>Economic activity of household members</i>		
Agriculture, forestry & fishing	-0.0069*(0.0038)	-0.0217***(0.0042)
Industry	-0.0150***(0.0025)	-0.0200***(0.0022)
Construction	-0.0096***(0.0030)	-0.0162***(0.0028)
Wholesale & retail trade	-0.0107***(0.0024)	-0.0152***(0.0022)
Transportation & storage	-0.0074***(0.0033)	-0.0157***(0.0032)
Accommodation & food service activities	-0.0020(0.0028)	-0.0045*(0.0025)
Information & communication	-0.0163***(0.0047)	-0.0207***(0.0041)
Financial & insurance activities	-0.0327***(0.0061)	-0.0276***(0.0044)
Real estate, professional & other business activities	-0.0108***(0.0028)	-0.0141***(0.0024)
Public administration & defence	-0.0247***(0.0035)	-0.0304***(0.0031)
Education	-0.0136***(0.0033)	-0.0230***(0.0031)
Human health & social work activities	-0.0123***(0.0027)	-0.0225***(0.0025)
Other services	-0.0080***(0.0031)	-0.0115***(0.0028)
<i>Health status of household members</i>		
Chronic illness/condition	0.0039***(0.0014)	0.0013(0.0013)
Very bad or bad self-perceived health	0.0086***(0.0021)	0.0126***(0.0019)
Limitation in activities due to health problems	0.0109***(0.0016)	0.0088***(0.0014)
Household representative: female	-0.0010(0.0016)	-0.0030***(0.0015)
<i>Household representative: age [70+]</i>		
20 to 29	-0.0136***(0.0066)	-0.0083(0.0061)
30 to 39	-0.0026(0.0062)	-0.0030(0.0058)
40 to 49	-0.0040(0.0061)	-0.0014(0.0057)
50 to 59	0.0004(0.0060)	-0.0037(0.0057)
60 to 69	-0.0104*(0.0056)	-0.0044(0.0052)

TABLE 6 continued

	Arrears on mortgage or rental payments, twice or more	
	2020	2021
<i>Household representative: activity status [retired]</i>		
Unemployed	0.0382***(0.0037)	0.0413***(0.0035)
At work	0.0131***(0.0037)	0.0182***(0.0035)
Other, inactive	0.0157***(0.0037)	0.0231***(0.0034)
<i>Household representative: education [tertiary]</i>		
Primary	0.0195***(0.0033)	0.0186***(0.0030)
Lower secondary	0.0142***(0.0027)	0.0139***(0.0024)
Upper secondary	0.0103***(0.0023)	0.0078***(0.0020)
Post-secondary non-tertiary	0.0104**(0.0045)	0.0079**(0.0037)
<i>Household representative: occupation [professionals]</i>		
Armed forces occupations	0.0093(0.0098)	0.0197**(0.0091)
Managers	0.0121***(0.0045)	0.0144***(0.0038)
Technicians & associate professionals	0.0032(0.0034)	0.0113***(0.0028)
Clerical support workers	0.0114***(0.0037)	0.0067**(0.0033)
Service & sales workers	0.0221***(0.0032)	0.0208***(0.0029)
Skilled agricultural, forestry & fishery workers	0.0239***(0.0054)	0.0237***(0.0050)
Craft & related trades workers	0.0191***(0.0037)	0.0218***(0.0032)
Plant & machine operators & assemblers	0.0186***(0.0039)	0.0170***(0.0035)
Elementary occupations	0.0230***(0.0035)	0.0244***(0.0031)
<i>Household representative: consensual union [none]</i>		
Consensual union on a legal basis	-0.0174***(0.0022)	-0.0182***(0.0020)
Consensual union without a legal basis	-0.0081***(0.0028)	-0.0156***(0.0026)
Number of observations	139025	
Percent of correctly classified	96%	
Log pseudolikelihood value	-18076	
Pseudo R-squared	0.1936	

Notes: The table shows the marginal effects of characteristics obtained from the estimation of a probit model by the maximum likelihood method; the corresponding standard errors based on the delta method are shown in parentheses. The model is estimated by pooling the available observations from the 2020 and 2021 EU-SILC surveys, while allowing the effects of characteristics to differ between the two years. The symbols “*”, “**” and “***” denote statistical significance of marginal effects at the 10%, 5% and 1% level, respectively. The characteristics shown in squared brackets are used as the reference cases.

The effects of the country of residence on the probability of arrears are presented in the Appendix (Table A1, second and third columns). Households in all EU countries under consideration are associated with a significantly lower probability of arrears in 2020 than those in Greece. In 2021, the position of households in Greece improved vis-à-vis 2020, while the situation of households in Cyprus and Romania deteriorated considerably, as households in all other EU countries examined (including Greece) were significantly less likely to fall into arrears.

When the focus is exclusively on mortgagors, the bulk of which are found in households with members less than 70 years of age, the findings are in line with those

that emerged from the more general case of payment arrears relating to either rent or mortgage. Employment, education, health-related characteristics of household members as well as marital status affect the probability of mortgage arrears significantly (see, Table A2 in the Appendix). Specifically, the probability of mortgage arrears increases in the case of self-employment, a temporary main job, unemployment, lower levels of education and health problems. Even though the presence of household members in employment tends to reduce the probability of mortgage arrears, the effects are not significant for all economic activities. Households with members employed in accommodation and food services were more exposed to mortgage arrears than workers in other sectors. Moreover, households with members employed in the financial or public sectors seem to have faced a lower risk of overdue mortgage repayments compared to households with workers in other sectors.

Finally, looking at the country effects, in 2020, households in all EU countries analysed were associated with a significantly lower probability of arrears than those in Cyprus and Greece (see, Table A1 last two columns). In 2021, the situation of households in Cyprus deteriorated markedly, vis-à-vis 2020 and compared to all other countries in the sample. The likelihood of mortgage arrears also increased in Bulgaria in 2021, with the households in Bulgaria and Greece facing higher risk than those in all other countries considered except for Cyprus. In 2021, a household in Cyprus was much more likely to fall into mortgage arrears than a similar household in another EU country. Thus, households with mortgages in Cyprus, Greece and Bulgaria exhibited greater financial distress during the pandemic than those in other EU countries.

The economic hardship experienced by households in the above countries is also reflected in the increased probability of pandemic-induced income loss, discussed in section 4.2. However, these countries reported relatively high percentages of (i) households in arrears with housing payments (Table 2) and (ii) households having difficulty in making ends meet (Table 3) before the pandemic crisis (i.e. in 2019), indicating that the COVID-19 crisis possibly exacerbated already existing financial distress. The relatively high ratio of aggregate household debt to GDP in Cyprus (and to a smaller degree in Greece) could have also contributed towards the above result. Cyprus has the fourth highest household debt ratio in the EU, while the ratio for Greece is slightly above the median. Nevertheless, Denmark and Sweden have a higher aggregate household debt ratio than Cyprus but are found to be associated with a much lower probability of mortgage arrears, a finding also pointing to other factors affecting household distress. These factors may involve the size, type and

effectiveness of policy support measures across countries, the structure of the economies, as well as legal frameworks and institutions in different countries.

5. Discussion and conclusions

The COVID-19 crisis has propelled research efforts by academics and practitioners to the study of the economic effects of the pandemic, resulting in a growing literature. The findings of the recent literature show that low-income households suffered more severe economic effects because of the pandemic than those with higher incomes, and these effects on low-income households are likely to be long-lasting. The adverse economic effects of the pandemic, such as increases in poverty and inequality, have been alleviated by policy measures as indicated in various studies, yet concerns have been expressed over the longer-term consequences of the pandemic. As the COVID-19 shock was followed by the cost-of-living crisis shortly after, and then the tightening of monetary policy, economic hardship, particularly in lower-income or liquidity constrained households, is likely to be exacerbated.

This paper aims to cast light on the profile of households that faced increased probability of economic hardship during the COVID-19 crisis. Economic hardship is measured by perceived household income losses or arrears with major housing payments such as rent or mortgage. Despite the unprecedented support measures implemented across EU countries to mitigate the economic effects of the pandemic, we find that some groups, especially within working-age households, experienced increased likelihood of economic hardship, while older households with members in retirement were significantly less exposed to financial difficulties than younger ones. Households with self-employed or unemployed members were associated with increased vulnerability to the COVID-19 crisis, as well as those with a migratory background. The probability of economic hardship during the pandemic crisis rose with the number of people living in the household and the presence of members with health problems, particularly when their usual activities were hampered. Similar findings have been reported in other studies on the economic impact of the pandemic (see, e.g., Bossavie et al. 2021; Clark et al. 2021; Cziriak 2022; Mikolai et al. 2020).

Moreover, we find a significant role for the economic activity and occupation of household members in determining the probability of economic hardship. Households with members employed in the hospitality sector (accommodation or food service activities) or with service and sales workers are among the hardest hit by the pandemic crisis. The country of residence also influences the probability of economic hardship, with significant differences across EU countries. Cyprus and, to a lesser degree,

Greece, Romania, Bulgaria and Malta emerged as the most susceptible to the COVID-19 crisis among EU countries. Juxtaposing the above finding with aggregate unemployment data, we observe that Romania, Bulgaria, Malta, and to a smaller degree, Cyprus registered increases in the unemployment rate in 2020 that were larger than the EU average. Although unemployment fell in 2021, Romania and Cyprus ended up with higher unemployment rates than those recorded in 2019. Unemployment in Greece was the highest in the EU both before the pandemic (2019) and over 2020 – 2021, despite its downward trend during 2019 – 2021. Palomino et al. (2020) find that the increases in inequality and poverty because of government measures to contain the spread of COVID-19 (i.e. lockdowns and social distancing measures) are larger in Eastern and Southern European countries than in Central and Northern Europe. According to their estimates, Cyprus registers the largest wage losses for poor workers and the biggest increase in wage inequality. Their findings hinge on the ability of people to work during lockdowns and under social distancing measures, and ultimately on the production structure of a country's economy. For example, Palomino et al. (2020) estimated that Southern European countries experienced the highest levels of closed activities during the pandemic because their productive structure is relatively concentrated on hospitality and recreation services.

Our analysis shows that the economic hardship experienced by households during the COVID-19 crisis is not limited to income losses, but it is also reflected in households' ability to meet major housing payments like rent or mortgage. Also, economic difficulties faced by households were not isolated in 2020 but lingered in 2021, despite the recovery of economies, a finding that points to possible longer-term effects discussed in the literature and needs to be investigated further. For example, education losses due to lockdowns, which have affected disproportionately low-income and financially distressed households, will likely translate into lower education attainment, higher human capital inequality, and future employability disadvantage and thus future income losses (Betthäuser et al. 2022; Blagg 2021; Blundell et al. 2022).

The varied effects estimated across EU countries reflect a number of factors, including the production structure (e.g. degree of diversification across economic activities), the type and duration of the pandemic containment measures, as well as pre-pandemic structural or economic weaknesses (e.g. high unemployment). The estimated differences in the probability of economic hardship across countries indicate that the COVID-19 crisis may have created new or exacerbated pre-existing inequalities between EU countries. Moreover, differences in the likelihood of economic hardship

between economic activities and occupation categories may have impacted inequality within EU countries, with possible effects on social cohesion.

Finally, the increased vulnerability of Cyprus to the COVID shock as documented in the results of this analysis and in other studies (see, e.g. Brzyska and Szamrej-Baran 2021; Marti and Puertas 2021; Palomino et al. 2020) should raise the alarm about the capacity of households to respond to economic shocks and the longer-term consequences on economic well-being.

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Appendix

TABLE A1
Country effects on the probability of arrears on mortgage or rental payments

Country [EL 2020]	Arrears on mortgage or rental payments, twice or more		Arrears on mortgage payments, twice or more	
	2020	2021	2020	2021
AT	-0.0867***(0.0047)	-0.0796***(0.0093)	-0.0590***(0.0060)	-0.0509***(0.0092)
BE	-0.0849***(0.0041)	-0.0966***(0.0092)	-0.0767***(0.0061)	-0.0754***(0.0091)
BG	-0.0417***(0.0097)	-0.0395***(0.0126)	-0.0297***(0.0137)	-0.0242(0.0157)
CY	-0.0234***(0.0047)	-0.0032(0.0093)	-0.0025(0.0049)	0.0193**(0.0084)
CZ	-0.0858***(0.0054)	-0.0900***(0.0098)	-0.0656***(0.0073)	-0.0755***(0.0115)
DE	–	-0.0933***(0.0089)	–	-0.0537***(0.0080)
DK	-0.0918***(0.0049)	-0.1057***(0.0095)	-0.0691***(0.0063)	-0.0823***(0.0097)
EE	-0.0876***(0.0077)	-0.0726***(0.0102)	-0.0613***(0.0076)	-0.0486***(0.0095)
EL	0.0000	-0.0253***(0.0090)	0.0000	-0.0068(0.0080)
ES	-0.0406***(0.0028)	-0.0441***(0.0088)	-0.0374***(0.0034)	-0.0346***(0.0078)
FI	-0.0599***(0.0034)	-0.0746***(0.0089)	-0.0514***(0.0041)	-0.0594***(0.0083)
FR	-0.0570***(0.0032)	-0.0613***(0.0087)	-0.0483***(0.0042)	-0.0579***(0.0083)
HR	-0.0294***(0.0068)	-0.0283***(0.0105)	-0.0229***(0.0068)	-0.0182*(0.0096)
HU	-0.0452***(0.0055)	-0.0471***(0.0096)	-0.0323***(0.0056)	-0.0304***(0.0087)
IE	-0.0425***(0.0042)	-0.0462***(0.0091)	-0.0269***(0.0046)	-0.0268***(0.0083)
IT	-0.0602***(0.0036)	-0.0668***(0.0090)	-0.0620***(0.0057)	-0.0558***(0.0084)
LT	-0.0442***(0.0097)	-0.0747***(0.0137)	-0.0430***(0.0111)	-0.0456***(0.0112)
LU	-0.1036***(0.0110)	-0.0834***(0.0100)	-0.0848***(0.0127)	-0.0620***(0.0096)
LV	-0.0464***(0.0049)	-0.0471***(0.0096)	-0.0410***(0.0076)	-0.0360***(0.0099)
MT	-0.0569***(0.0060)	-0.0600***(0.0103)	-0.0365***(0.0069)	-0.0296***(0.0096)
PT	-0.0682***(0.0036)	-0.0689***(0.0092)	-0.0534***(0.0040)	-0.0473***(0.0082)
RO	-0.0538***(0.0137)	-0.0127(0.0130)	–	–
SE	-0.0944***(0.0051)	-0.0996***(0.0093)	-0.0788***(0.0067)	-0.0890***(0.0097)

Notes: The table shows the marginal effects of country dummy variables obtained from the estimation of the probit model presented in Table 6 and Table A2 (see Table 6 and Table A2 for more details). For the country codes, see Table 1. The observations for DE in 2020 were excluded as the data for some characteristics are not available. The observations for RO were excluded from the estimation of probit model for the probability of mortgage payments arrears, owing to the very small number of observations with $y=1$ (only four observations in 2021) that complicates the accurate determination of the effects.

TABLE A2
Marginal effects of characteristics, arrears on mortgage payments

	Arrears on mortgage payments, twice or more	
	2020	2021
Household in urban area	-0.0039*(0.0020)	-0.0039**(0.0017)
Household with a migratory background	0.0026(0.0088)	-0.0072(0.0078)
Number of people in household	0.0001(0.0018)	0.0059***(0.0015)
Number of household members aged 0 to 5	0.0039(0.0026)	-0.0061***(0.0023)
Number of household members aged 6 to 14	0.0060***(0.0021)	-0.0015(0.0018)
Number of household members aged 15 to 19	0.0047*(0.0024)	0.0001(0.0021)
Self-employed household members	0.0093***(0.0024)	0.0149***(0.0021)
Household members with temporary main job	0.0076***(0.0016)	0.0126***(0.0019)
Household members with part-time main job	0.0032(0.0023)	0.0048**(0.0020)
<i>Economic activity of household members</i>		
Agriculture, forestry & fishing	-0.0044(0.0042)	-0.0118**(0.0046)
Industry	-0.0067***(0.0026)	-0.0114***(0.0023)
Construction	-0.0013(0.0032)	-0.0076***(0.0029)
Wholesale & retail trade	-0.0029(0.0025)	-0.0076***(0.0022)
Transportation & storage	-0.0013(0.0033)	-0.0088***(0.0033)
Accommodation & food service activities	0.0031(0.0032)	-0.0042(0.0029)
Information & communication	-0.0076(0.0047)	-0.0092**(0.0041)
Financial & insurance activities	-0.0197***(0.0054)	-0.0189***(0.0042)
Real estate, professional & other business activities	-0.0042(0.0030)	-0.0090***(0.0027)
Public administration & defence	-0.0123***(0.0032)	-0.0202***(0.0029)
Education	-0.0050(0.0033)	-0.0139***(0.0031)
Human health & social work activities	-0.0054*(0.0029)	-0.0118***(0.0026)
Other services	-0.0064*(0.0037)	-0.0084***(0.0032)
<i>Health status of household members</i>		
Chronic illness/condition	0.0025(0.0016)	0.0010(0.0014)
Very bad or bad self-perceived health	0.0080***(0.0029)	0.0105***(0.0026)
Limitation in activities due to health problems	0.0087***(0.0018)	0.0065***(0.0016)
Household representative: female	0.0013(0.0020)	0.0018(0.0018)
Household representative: age [60 to 69]		
20 to 29	-0.0021(0.0065)	-0.0181***(0.0060)
30 to 39	0.0071(0.0043)	-0.0049(0.0034)
40 to 49	0.0042(0.0040)	-0.0069**(0.0031)
50 to 59	0.0124***(0.0038)	-0.0057**(0.0028)
<i>Household representative: activity status [retired]</i>		
Unemployed	0.0277***(0.0052)	0.0373***(0.0047)
At work	0.0088*(0.0050)	0.0192***(0.0045)
Other, inactive	0.0109**(0.0054)	0.0210***(0.0048)

TABLE A2 continued

	Arrears on mortgage payments, twice or more	
	2020	2021
<i>Household representative: education [tertiary]</i>		
Primary	0.0143***(0.0044)	0.0132***(0.0039)
Lower secondary	0.0112***(0.0032)	0.0124***(0.0028)
Upper secondary	0.0064**(0.0025)	0.0082***(0.0023)
Post-secondary non-tertiary	0.0096*(0.0049)	0.0054(0.0043)
<i>Household representative: occupation [professionals]</i>		
Armed forces occupations	0.0098(0.0099)	0.0221**(0.0093)
Managers	0.0020(0.0049)	0.0086**(0.0040)
Technicians & associate professionals	0.0055(0.0036)	0.0084***(0.0031)
Clerical support workers	0.0137***(0.0039)	0.0070**(0.0035)
Service & sales workers	0.0203***(0.0036)	0.0154***(0.0033)
Skilled agricultural, forestry & fishery workers	0.0206***(0.0063)	0.0160***(0.0061)
Craft & related trades workers	0.0174***(0.0043)	0.0172***(0.0037)
Plant & machine operators & assemblers	0.0195***(0.0045)	0.0138***(0.0041)
Elementary occupations	0.0178***(0.0044)	0.0189***(0.0039)
<i>Household representative: consensual union [none]</i>		
Consensual union on a legal basis	-0.0170***(0.0027)	-0.0180***(0.0024)
Consensual union without a legal basis	-0.0132***(0.0036)	-0.0143***(0.0033)
Number of observations	66962	
Percent of correctly classified	97%	
Log pseudolikelihood value	-6417	
Pseudo R-squared	0.2001	

Notes: The table shows the marginal effects of characteristics obtained from the estimation of a probit model by the maximum likelihood method; the corresponding standard errors based on the delta method are shown in parentheses. The model is estimated by pooling the available observations from the 2020 and 2021 EU-SILC surveys, while allowing the effects of characteristics to differ between the two years. The estimation sample consists of households with members aged less than 70. The symbols “*”, “**” and “***” denote statistical significance of marginal effects at the 10%, 5% and 1% level, respectively. The characteristics shown in squared brackets are used as the reference cases.