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# Welfare resilience at the onset of the COVID-19 pandemic in four European countries: Impact on public finance and household incomes

# Welfare resilience at the onset of the COVID-19 pandemic in a selection of European countries: Impact on public finance and household incomes

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## Executive summary

This paper assesses the impact on household incomes of the COVID-19 pandemic and governments' policy responses in April 2020 in four large and severely hit European countries: Belgium, Italy, Spain and the UK. We provide comparative evidence on the level of relative and absolute welfare resilience at the onset of the pandemic, by creating counterfactual scenarios using the European-wide tax-benefit model EUROMOD combined with COVID-related household surveys and timely labour market data. We find that income poverty increases in all countries due to the pandemic while inequality remains broadly the same. Differences in the impact of policies across countries arise from four main sources: the asymmetric dimension of the shock by country, the different protection offered by each tax-benefit system, the diverse design of discretionary measures and the differences in the household level circumstances and living arrangements of individuals at risk of income loss in each country.

## Acknowledgement

# 1   Introduction

The COVID-19 pandemic has led to a worldwide economic downturn worse than the one that characterised the 2008 Great Recession. The potential impact on GDP, although mostly unpredictable today without a clear knowledge of the further development of the health emergency, can lead to a massive slump in economic development (Dorn et al. 2020). The OECD's general estimates regarding the initial direct impact of shutdowns revealed that the level of output would correspond to a decline in annual GDP growth of around 2 percentage points for each month of shutdown (OECD 2020a). Focusing on the situations faced by workers, the International Labour Organization estimated initially a rise in global unemployment of between 3% and 13%, with underemployment expected to increase on a large scale and the decline in economic activity and travel limits impacting both manufacturing and services (ILO, 2020).

To limit the spread of the virus governments across Europe restricted or even completely shut down many economic activities. Often only key essential sectors such as health care and food retail were allowed to remain open. These containment measures resulted in unprecedented demand and supply shocks. Financial markets reacted with a sharp increase in volatility and a fall in asset prices. In the second quarter of 2020, compared to the first one, GDP fell drastically in all four countries – by 11.8% in Belgium, 13% in Italy, 17.9% in Spain and 18.8% in the UK – making them some of the worst affected countries economically in Europe.[1]

The picture described above, as well as the lessons of previous recessions such as the one of 2008, suggest that the downturn due to the COVID-19 pandemic will overshadow European economies for years to come, through a legacy of unemployment, public debt and long-lasting impacts on household incomes (Jenkins et al., 2013). As Saez and Zucman (2020) rightly point out, governments "can prevent a very sharp but short recession from becoming a long-lasting depression" by acting as the payer of last resort: providing insurance to the affected workers and making sure that cash flows to idle workers and businesses immediately. Governments across Europe indeed swiftly reacted to the economic impact of the health shock by adjusting existing welfare policies or even introducing completely new ones. These policies were often innovative and introduced at a much larger scale compared to the policy responses to the 2008 Great Recession  (Moreira & Hick, 2021).

In light of these policy responses, this paper assesses the welfare resilience of household incomes during the pandemic in a cross-country perspective. In particular, we analyse the extent to which the tax-benefit systems of four large and severely hit European countries - Belgium, Italy, Spain and the UK - provided income stabilisation for those who lost (all or part of) their earnings as a consequence of restrictions to economic activities.

The countries studied in this paper have experienced high levels of infection rates and many deaths in their populations. Italy was the European country that experienced the first sudden outbreak at the end of February 2020. Subsequently, within the first half of March 2020, both Spain and Belgium started to follow a rapid increase in infections and deaths and by the end of March 2020 that was also happening in the UK. At the end of 2020, the four countries

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[1] See Eurostat's indicator "GDP and main components (output, expenditure and income) [NAMQ_10_GDP]".

registered some of the highest numbers of deaths per million inhabitants in Europe (OECD/European Union, 2020).

We focus on the impact in the first month of the COVID-19 pandemic (April 2020) as the lockdown was in most countries the most strict at that time. Focussing on a single month has some clear advantages for measuring welfare resilience to an unexpected shock. First, it is easier to identify who was affected by the shock in each country (i.e. losing working hours or/and income) as this is directly linked to the national rules of the shutdown and also to each country's labour market structure. Second, it allows for an evaluation of both country-specific short-term stabilizers and emergency national measures before any of the EU-level initiatives to cushion the shock kicked in.

We measure the amount of income insurance that individuals and their households received from the welfare state in April 2020, effectively providing a measure of the resilience of welfare systems at the beginning of the crisis. A comparative perspective across the most severely hit countries is warranted as cross-country differences in welfare resilience may be considerable. Indeed, Dolls et al. (2012) show that automatic stabilizers differ greatly across countries, particularly in the case of asymmetric shocks. Moreover, in the European context, there exists an important variation in income stabilisation mechanisms of taxes and benefits, with some countries, especially in Southern Europe, that are very poorly designed to face times of emergency. Besides the automatic stabilisers, also the discretionary policy measures introduced by many European governments to support the most vulnerable (OECD, 2020b) differ across countries, but the efficacy of these policies has still to be assessed empirically.

Note that the possibilities for empirical analysis are constrained by the lack of up-to-date information on household incomes and labour market circumstances, which usually only become available a few years after the economic shock and only in a limited number of countries. To address this limitation, we assess the impact of the economic lockdown on household income by simulating counterfactual scenarios with a fiscal microsimulation approach (Figari et al., 2015).

First, we attempt to identify the workers affected by the lockdown by using up-to-date information in each country, either derived from COVID related surveys or legislation, to predict for each worker the unemployment or furlough probability taking into account their activity sector and socio-demographic characteristics. Second, for these individuals who are expected to have lost (part of) their earnings we use EUROMOD to estimate their household income, considering the direct cushioning effect of the tax-benefit system which depends on the remaining household market income as well as personal and household characteristics. It is important to note that we do not consider other aspects such as the reduced likelihood to get a job for those who are looking for one and the wider consequences of macroeconomic feedbacks. The use of microsimulation models to consider how welfare systems protect people against an extreme shock is known as a "stress test" of the tax-benefit system (Atkinson, 2009) and has become increasingly popular in analysing consequences of the Great Recession as shown for instance by Fernandez Salgado et al. (2014) and Jenkins et al. (2013).

A key feature of our analysis is that it provides a first cross-country analysis of the initial impact of the COVID-19 pandemic on household incomes, taking into account the interaction between the country-specific economic shocks and the national policy responses. In particular, cross-country variations in the budgetary and distributional consequences of the

shutdown depend on (1) the asymmetric dimension of the shock in each country, (2) the different levels of protection offered by the tax-benefit systems, (3) the diverse design of discretionary measures and (4) the differences in the household level circumstances and living arrangements of individuals at risk of income loss in each country.

The paper is structured as follows. Building on a review of the most up-to-date contributions appeared in the literature, we highlight the main motivations to exploit such an approach in Section 2. There we describe the tax-benefit model EUROMOD; simulations of the labour market shocks and the characteristics of those affected by earnings losses in the different countries considered; and the indicators we apply to capture the resilience of welfare systems in both relative and absolute terms. The most relevant features of the policy measures included in the analysis are described in Section 3. Empirical evidence on the size and distribution of earnings losses and compensations offered by the countries' tax-benefit systems is presented in Section 4. Section 5 shows the differing degrees of relative and absolute resilience. In Section 6 we conclude, summarise the main findings and suggest future improvements in light of ongoing developments as data is made available.

## 2    Literature review and empirical methodology

As Clark et al. (2020) have recently underlined, we observe fast-growing literature on the impact of lockdowns on well-being (e.g. Brodeur et al., 2021, Layard et al., 2020), on labour market participation (e.g. Adams-Prassl et al., 2020), on the levels of unemployment or underemployment (e.g. Guven et al., 2020) and gender equality (e.g. Alon et al., 2020, Farré et al., 2020) in a variety of countries worldwide.

Regarding the distributional consequences of the pandemic, Clark et al. (2020) and Belot et al. (2020) provide a cross-country comparative perspective exploiting two specific surveys undertaken in different countries at a time. The first one uses longitudinal high-frequency information on household disposable income in five European countries (France, Germany, Italy, Spain and Sweden) run by the University of Luxembourg starting at the end of April 2020 and the second one uses cross-section data from China, Japan, South Korea, Italy, the UK and the US also for April 2020. However, the data do not allow to distinguish the impact of the labour income shock versus the extent to which the tax-benefit systems and discretionary policies have provided household income stabilisation.

Several country-specific studies specifically focus on the impact of welfare measures on household disposable income: Beirne et al. (2020) and O'Donoghue et al. (2020) on Ireland, Brewer and Gardiner (2020) and Brewer and Tasseva (2020) on the UK, Bruckmeier et al. (2020) on Germany, Figari et al. (2020) on Italy, Li et al. (2020) on Australia and Marchal et al. (2021) on Belgium. Nevertheless, using the results of different country-specific analyses to compare the levels of welfare resilience to a shock is a very difficult task because authors use diverse strategies to simulate the impact of the shock on household incomes and analyse different indicators of resilience.

Almeida et al. (2020) start from the macroeconomic scenarios included in the European Commission Spring 2020 forecasts and translates the changes in several aggregate variables present in the macroeconomic scenarios into changes at the individual level by reweighting

individual observations. This reweighting strategy is useful but has a main drawback as it assumes that the newly unemployed or furloughed have similar characteristics as those observed in the data and does not adjust to real sector-specific unemployment changes due to lockdown. Additionally, given that they do not explicitly simulate compensation schemes but use reweighting to take them into account, the potentially heterogeneous effect of these schemes across the income distribution is not considered.

We depart from the above-mentioned studies by applying the so-called stress-testing methodology to the tax-benefit systems to assess the impact on household incomes of the government responses at the onset of the COVID-19 pandemic (March/April 2020) in Belgium, Italy, Spain and the UK. Our contribution is novel in that we provide timely cross-country comparative evidence on the distributional impact of COVID-19 and the governments' policy responses, adopting a fully individual micro-level analysis comparable across countries.

## 2.1 Stress-testing the tax-benefit systems

The COVID-19 pandemic and the containment measures taken created a sudden economic shock with a direct impact on the labour market participation of individuals, and hence on household incomes. To inform policy learning, it is essential to provide timely analysis to assess the success of the existing as well as emergency tax-benefit and earnings compensation schemes in protecting household incomes. The fiscal literature refers to the first as automatic stabilizers and the latter as discretionary policies (Paulus and Tasseva, 2020). Unfortunately, micro-data on household incomes during the pandemic will only become available with a few years lag. To address this data limitation, we simulate labour market COVID-19 shocks, and predict household incomes during the crisis, by combining a tax-benefit model with different sources of household micro- and/or macro-data.

Our methodology follows closely the approach to stress-test the welfare state. Stress-testing is commonly used to assess the vulnerability of portfolios in financial institutions and the resilience of the financial systems to the extreme, but plausible shocks (Jones et al., 2004). Atkinson (2009) suggests extending the approach to tax-benefit systems to assess their resilience to major economic downturns. Stress-testing can be applied to assess the effects of either hypothetical or contemporary shocks for which no household micro-data are yet available. Thus, we follow the latter (contemporary shocks) option and build on the work by Fernandez Salgado et al. (2014), who analyse the income compensation provided by the welfare state to newly unemployed at the onset of the Great Recession. Bruckmeier et al. (2021) is a recent application of the same approach implemented through a combination of data and models on firm output expectations, labour demand and individual level policies.

For the individuals affected by the simulated shocks, we analyse how much of the loss to their labour income is cushioned by the existing fiscal policies – i.e. automatic stabilizers – in each country in the form of (a) income taxes and social insurance contributions, (b) contributory benefits for those who lost their earnings (if entitled), (c) other means-tested benefits and tax credits designed to protect families on a low income, and (d) other household incomes, in the form of earnings of those still in work as well as capital incomes, pensions and benefits, received by other household members. In addition, we capture the distributional effects of

the discretionary policies that governments have implemented to prevent the sudden fall in household income.

With our stress-testing approach, we focus on the direct compensation provided by the tax-benefit system and earnings compensation schemes and abstract from other adaptive changes in individuals' and their family members' behaviour in the short or long term. We focus exclusively on the loss of earnings as one of the channels through which the COVID-19 pandemic directly affects individual well-being. The overall effect of the pandemic on income distribution is likely to be affected by general equilibrium consequences and other behavioural responses. However, individuals and households directly affected by earning loss suffer to a large extent and it is important to assess the extent to which the welfare system helps to stabilise their income, and whether there are specific weaknesses in the policy instruments in operation.

## 2.2   Counterfactual scenario derived using EUROMOD

We make use of household micro-data and a tax-benefit microsimulation model to estimate baseline household incomes, i.e. before COVID-19, and counterfactual household incomes during the first month (March/April 2020) of the pandemic.

To derive our baseline scenario of the pre-COVID income distribution, we use household micro-data from the Statistics on Income and Living Conditions (SILC) for 2018 (with 2017 incomes) for Belgium, Italy and Spain and from the Family Resources Survey (FRS) for 2018/19 for the UK. Both the SILC and FRS include very rich information on individual and household characteristics and incomes and are broadly representative of the national population before the onset of the pandemic. The financial values of the income data are uprated to 2020 to account for the average growth in earnings and statutory indexation of public pensions and disability benefits between 2017/2018 and 2020. We do not make any adjustments for changes in the population composition between 2017/2018 and 2020. We then combine these data on gross (pre-tax) market/original incomes with the European-wide tax-benefit model EUROMOD which calculates for each individual/household in the sample their social insurance contributions (SIC), income tax liabilities and benefit entitlements, as well as their disposable income, based on the 2020 pre-COVID-19 tax-benefit rules.

To the extent it is relevant in each country, EUROMOD baseline simulations are corrected for income tax evasion (Italy) and benefits non-take-up (UK, Belgium) and we assume there are no changes in the tax evasion and benefit take-up behaviour as a consequence of the shock.

For more information on EUROMOD, see Sutherland and Figari (2013) and the EUROMOD Country Reports (Assal et al., 2020 for Belgium; Ceriani et al., 2020 for Italy; Navas Román and Villazán Pellejero, 2020 for Spain; and Reis and Tasseva, 2020 for the UK) for the details on the policies simulated.

To derive our counterfactual scenario we simulate unemployment and earnings shocks to the workers in the SILC and FRS samples. These shocks resemble the COVID-19 shocks that occurred in the first month of lockdown in each country. The shocks simulations are informed by the most up-to-date (at the time of writing) and detailed information on the labour market changes in each country, based on: external micro-data from the Corona Study for Belgium;

information on the economic sectors enforced to shut down by the national laws in Italy; the Labour Force Survey and aggregate statistics from the social security registers for Spain; the Understanding Society COVID-19 Study for April 2020 for the UK. To simulate the shocks as accurately as possible, we apply somewhat different approaches in each country, taking into account differences in the types of shock and available data. Despite differences in the approaches, in all four countries, we focus explicitly on modelling changes to (self-) employment and earnings and household incomes, which allows us to draw consistent and meaningful cross-country comparisons.

In more detail, we apply the following approaches to simulate the COVID-19 labour market shocks.

In **Belgium**, we identify affected individuals by calculating the propensity of workers to become temporarily unemployed or to have to shut down their self-employment activities. The characteristics that define this propensity are derived from an analysis of the Corona study, a survey that tracks the experiences of households during the lockdown and its aftermath. The propensity is calibrated against administrative data on the share of employees receiving a temporary unemployment benefit or a bridging right for self-employed in April, by sector, age group and gender. More details on the method used can be found in Marchal et al. (2021).

In **Italy**, we identify workers in the economic sectors at 6-digit ATECO level that were listed in the Decree-Law imposing the shutdown of economic activities.[2] Although SILC microdata lack information on business activities at 6-digit level, we draw on other detailed available statistics released by Istat (namely, the operating firms' archive (ASIA), the national labour force survey (RCFL) and National Accounts) to compute the occupation shares in each sector subject to shut down. We then randomly select the individuals, with a positive income source from either employment or self-employment. We perform this selection by sector of employment at 2-digit ATECO level, which we relate to data in EUROMOD to get the same occupation shares subject to the shutdown. Details can be found in Figari et al. (2020).

In **Spain**, we estimate the propensity of active male and female adults to become unemployed using the 2018 Spanish Labour Force Survey (SLFS) by age, education, civil status, household type, immigrant origin, activity status, industry or sector, occupation, region. We then use the estimated coefficients from the probit model to predict the probability of an unemployment outcome for each employed individual in the SILC sample. We then randomly assign each individual to one of the outcomes (unemployment or employment) respecting these probabilities. We then order individuals by sector and region and according to this random assignment we are able to calibrate our numbers by the real impact of the shock using Social Security Registers for March and April 2020 by sector (12 categories) and region (7 categories). Moreover, we randomly select workers entering furlough by sector of activity and region and calibrate against administrative data the share of employees or self-employed receiving a temporary unemployment benefit in April.

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[2] (Decree Law of the Minister of Economic Development which updates the DPCM 22/3/2020 available here https://www.gazzettaufficiale.it/eli/id/2020/03/26/20A01877/sg )

In the **UK**, we use data from the April 2020 wave of the Understanding Society COVID-19 Study (UKHLS hereafter) which contains information on individuals' labour market status and earnings in February 2020 (before COVID-19) versus April 2020 (after COVID-19). We first estimate two multinomial logit models on the UKHLS data – one on the sample of employees and another one on the sample of self-employed, both with positive earnings in February 2020. The model for employees has four outcomes: 1) unemployed, 2) furloughed, 3) still employed but with reduced hours and earnings, 4) still employed and with no drop in earnings. Similarly, the model for self-employed has three outcomes: 1) no longer engaged in self-employment, 2) still self-employed but with reduced hours and earnings, 3) still self-employed and with no drop in earnings. In both models, we control for a range of individual and household-level characteristics, including age, sex, industry, household type, baseline earnings ventile groups and number of working hours in bands by sex. We then take the estimated coefficients from the models and apply them on the sample of FRS workers with positive earnings, to predict the probability of each labour market outcome for each worker. We randomly assign each worker to one of the outcomes, accounting for these predicted probabilities. For detailed information on the methodology and estimates from the multinomial logit models, see Brewer and Tasseva (2020).

Finally, using EUROMOD, we apply the tax-benefit rules as of March/April 2020 on the data with modified workers' earnings to compute SIC, taxes, benefits, earnings compensation schemes and household disposable incomes during the first month of the COVID-19 crisis. By comparing the baseline and counterfactual, we estimate the impact on household incomes of the crisis and governments' fiscal policies. We discuss the tax-benefit and earnings compensation schemes in more detail in section 3.

## 2.3    The characteristics of those affected by earning loss

The analysis focuses on employed and self-employed individuals who lost (all or part of) their earnings in the immediate aftermath of the COVID-19 outbreak, ranging from 20% in Spain to around 30% in Belgium and Italy and 37% in the UK (Table 1).

Around 40% of those affected by an earnings shock live in a family with children, pointing to the need to have welfare systems that protect not only workers but their dependent family members as well. Moreover, the share of those being the only earner in the family is relatively high ranging from around 25% in Spain and the UK to 32% in Belgium and 41% in Italy: for their families, the temporary shutdown of their activities implies the loss of the main income source.

The distribution of those affected by an earnings shock by household income quintile groups (assessed before the earnings loss) shows an increasing pattern despite important differences across countries. There are relatively fewer individuals affected in the first quintile in Belgium, the UK and Italy than in Spain where the distribution across quintiles is more uniform.

**Table 1. Characteristics of those affected by earnings losses**

|  | Belgium | Italy | Spain | UK |
|---|---|---|---|---|
| *Workers affected by earnings losses %* | 30.28 | 28.88 | 19.85 | 37.46 |
|  |  |  |  |  |
| *Presence of children %* | 41.5 | 39.05 | 38.75 | 41.89 |
|  |  |  |  |  |
| *Number of earners in the family %* |  |  |  |  |
| 1 | 31.75 | 40.73 | 26.77 | 24.22 |
| 2 | 56.11 | 44.15 | 51.65 | 54.09 |
| 3+ | 12.14 | 15.11 | 21.59 | 21.69 |
|  |  |  |  |  |
| *Household income quintile %* |  |  |  |  |
| Bottom | 8.50 | 13.64 | 15.01 | 11.63 |
| 2nd | 17.76 | 15.39 | 19.80 | 16.83 |
| 3rd | 22.65 | 20.93 | 21.29 | 21.98 |
| 4th | 25.44 | 24.74 | 23.11 | 25.82 |
| Top | 25.66 | 25.31 | 20.79 | 23.75 |

Notes: Summary statistics for those affected by earnings losses as identified in EUROMOD data. Quintile groups based on equivalised household disposable income in the baseline.
Source: Own calculations with EUROMOD version I3.0+.

## 2.4   Income stabilisation indicators

Following Fernández Salgado et al. (2014), we focus on three indicators measuring the relative and absolute resilience provided by the tax-benefit policies and earnings compensation schemes during the pandemic. These indicators are the Net Replacement Rate, the Compensation Rate and changes to the Poverty Rate.

The Net Replacement Rate is a measure of relative resilience and captures the level of income stabilisation with respect to the baseline income (Immervoll and O'Donoghue, 2004). It is computed on the sample of workers affected by the shock and equals:

$$\text{Net Replacement Rate} = \frac{Y_{post}}{Y_{pre}}$$

where $Y_{pre}$ and $Y_{post}$ are equivalised household disposable income in the baseline and after the shock, respectively. Household disposable income is made up of the sum of gross (pre-tax) original income (i.e. earnings from (self-)employment, private pensions, private transfers, income from rent and investment income) and public benefits minus taxes (i.e. income taxes plus SIC). To account for household composition and economies of scale within the household, household incomes are equivalised using the modified OECD equivalence scale (a value of 1 for the head, 0.5 for any other adult aged 14+ and 0.3 for each child aged <14).

To measure the level of income protection provided by the different policies, we break down the Net Replacement Rate by income source:

$$\text{Net Replacement Rate} = \frac{O_{post} + B_{post} - T_{post}}{Y_{pre}}$$

where $O_{post}$, $B_{post}$ and $T_{post}$ are equivalised household original income, public benefits and taxes, respectively, after the shock. We also break down further $B_{post}$ into the different benefit types to show explicitly the contribution of (1) the earnings compensation schemes, (2) unemployment benefits and (3) means-tested and other benefits (e.g. housing and social assistance benefits).

The Net Compensation Rate is another indicator of relative resilience which captures the level of protection offered by fiscal policies. It is also computed on the sample of workers affected by the COVID-19 shocks and measures the proportion of net earnings lost due to the crisis, compensated by public benefits net of taxes, as follows:

$$\text{Net Compensation Rate=}\frac{\left(B_{post} - B_{pre}\right) - \left(T^*_{post} - T^*_{pre}\right)}{\left(E^*_{post} - E^*_{pre}\right)},$$

where $B_{post}$ and $B_{pre}$ are equivalised household public benefits, $T^*_{post}$ and $T^*_{pre}$ are taxes liable on the worker's earnings and $E^*_{post}$ and $E^*_{pre}$ are the worker's earnings net of taxes, respectively after and before the shock. Thus, the denominator captures the loss in *net* earnings due to the shock, while the numerator shows how much of this loss is absorbed by more generous benefit entitlements and/or lower taxes. The Net Compensation Rate allows us to isolate the net government support, abstracting from the income insurance provided by the gross original income of other household members. As with the Net Replacement Rate, we break down further the Net Compensation Rate to show the contribution of benefits by type.

Our indicator of absolute resilience is the change in the Poverty Rate due to the shock measured against a *fixed* poverty threshold, i.e. 60% of the median baseline equivalised household disposable income. We look at poverty changes among different subgroups (workers affected by the shock and children) versus the total population. Our approach of using a poverty threshold fixed to the baseline income distribution follows the suggested practice to measure poverty during an economic downturn with a poverty line fixed in real terms (Jenkins et al., 2013). It allows capturing the drop in living standards that individuals face, by comparing their current circumstances with their situation before the income shock (Matsaganis and Leventi, 2011). A normative judgment about the appropriate level of income protection provided by the welfare state is beyond the scope of this paper (Boadway and Keen, 2000). Nevertheless, given the overarching policy objective of limiting the number of individuals at risk of poverty, it is implicit that household incomes should not fall below the poverty threshold as a result of the crisis.

Finally, when interpreting the results it should be noted that our main indicators – the Net Replacement Rate, Compensation Rate and changes to Poverty Rate among workers affected by the shock – are measured on the sample of workers affected by the COVID-19 shocks only and thus, results are not affected per se by the numbers of individuals affected by the shock. In comparison, the proportion of affected workers matters for total population estimates of the budgetary costs and changes to income poverty and inequality.

## 3 Income protection policies during COVID-19

The existence in all European countries of a developed welfare state, that is intended, among other things, to protect people and their families against economic shocks is one of the main differences between the crisis faced today and that of the 1930s. However, the sudden and unexpected shock due to the COVID-19 pandemic forced European governments to adapt existing measures and to define new discretionary and bold measures to support those who are bearing a disproportionate share of the economic burden (OECD, 2020a)

Table 2 provides a summary of the most important measures implemented in April 2020 in our selection of countries. All four countries took similar provisions to safeguard incomes of employees, though the design, the size and scope are somewhat different. In what follows we refer to "Earnings Compensation Schemes" to identify the different instruments (e.g. furlough schemes, subsidies to self-employed, …) in place in each country to protect employment and self-employment incomes (Konle-Seild, 2020).

Starting with the provisions for employees, the most important measure in Belgium was the extension of access to the so-called system of temporary unemployment to all employees ('*Tijdelijke werkloosheid COVID-19*', a furlough-type measure); previously, the system was only accessible for economic conditions or under 'force majeure', but under COVID-19 a much broader definition was applied and the application procedure considerably simplified, causing most employees from impacted employers to be eligible. Benefit generosity was increased on the one hand by raising the replacement rate from 65% to 70% of the previous monthly wage (with lower and upper bounds) and on the other hand by providing a daily supplement of 5.63 euro. The daily benefit ranges from a minimum of 55.59 euro up to a maximum 74.71 euro and is paid according to a six-day workweek. In April a withholding tax of 26.75% was applied at source. Alternatively, unemployed workers can get the existing contributory unemployment benefit.

To compensate the earning loss suffered by the employees in Italy, the government extended with the Decree-Law 18/2020 ("Cura Italia") the existing furlough scheme (i.e. *Cassa Integrazione Guadagni*, CIG) relaxing the eligibility conditions and allowing most of the employees to be entitled to the scheme. Only domestic workers and consultants (i.e. *parasubordinati*) are not eligible. The wage compensation scheme provides a replacement of 80% of earnings subject to a maximum cap: if monthly earnings are below 2,160 euro, CGI cannot exceed 940 euro, while if earnings are above the threshold the CGI is capped at 1,130 euro. This implies that in practice the replacement rate can be substantially below 80% for most workers. Transfer payments are subject to income taxes. The same Decree-Law imposes that firms cannot fire employees after February 23, 2020: this implies that existing Unemployment Insurance Schemes do not apply to the generality of workers but only to those with temporary contracts that reach the end during the COVID-19 pandemic.

In Spain, the Contributory Unemployment benefit (*Prestación por desempleo*) and the Temporary unemployment subject to administrative approval (*Expediente de Regulación Temporal de Empleo* a furlough-type measure) also protect a replacement rate of 70% with

lower and upper bounds. Similarly to the Belgian case, this temporary unemployment system was already in place but was only accessible for economic conditions or under 'force majeure', but under COVID-19 a much broader definition was applied and the application procedure was considerably simplified, causing most employees from impacted employers to be eligible. The benefit can range between 502 euro and 1,411 euro per month.

To support business and workers in the UK, the government introduced the Coronavirus Job Retention Scheme to subsidise earnings of furloughed employees. The scheme allows employers to reduce employees' working hours to zero, without laying employees off and thus, reducing the costs of searching and re-hiring workers later on. In April 2020, this scheme pays 80% of gross earnings up to a maximum of £2,500 per month. In the case of a job loss, employees who have previously paid SIC are entitled to the contributory unemployment benefit Jobseeker's Allowance (JSA).

Belgium, Italy and Spain also set up provisions for the self-employed (the UK Self-employment Income Support Scheme was introduced from May 12 onwards and is hence not considered in this analysis ). In Belgium, this was done through an extension of access to the so-called bridging right ('*Overbruggingsrecht*'). It entails a lump-sum transfer of 1,291.69 euros per month for self-employed without dependent family members (or 1,614.10 euros for self-employed with dependent family members). Amounts are halved for those self-employed whose activity is a secondary one and whose yearly income ranges between 6,996.89 euros and 13,993.77 euros. To compensate the earning loss incurred by the self-employed in Italy, the government defined a new lump-sum transfer of 600 euro to be paid for March to all self-employed, irrespective of whether they incurred a loss or not. The self-employed in specific professional bodies (e.g. lawyers, accountants, notaries, etc.) are eligible for the lump-sum transfer only if their 2019 income was below 35,000 euro. The transfer is not subject to income tax and does not enter in any means-test of other benefits. In Spain, a contributory unemployment benefit for the self-employed was already in place since November 2010. The Spanish government, however, set up additional provisions for the self-employed through a temporary unemployment benefit linked to the COVID-19 crisis. This benefit has the aim to protect earnings of those self-employed who did not have enough contributions (12 months before shock) to be eligible for the contributory unemployment benefit. Both benefits provide protection through a replacement rate of 70% with lower and upper bounds.

In Italy, employees bound to continue work on company premises and those who cannot typically work from home are entitled to a lump-sum transfer of 100 euro to be paid for March. Estimates show that 50% of employees working in the economic sectors that are not subject to the shutdown still work on company premises (Fondazione Studi Consulenti del Lavoro, 2020). The transfer is not subject to income tax and does not enter in any means-test of other benefits.

Except for income tax which is generally lower due to the lower level of earnings the rest of traditional automatic stabilizers embedded in the tax-benefit systems operate in a different way across countries.

Social insurance contributions (SSCs) paid by employees and self-employed fall because of the losses to earnings and because either they are based on the amount of benefits which is lower than the earnings as in the UK or because they are credited by the government (and as such not accounted for in this analysis) as in Belgium and Italy. The exception is Spain, where only employer SSCs are credited by the government and workers, are still paying contributions on the same base as with previous earnings.

The existing income-tested benefits in Italy (i.e. the bonus IRPEF, Family allowances and the Citizenship income) and Spain (i.e. the Regional minimum income schemes - *Rentas Mínimas*) are based on the income and means-test of the previous fiscal year – or at least previous months – and thus, do not react immediately to the loss of earnings experienced in March/April 2020. In contrast, in the UK, entitlements to the income-tested benefits are calculated based on 'current' incomes and circumstances, allowing them to compensate families immediately for the income losses they are experiencing. Low-income families and/or unemployed individuals can also receive support from the main means-tested benefit Universal Credit (UC) which consists of a standard allowance and additional allowances depending on family circumstances. Before COVID-19, UC and JSA paid the same amount to single individuals aged 25+ of £323 per month. In response to the pandemic, the UK government increased UC standard allowance by £20 per week which was a significant increase in relative terms of 28% for singles aged 25+ and 17% for couples. Access to UC for self-employed was also relaxed. The UC allowance which supports families paying their rent and Housing Benefit (HB) were made more generous by increasing the Local Housing Allowance Rates used to calculate benefit entitlements. Income support is also provided to low-income families by other means-tested benefits such as Working Tax Credit (WTC) and Council Tax Reduction (CTR). The basic allowance of WTC was increased by £20 per week in line with UC. Finally, the earnings disregard for HB and CTR was increased making benefits more generous. Noteworthy, the increased benefit generosity in the UK will have an impact not only on the incomes of families affected by the COVID-19 shocks but also on those already claiming benefits before the pandemic. In Belgium, no changes occurred to the means-tested social assistance benefit scheme in the immediate aftermath of the lockdown. Eligibility for the benefit depends on current need (and assets). In principle, social assistance can act as a top-up to those who saw their income decrease under the social assistance threshold.

In addition to the policies listed in Table 2, other policies have been taken, but these are not included in the simulations mainly due to data unavailability. Examples of these are: in Belgium the reduction of unemployment benefits was suspended. In Italy, the government allowed employees in the private sector with children up to 12 years old to take parental leave for 15 days at 50% of the earnings' level or, alternatively, to have a babysitting bonus of 600€ (incremented to 1000€ for those working in the health system). In Spain, there was rent payment help, as well as an extra subsidy for domestic workers and temporary workers. In addition, we do not consider the suspension of mortgage payments on the main residence in Belgium, Italy and Spain because these policies involve only a change in the timing of payment with potential effects on lower than usual interest rates for these payments.

**Table 2. Governments responses to the COVID-19 pandemic (simulated policies only)**

| Belgium | Italy | Spain | United Kingdom |
|---|---|---|---|
| Earnings compensation schemes - employees | | | |
| Temporary unemployment benefit [*Tijdelijke werkloosheid – COVID-19*]<br><br>Existing scheme extended to all employees<br>Up to 70% with min and max (2084€) | Temporary unemployment benefit [*CIG = Cassa Integrazione Guadagni]*<br><br>Existing scheme extended to most employees<br>Up to 80% with max (1130€) | Temporary unemployment benefit [*ERTE = Expediente de Regulación Temporal de Empleo].*<br><br>Existing scheme<br>Up to 70% with min and max (1411€) | Coronavirus Job Retention Scheme<br><br>New scheme<br>Up to 80% with max (£2,500) |
| Earnings compensation schemes - self-employed | | | |
| Bridging right [*Tijdelijke crisismaatregel overbruggingsrecht* ]<br><br>Existing scheme extended<br>Lump-sum benefit (1262\1614€) | *Lump-sum transfer [Bonus 600€]*<br><br><br><br>New scheme<br>Lump-sum benefit (600€) | Temporary unemployment benefit *[Prestación extraordinaria por cese de actividad COVID-19].*<br>New scheme<br>Up to 70% with min and max (1411€) | n/a |
| Unemployment benefits | | | |
| Contributory unemployment benefit for employees *[Werkloosheidsverzekering]* | Ban for firms to lay off employees | Contributory unemployment benefit for employees *[Prestación por desempleo]*<br><br>Contributory unemployment benefit for self-employed *[Prestación económica cese de actividad de trabajadores autónomos].* | Contributory unemployment benefit for employees [contribution-based Jobseeker's Allowance] |
| Other schemes | | | |
| Social assistance benefit *[Leefloon – Recht op maatschappelijke Integratie]* | Lump-sum transfer (100€) to employees working at their firms' premises. | | Universal Credit (main allowances increased by £20 per week, rent component increased); Working Tax Credit (main allowances increased by £20 per week), Housing Benefit (increased, earnings disregard increased by £20 per week), Council Tax Reduction (earnings disregard increased by £20 per week) |

Notes: Authors' elaborations based on national legislation. See the EUROMOD Country Reports for details.

## 4 Budgetary effects and distributional changes

We first show the simulated fiscal cost of the main income protection schemes acting in each country at the onset of the pandemic. We then assess the impact of COVID-19 and the policy responses on household gross (pre-tax) original and disposable income and the share of gainers and losers, on average for the whole population and by income quintile groups of pre-COVID incomes. Finally, we analyse the impact of the crisis on income inequality.

Table 3 reports the simulated costs and the number of entitled individuals for each measure compared with the available figures from administrative statistics. Several caveats need to be considered as the comparison between simulated and administrative figures is particularly challenging due to the lack of availability of administrative figures at the same detailed level and for the same period as produced by EUROMOD, i.e. March/April 2020, the first month of the pandemic. Nevertheless, this comparison of the available figures shows the generally high level of external validity of our simulations, in particular related to the main simulated instruments.

Overall the resources dedicated to compensating income losses of individuals and families for the first month of the pandemic crisis range from 0.30% of annual GDP in Spain to 0.51% in the UK, showing large disparities in the resources allocated to the crisis, but in line with differences in the share of workers affected by the labour market shocks as shown in Table 1.

Across countries, the measures that absorb most resources are the earnings compensation schemes for the employees, followed by the new instruments introduced to sustain self-employed incomes. Substantial resources are also devoted to the increased generosity of the existing means-tested benefits in the UK and the payment of contributory unemployment benefits in Spain.

**Table 3. External validity of simulations of schemes (EE=employees; SE=self-employed)**

| Country & Policy | Simulations | | | Administrative data | |
|---|---|---|---|---|---|
| | Cost | | Entitled | Cost | Entitled |
| | billions | % of annual GDP | thousands | billions | thousands |
| **Belgium** | | | | | |
| Earnings compensation scheme – EE | 1.3 | 0.26 | 1,117 | 1.3 | 1,170 |
| Earnings compensation scheme – SE | 0.4 | 0.08 | 278 | 0.57 | 405 |
| **Italy** | | | | | |
| Earnings compensation scheme – EE | 4.8 | 0.27 | 5,566 | n.a. | 5,500 |
| Earnings compensation scheme – SE | 1.9 | 0.11 | 3,230 | 2.4 | 3,955 |
| Lump-sum transfer (100€) | 0.6 | 0.03 | 5,968 | n.a | n.a. |
| **Spain** | | | | | |
| Earnings compensation scheme – EE | 2.4 | 0.20 | 2,788 | 2.5 | 2,381 |
| Earnings compensation scheme – SE | 0.7 | 0.06 | 1,036 | 1.2 | 1,138 |
| Unemployment benefit – EE | 0.5 | 0.04 | 424.6 | n.a. | n.a. |
| Unemployment benefit – SE | 0.04 | 0.00 | 57.3 | n.a. | n.a. |
| **UK** | | | | | |
| Earnings compensation scheme – EE | 10.4 | 0.46 | 7,305 | n.a. | 8,787 |
| Unemployment benefit | 0.2 | 0.01 | 0.6 | n.a | n.a. |
| Universal Credit | 0.9 | 0.04 | 5,380 | n.a. | 5,260 |

Notes: Costs and entitlements refer to one-month payments (March\April 2020). Amounts are expressed in euros in Belgium, Italy and Spain; in pounds in the UK. GDP for 2019 based on Eurostat data (online data code: TEC00001). "Earnings compensation scheme – EE" includes Temporary unemployment in Belgium, CIG and lump sum benefit in Italy, ERTE in Spain, Coronavirus Job Retention Scheme in the UK. "Earnings compensation scheme - SE" includes Bridging right in Belgium, Lump sum transfer in Italy, Temporary unemployment for SE in Spain. In the UK, the simulated number of entitled to the 'Earnings compensation scheme – EE' refers to the number of furloughed employees, while the administrative data refers to the number of employments.

Source: Simulations based on own calculations with EUROMOD I3.0+. Administrative data from different national sources. Details available from the authors upon request.

Overall, the one-month shutdown at the beginning of the COVID-19 crisis implied a loss of original income of around 0.51% of annual GDP (6 billion euros) in Spain, 0.64% (3 billion euros) in Belgium, 0.89% (16 billion euros) in Italy and 0.96% (22 billion pounds) in the UK. With such a loss of original income, governments lost substantial amounts of income tax revenue and social security contributions (including both employer and employee contributions) which act as automatic stabilizers, reducing their burden on the shoulders of the individuals who experienced an income loss. The main exception is represented by Spain where workers, while receiving the benefits, pay contributions calculated on the previous "contribution base" as defined while at work. Despite additional resources transferred as state benefits ranging from 0.29% of annual GDP in Spain to 0.52% in the UK, the loss of disposable income for families is between 4% and 5% of the disposable income before the shock in Belgium, Italy and Spain and around 8% in the UK.

**Table 4. Income changes due to the COVID-19 and governments' policy responses**

| Income source | billions | % of annual GDP | % change |
|---|---|---|---|
| **Belgium** | | | |
| Original income | -3.0 | -0.64 | -18.39 |
| Social security contribution: employer | -0.5 | -0.12 | -15.36 |
| Social security contribution: employee & self-employed | -0.4 | -0.09 | -19.09 |
| Income tax | -0.4 | -0.08 | -8.22 |
| State benefits | 1.7 | 0.35 | 25.76 |
| Disposable income | -0.6 | -0.12 | -3.67 |
| **Italy** | | | |
| Original income | -15.9 | -0.89 | -25.97 |
| Social security contribution: employer | -3.4 | -0.19 | -25.96 |
| Social security contribution: employee & self-employed | -1.7 | -0.09 | -25.87 |
| Income tax | -2.8 | -0.15 | -16.19 |
| State benefits | 8.0 | 0.45 | 27.84 |
| Disposable income | -3.4 | -0.19 | -5.15 |
| **Spain** | | | |
| Original income | -6.3 | -0.51 | -15.66 |
| Social security contribution: employer | -1.5 | -0.12 | -15.60 |
| Social security contribution: employee & self-employed | -0.1 | -0.01 | -3.54 |
| Income tax | -0.8 | -0.06 | -10.90 |
| State benefits | 3.6 | 0.29 | 25.41 |
| Disposable income | -1.8 | -0.15 | -4.11 |
| **UK** | | | |
| Original income | -21.8 | -0.96 | -23.53 |
| Social security contribution: employer | -0.9 | -0.04 | -13.34 |
| Social security contribution: employee & self-employed | -1.1 | -0.05 | -13.97 |
| Income tax | -2.5 | -0.11 | -14.21 |
| State benefits | 11.7 | 0.52 | 68.3 |
| Disposable income | -6.5 | -0.29 | -7.65 |

Notes: Income changes refer to one-month (March-April 2020) shutdown. Amounts are expressed in euros in Belgium, Italy and Spain; in pounds in the UK. GDP for 2019 based on Eurostat data (online data code: TEC00001). Source: Own calculations with EUROMOD I3.0+.
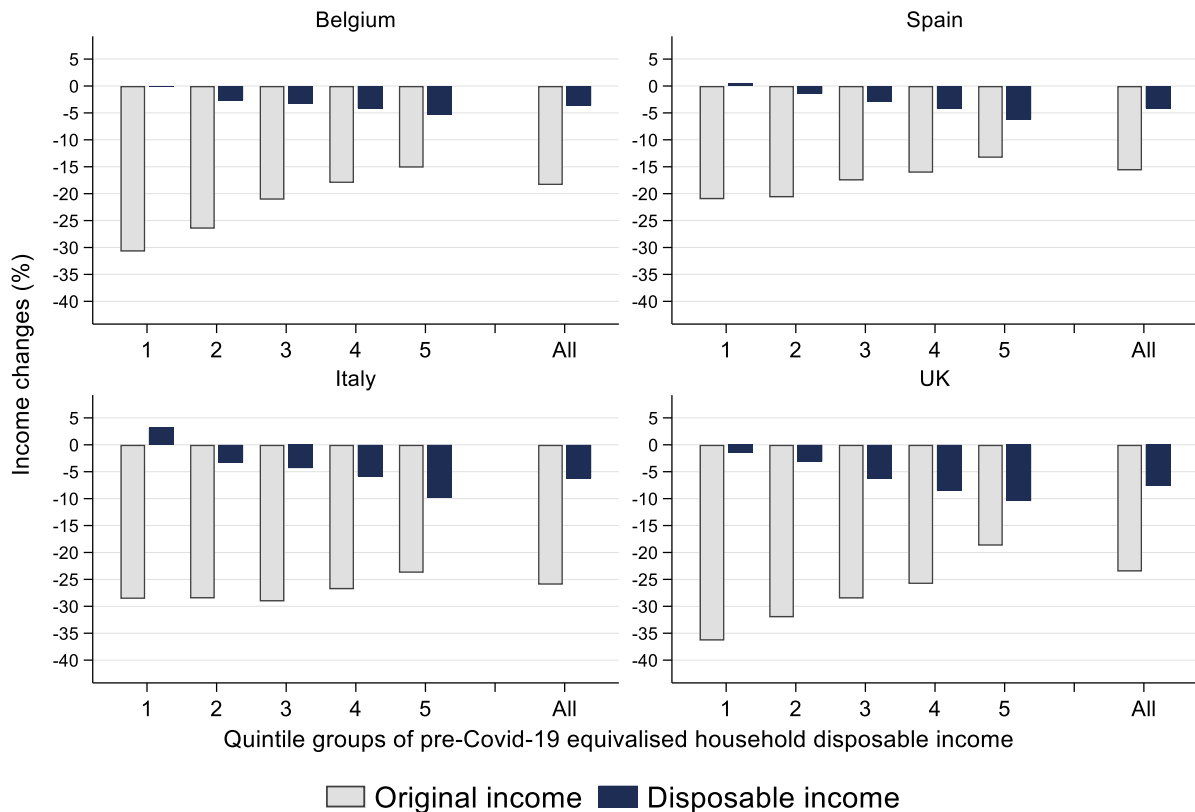
Figure 1 shows the percentage change in average original and disposable income due to the crisis with respect to the baseline (pre-COVID-19), for the whole population as well as by quintile groups of pre-COVID-19 household incomes. A negative (positive) change means a loss (gain) to income. On average for the whole population, in all four countries, both original and disposable income fell substantially, with the loss to original income being several times larger than the loss to disposable income. The drop to original income ranges from -15% in Spain to more than -25% in Italy while the drop to disposable income is from around -3% in Belgium and Spain to -5% in Italy and -7% in the UK.

Along quintiles groups, we see the unequal distribution of income losses. Consistently across countries, original income losses are more pronounced at the bottom of the distribution. On

average, those in the first (poorest) quintile group lose more than 35% of their original income in the UK, around 30% in Belgium and Italy and 20% in Spain. Those in the top (richest) quintile group lose around 25% in Italy, 20% in the UK, 15% in Belgium and around 13% in Spain. This is in part because one-earner families are more concentrated at the bottom of the distribution and the pandemic causes the loss of their main source of original income. Along the income distribution, families are characterised by more earners and other income sources (e.g. property and capital income) which act as self-insurance.

In contrast to original income, changes in disposable income show the opposite pattern, with the largest losses at the top of the income distribution in all four countries, of around -10% in Italy and the UK and -5% in Belgium and Spain. In the bottom quintile, we find a small loss to the disposable income of around -1% in the UK, no change in Belgium and Spain and a small income gain of +3% in Italy. The differences in the changes between original and disposable income come from the contribution of tax-benefit policies which offset the large falls in earnings. We explore these in more detail in Section 5.

**Figure 1. Income losses due to the COVID-19 and governments' policy responses, by household income quintile groups.**



Notes: Changes (in %) in equivalised household original and disposable income due to COVID-19 and governments' policy responses. Income quintile groups are based on the pre-COVID-19 distribution of equivalised household disposable income.
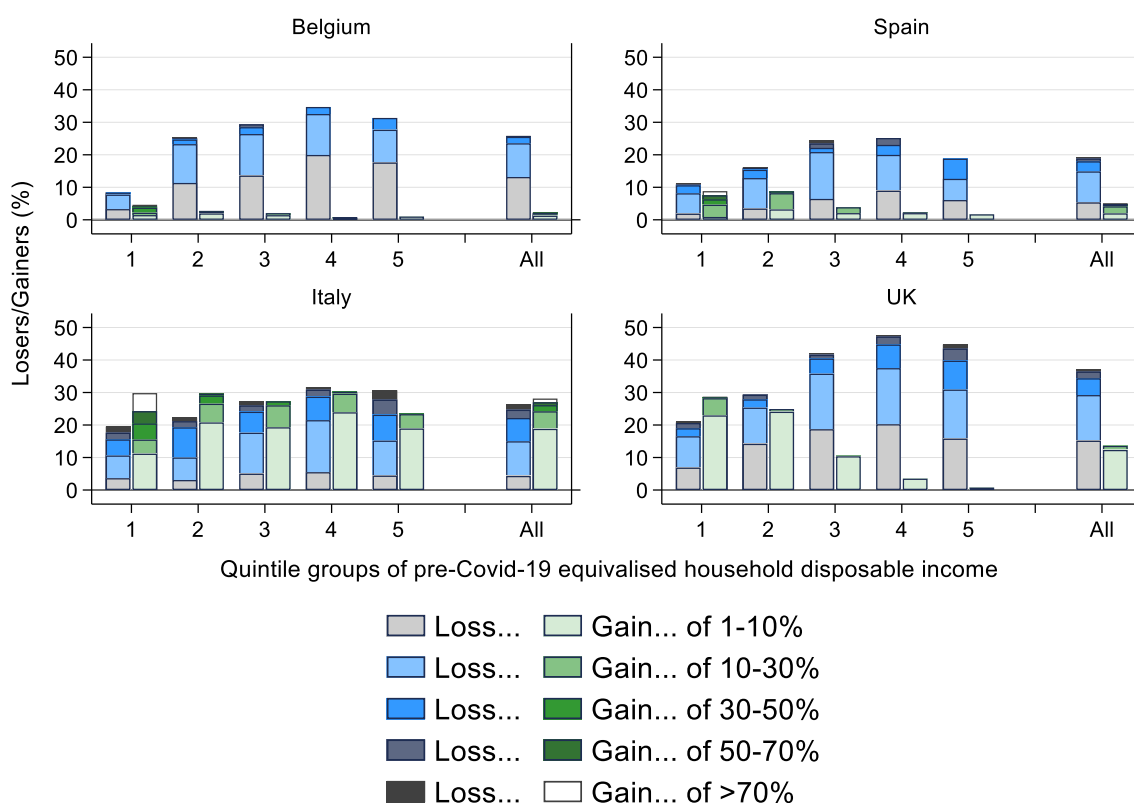Source: Own calculations with EUROMOD I3.0+.

Figure 2 reports the share of individuals who experience a loss or gain in household disposable income in the first month of the pandemic, for the whole population as well as by quintile of pre-COVID-19 household disposable income. We look at individuals with losses or gains of 1-

10%, 10-30%, 30-50%, 50-70% and more than 70% of baseline (pre-COVID-19) disposable income. Except for Italy, the share of losers due to the crisis is larger than the share of gainers. In Italy, there are slightly more gainers than losers but this is primarily due to a large group of individuals with a small gain of disposable income of between 1-10%. Excluding this group, there are more losers than gainers with an absolute income change of more than 10%.

Looking across the income distribution, in all countries, there is a larger share of losers in the top three quintile groups than in the bottom two quintiles. The share of losers with losses of more than 30% is also higher in the middle/top than at the bottom of the distribution in Belgium and the UK. In Italy and the UK, there is also a substantial number of gainers. In Italy, these are mainly due to the bonus of 100€ distributed to all employees working at the firms' premises. In the UK, the presence of gainers (with gains of 1-10% in the bottom three quintiles and of 10-30% in the first quintile) is due to the increased generosity of means-tested benefits.

**Figure 2. Income gainers and losers due to COVID-19 and governments' policy responses, by household income quintile groups.**



Quintile groups of pre-Covid-19 equivalised household disposable income

Legend:
Loss... / Gain... of 1-10%
Loss... / Gain... of 10-30%
Loss... / Gain... of 30-50%
Loss... / Gain... of 50-70%
Loss... / Gain... of >70%

Notes: Loss/gain measured as the % change in equivalised household disposable income due to COVID-19 and governments' policy responses. Income quintile groups are based on the pre-COVID-19 distribution of equivalised household disposable income.
Source: Own calculations with EUROMOD I3.0+.

Despite these relevant and pronounced income changes at the top of the distributions, that also hide re-rankings as individuals move along the distribution due to the loss in their earnings, the Gini index based on disposable income is not statistically significantly different

before and after the crisis in all countries but in Italy where we observe a non-negligible increase in inequality (Table 4).

**Table 4. Income inequality: Gini index**

| Country | Pre-COVID-19 | Post-COVID-19 |
|---------|--------------|---------------|
| Belgium | 0.225 | 0.223 |
| | (0.004) | (0.004) |
| Italy | 0.326 | 0.332 |
| | (0.003) | (0.003) |
| Spain | 0.322 | 0.320 |
| | (0.003) | (0.003) |
| UK | 0.309 | 0.306 |
| | (0.003) | (0.003) |

Notes: Income inequality based on equivalised household disposable income. Post-COVID-19 refers to income inequality in April 2020. Bootstrapped standard errors after 200 replications are shown in parenthesis.
Source: Own calculations with EUROMOD I3.0+.

We also estimate the Atkinson index of inequality (with aversion parameter of 1) pre- and post-COVID-19 and decompose it into within and between group inequality (Table 5). Within group inequality here is the weighted sum of inequality within ventile groups of household disposable income. Between group inequality captures inequality between ventile groups if each person had the mean income in the ventile which she belonged to. Consistent with the results on Gini, we estimate that only in Italy the Atkinson index increases slightly. Decomposing the index by ventile groups, not surprisingly we find that most of the inequality across countries is explained by between group rather than within group inequality. In all four countries, within group inequality increases while between group inequality goes down (in Italy the increase in the former is only partly offset by the decrease in the latter, explaining the overall rise to inequality). The increase in within group inequality is due to the asymmetric nature of the crisis: people's incomes within ventiles become more heterogeneous depending on whether they are hit by the shock, how much income protection they receive from the state, how many earners and what other incomes there are in the household. In contrast, the reductions to household disposable income which are largest for previously higher-income families compress the income distribution and reduce between group inequality.

**Table 5. Income inequality: Atkinson index**

| Country | Pre-COVID-19 | | | Post-COVID-19 | | |
|---|---|---|---|---|---|---|
| | A(1) | Within | Between | A(1) | Within | Between |
| Belgium | 0.089 | 0.008 | 0.082 | 0.087 | 0.013 | 0.075 |
| | (0.004) | (0.002) | (0.003) | (0.005) | (0.002) | (0.003) |
| Italy | 0.176 | 0.011 | 0.167 | 0.186 | 0.05 | 0.143 |
| | (0.003) | (0.001) | (0.003) | (0.003) | (0.002) | (0.003) |
| Spain | 0.175 | 0.006 | 0.169 | 0.171 | 0.019 | 0.155 |
| | (0.004) | (0.001) | (0.004) | (0.004) | (0.001) | (0.004) |
| UK | 0.152 | 0.01 | 0.143 | 0.15 | 0.029 | 0.125 |
| | (0.003) | (0.001) | (0.002) | (0.003) | (0.002) | (0.002) |

Notes: Groups based on ventile groups of equivalised disposable income. A(1) refers to the Atkison index with parameter alfa of inequality aversion set to 1. Bootstrapped standard errors after 200 replications are shown in parenthesis.
Source: Own calculations with EUROMOD I3.0+.

Empirical evidence reported by Clark et al. (2020) and based on panel data from the COME-HERE survey on five European countries, shows that the pattern of inequality in Europe during the pandemic can be divided into two periods: since the beginning of the crisis up to May 2020 relative inequality slightly increased – on average across countries and in particular in Italy consistently with our results - before dropping back to pre-COVID levels in September.

## 5 Relative and absolute resilience

This section assesses welfare resilience at the onset of the pandemic. To measure relative resilience, we estimate the Net Replacement Rates and the Net Compensation Rates which capture the contribution of the tax-benefit systems and household composition to income protection. To assess absolute resilience, we look at changes in the poverty rates. For more details on the measures, see section 2.4.

### 5.1 Net Replacement Rate

The average Net Replacement Rate is illustrative of the relative resilience due to differences in tax-benefit systems, characteristics of the individuals affected by the shutdown and household composition. Estimated on the sample of families affected by the labour market shocks, Figure 3 shows the Net Replacement Rate (depicted as a black circle) for the whole sample as well as by quintile groups of pre-crisis disposable income. The Net Replacement Rate is also broken down by income component (shown in bars), to show the separate contribution of: Earnings compensation schemes; Unemployment benefits; Means-tested and other benefits; Original income; and Income tax + SIC (with the latter two reducing the Net Replacement Rates and hence shown negative).

Looking at the overall Net Replacement Rate, Figure 3 shows that household disposable income on average is simulated to fall to as much as 80% of its pre-shock level considering all households with at least one individual affected by the shutdown of economic activities in Belgium, Spain and to a bit less than 80% in the UK. In Italy, the replacement is limited to around 70% of the pre-shock level. Breaking down the Net Replacement Rate by income source highlights the large contribution and protective role of Original income (i.e. earnings of other household members as well as other types of original income other than earnings) and the earnings compensation schemes in all countries. Post-crisis Original income (light grey bars) accounts from 30% of pre-crisis disposable income in Italy, 40% in Spain, 50% in the UK, and up to 65% in Belgium; while earning compensation schemes (light rose bars) account to 30-40% across countries. Unemployment benefits (in darker blue) in Spain and Italy and Means-tested and other benefits (in lighter blue) in all four countries also contribute to protecting household incomes against the shock; overall replacing 10-20% of pre-crisis incomes. Income tax + SIC (in dark grey), as by design, reduce after-tax incomes and account to -12.5% of pre-crisis incomes in Italy, -20% in Spain and the UK and -30% in Belgium.

Along the income distribution, Net Replacement Rates are higher at the bottom than in the middle and top of the distribution. In Belgium and Spain, in the first quintile group, the Net Replacement Rate is about 1, meaning that on average the poorest households did not see a change to their disposable income.
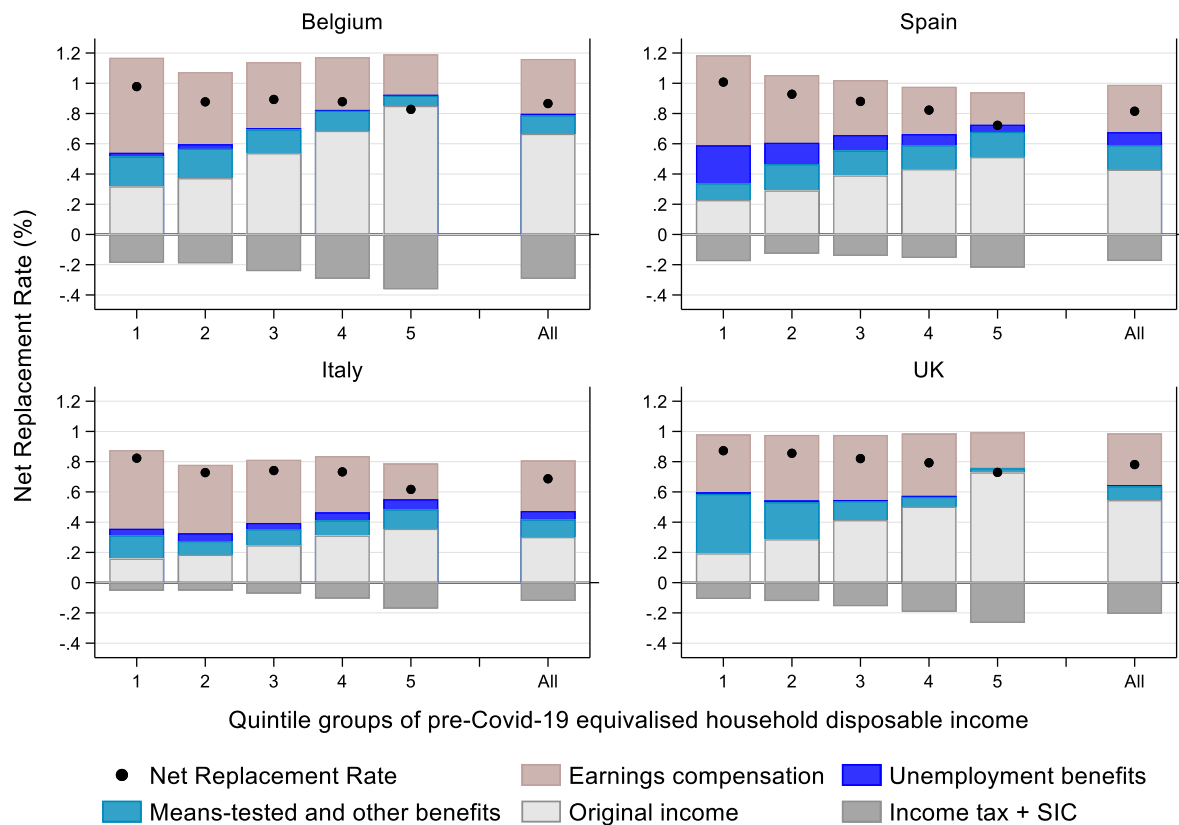
Across quintile groups, earnings of other household members (and income sources not affected by the economic shutdown as capital and property income) are progressively more important as household income increases: the Net Replacement Rates are likely to be pushed up by the presence of these incomes at the top of the income distribution, but this is partly compensated by progressive Income tax + SIC.

Earnings compensation schemes introduced in the different countries account for a substantial share of post-shock household income across all quintiles, with a larger contribution at the bottom than the rest of the distribution in Belgium, Spain and Italy and somewhat equal contribution across the first four quintiles in the UK. In all four countries, due to the cap on earnings replacement, earnings compensation schemes protected incomes in the richest quintile least.

Income from means-tested benefits and other transfers (i.e. mainly pensions and disability benefits) plays a smaller but important role at the bottom of the distribution mostly in Belgium and the UK, due to relative generous social assistance benefits and the Universal Credit, respectively. In Spain, and to a lesser extent in Italy, an important share of family income is due to the unemployment benefits, whose impact depends on both generosity of the schemes and the number of unemployed people entitled to receive them, already higher in Italy and Spain than in other countries before the crisis.

The general lesson of this analysis is that it is necessary to consider the social protection system as a whole and how it interacts with household composition and incomes received by other household members which act as self-insurance mechanisms. Focusing exclusively on discretionary measures is not enough to have a comprehensive picture.

**Figure 3. Decomposition (by income sources) of Net Replacement Rate for those affected by COVID-19, by household income quintile groups**



Quintile groups of pre-Covid-19 equivalised household disposable income

- ● Net Replacement Rate
- ▨ Earnings compensation
- ▮ Unemployment benefits
- ▮ Means-tested and other benefits
- ▯ Original income
- ▮ Income tax + SIC

Notes: The Net Replacement Rate is the ratio of household disposable income after and before the labour market shock, estimated on the sample of families affected by the shock. All population income quintiles based on the pre-COVID-19 distribution of equivalised household disposable income.
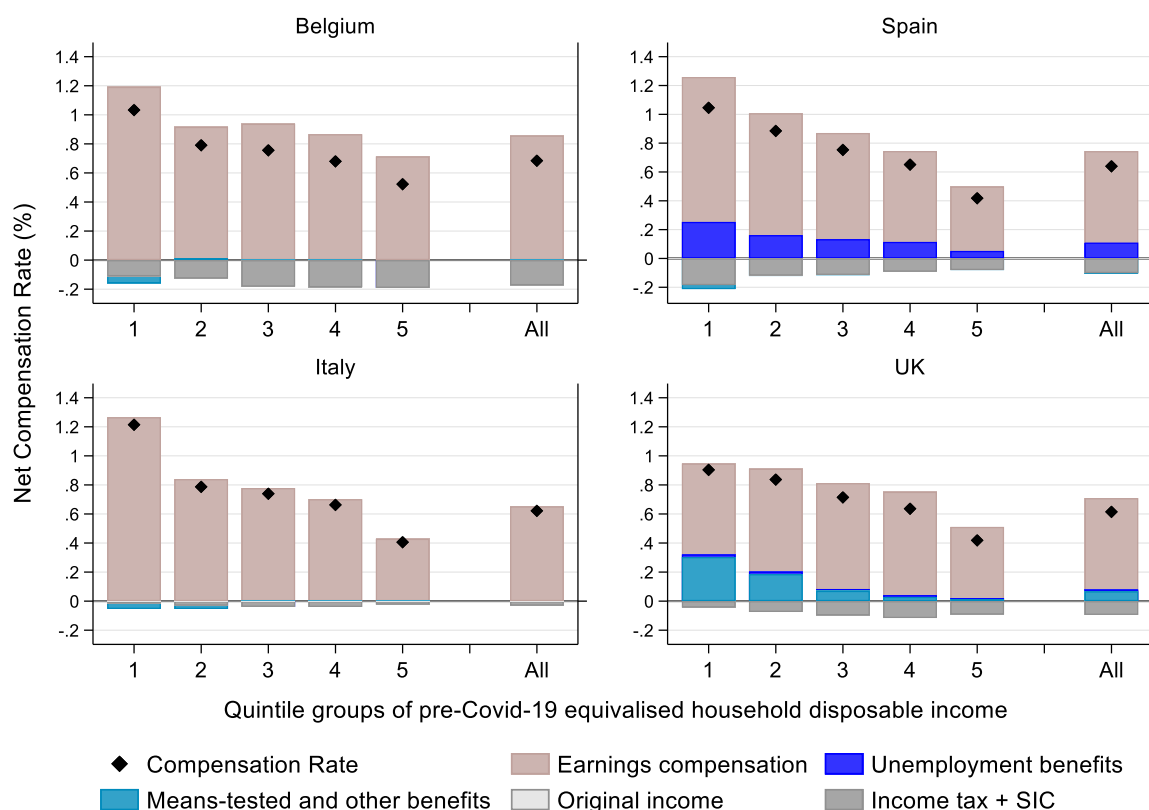
Source: Own calculations with EUROMOD I3.0+.

## 5.2   Net Compensation Rate

To focus on the income protection offered by public support, we now look at the Net Compensation Rate indicator. It measures the proportion of net earnings lost due to the crisis, compensated by state benefits net of income tax + SIC. As with the Net Replacement Rate, it is estimated on the sample of workers affected by the labour market shock. Similar to Figure 3, Figure 4 shows the overall Compensation Rate as well as the Compensation Rate by income quintile groups (depicted by the black diamond). The Net Compensation Rate is then broken down by income source (in bars): Earnings compensation schemes; Unemployment benefits; Means-tested and other benefits; Original income; and Income tax + SIC.

Figure 4 shows that the average net public contribution to the disposable income as a proportion of the net earnings lost because of the shock is around 70% in Belgium, 65% in Spain and around 60% in Italy and the UK, with a decreasing pattern along the income distribution.

**Figure 4. Decomposition (by income sources) of Net Compensation Rate for those affected by COVID-19, by household income quintile groups**



Quintile groups of pre-Covid-19 equivalised household disposable income

◆ Compensation Rate  ▨ Earnings compensation  ▮ Unemployment benefits
▮ Means-tested and other benefits  ▢ Original income  ▮ Income tax + SIC

Note. The Net Compensation Rate measures the proportion of net earnings lost due to the crisis, compensated by state benefits net of income tax + SIC. All population income quintile groups are based on the pre-COVID-19 distribution of equivalised household disposable income.

Source: Own calculations with EUROMOD version I3.0+.

Most public support is channelled through the earnings compensation schemes (light rose bars) only slightly reduced by the income tax (grey bars) payable on some of these benefits. These benefits make up the largest share of public support at the bottom of the distribution but also provide a relatively large compensation for those in the upper part of the distribution. Families in the bottom quintile groups benefit relatively more from these benefits as the amount of these schemes is capped at a maximum level in all countries, although it is much higher in the UK than in the rest of the countries. In Italy and Spain other schemes are characterised either by a lump-sum transfer (bonus 600€ in Italy) or a minimum level (502€ for the temporary unemployment benefit) which increases their progressivity. Their support is less evident in the UK for the individuals at the bottom of the distribution who receive support from Universal Credit and other existing means-tested benefits. In Spain, around 20% of earning lost is replaced by unemployment benefits, which are relatively more important at the bottom than in the rest of the distribution.

## 5.3 Poverty Rates

The extent to which the tax-benefit instruments allow those affected by the earnings shock to avoid falling below a given level of income depends on the generosity of the system, whether workers are entitled to receiving earnings compensation schemes, the income position of the individuals before losing their earnings and their household circumstances.

Table 6 shows the poverty rates, for different groups of the population before the onset of the COVID-19 pandemic and after the shutdown considering the policies introduced by the governments. The poverty line is always constant as in the baseline scenario before the shutdown.

In all four countries, living standards deteriorate due to the COVID-19 crisis with a large number of workers affected by the labour market shocks falling into poverty. Relative to the overall population, children are also adversely affected by the crisis.

**Table 6. Poverty rates before and after the onset of the COVID-19 pandemic**

| | Individuals affected by the shock | | Individuals affected by the shock in one-earner family | |
|---|---|---|---|---|
| Country | Pre-COVID-19 | Post-COVID-19 | Pre-COVID-19 | Post-COVID-19 |
| BE | 4.73 | 9.68 | 11.30 | 26.70 |
| | (0.516) | (0.893) | (1.439) | (2.419) |
| ES | 16.24 | 21.68 | 21.98 | 37.13 |
| | (0.993) | (1.196) | (2.194) | (2.343) |
| IT | 13.64 | 30.91 | 23.08 | 49.75 |
| | (0.585) | (0.832) | (1.139) | (1.230) |
| UK | 9.10 | 18.15 | 26.01 | 40.16 |
| | (0.424) | (0.662) | (1.164) | (1.257) |
| | All individuals | | Children | |
| Country | Pre-COVID-19 | Post-COVID-19 | Pre-COVID-19 | Post-COVID-19 |
| BE | 12.61 | 13.78 | 12.34 | 14.16 |
| | (0.604) | (0.641) | (1.228) | (1.306) |
| ES | 21.06 | 22.17 | 26.31 | 28.05 |
| | (0.596) | (0.609) | (1.137) | (1.142) |
| IT | 20.06 | 23.57 | 26.13 | 32.55 |
| | (0.442) | (0.466) | (0.931) | (0.984) |
| UK | 16.46 | 18.78 | 21.39 | 24.48 |
| | (0.367) | (0.392) | (0.738) | (0.749) |

Notes: Poverty rates based on equivalised household disposable income. The poverty threshold is fixed at 60% of the baseline (pre-COVID-19) median equivalised household disposable income. Bootstrapped standard errors after 200 replications are shown in parenthesis.
Source: Own calculations with EUROMOD I3.0+.

Focusing on the workers affected by the shock, the share of those at risk of poverty before the shock is hugely differentiated across countries, from Belgium characterised by a very low level of in-work poverty with less than 5% of workers in poverty to Spain with more than 16%. The impact of the shutdown is disruptive in Italy where the poverty rate, already as high as

14% increases to 31% showing the incapacity of the Italian welfare system to offer a good level of absolute resilience. In Belgium and the UK the poverty risk doubles, from 5% to 10% and from 9% to 18%, respectively. In Spain the poverty rate increases by a third, from 17% to 22%.

The individuals living in one-earner families are, as expected, more exposed to poverty risk relative to the generality of the individuals affected by the shock: almost half of them is at poverty risk in Italy due to the shock with shares as high as 37% and 40% in Spain and the UK, respectively. In Belgium, where only 11% working individuals in one-earner families are poor already before the COVID-19 pandemic 27% are below the poverty threshold after the shutdown.

When extending the analysis to the overall population and considering the compensation measures implemented by the governments, the breakthrough impact of the pandemic on the poverty status is evident in Italy with an increase in the poverty rate of more than 3 percentage points, followed by the UK (2 ppt), Belgium and Spain. The lack of absolute resilience in Italy is observed also looking at children who face a poverty risk after the shutdown as high as 33%.

## 6    Conclusion

We analyse the extent to which the tax-benefit systems and earnings compensation schemes in four large European countries, severely hit by the COVID-19 crisis, provide income support to those affected by the economic shutdown at the beginning of the pandemic (March/April 2020). We assess the level of relative and absolute welfare resilience of household incomes during the crisis in Belgium, Italy, Spain and the UK, by simulating counterfactual scenarios with EUROMOD, the European multi-country microsimulation model, combined with COVID-related household surveys and timely labour market data.

We estimate that on average household equivalised original income drops substantially by 13-15% in Spain and Belgium and as much as 23-25% in the UK and Italy. The governments' fiscal response to COVID-19 lessens these shocks, leading to smaller average losses in household disposable income of around 3-4% in Belgium and Spain, 5% in Italy and 7% in the UK. While the overall level of income inequality remains broadly the same, in terms of absolute resilience, the welfare states do not appear sufficiently well equipped to avoid large increases in income poverty.

The differences in the impact of policies across countries arise from four main sources: (1) the asymmetric dimension of the shock by country, (2) the different protection offered by each tax-benefit system, (3) the diverse design of discretionary measures and (4) the differences in the household level circumstances and living arrangements of individuals at risk of income loss in each country. In particular, earnings compensation schemes provide much-needed income protection for households and are the key to relative resilience in all four countries. Means-tested benefits in Belgium and the UK and unemployment benefits in Spain also play an important role in protecting incomes especially at the bottom of the distribution.

In general terms, our analysis has demonstrated on the one hand the cushioning role played by the tax-benefit system and on the other hand the importance of the income of other

household members in determining the economic resilience of those affected by the shutdown. Especially earnings compensation schemes have played a crucial role in protecting households' incomes. The sharing of risks within the household can be seen in general terms as a complement to the insurance function of the welfare state. However, as it is usual in distributive analysis, we have assumed complete income pooling within the household. The possibility that incomes are not pooled serves to remind us of the non-equivalence of income received in the form of earnings compensation schemes as an individual entitlement on the one hand, and income support schemes, usually assessed on the economic situation of the family as a whole, on the other.

Although we abstract from macroeconomic adjustments and potential behavioural reactions of households to policies, this paper provides a useful methodological benchmark and reference point by which one can evaluate the economic unfolding of the ongoing situation and the new policies that followed those implemented at the onset of the crisis. As mentioned by Clark et al. (2020) it is important to understand the mechanisms behind the movement of inequality across countries to disentangle the contributions of earnings shocks and policy responses. Furthermore, the analysis could be extended to nowcast the long-term (annual) income distribution (Navicke et a. 2014) and to consider the impact on material deprivation indicators (Figari, 2012). This kind of analysis would deserve as much attention as possible, but it is out of the scope of this paper as requires data not yet available in a cross-country perspective.

Moreover, our analysis entails the potential economic effects of the first month of the COVID-19 pandemic and examines the extent of the intended effects of the schemes, though in reality the transfer payments (i.e. earnings compensation and social assistance schemes) were inevitably delayed and this lag might have constrained the liquidity of families with effects on consumption and material deprivation. Consequently, the overall effects of the crisis would be exacerbated if the government does not provide immediately an income stabilisation for those who experience earning loss, which can potentially translate into further detrimental effects on the aggregated demand.

The effects of the COVID-19 pandemic are asymmetric and particularly relevant from an economic perspective for some families and less for others, despite the compensation measures implemented by the governments. It is crucial to take into account such unequal distribution of the shock as the economic consequences are expected to last long and to assess whether the welfare systems are ready for the challenges they have to face (Sacchi, 2008).

Several important policy issues can be highlighted. First, in Italy and Spain, for example, the most important income support schemes depend on past year's incomes and do not react to a sudden loss of earnings such as those experienced in March\April 2020. Second, some of the welfare tools deployed during the onset of the crisis, do not seem to be well-thought in terms of design as they provide either lump-sum transfers or minimum amounts to all those entitled while ignoring previous contribution bases or declared incomes, creating horizontal equity issues. Third, the earnings compensation schemes are capped at a different maximum level across countries which does not resemble differences in earnings distribution or price levels. Last, but not least, some schemes are designed in a way that offers categorical support

and prevents full coverage, with domestic workers and several categories of temporary workers being excluded from social protection.

These issues confirm that high levels of efficiency and effectiveness of social protection are key for the sustainability of European welfare systems to allow the countries to have an effective automatic stabilizer to support incomes during the crisis and enable governments to focus on the actions needed for the medium- and long-term economic recovery.

In a cross-country perspective, the empirical evidence on how well-suited existing institutional arrangements are for compensating income loss during the pandemic raises normative issues on the protection level that the tax-benefit systems should guarantee to the population and backs up several longstanding ideas debated in the recent past, such as a Basic Income and a European unemployment benefit. Unconditional Basic Income instruments could make comprehensive compensation possible during the pandemic, without the need for discretionary and temporary policies (Atkinson, 2015). A European unemployment benefit scheme could provide a macroeconomic stabilization and fiscal risk-sharing mechanism with interregional smoothing potential as important as intertemporal smoothing potential through debt (Dolls et al. 2018). Both ideas, although likely to be developed as academic reflections rather than policy suggestions, can contribute to understanding how to cushion asymmetric shocks and provide income insurance to the most vulnerable households in a systematic way, highlighting the potential social dimension of the European institutions already reinforced by the common European response to the COVID-19 crisis.

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