BOX 3: THE HOUSEHOLD-LEVEL IMPACTS OF THE COVID-19 WAGE SUPPLEMENT SCHEME[1]

The macroeconomic effects stemming from the COVID-19 pandemic have been well documented. However, until recently, analysis of its impacts at the household and/or the individual level was limited by the lack of availability of household-level survey data collected after the outbreak of the pandemic.

In such instances, microsimulation modelling offers one way to obtain timely estimates of the effects of interest. 'Microsimulation' encompasses a variety of techniques which apply policy rules at the level of individual units and enable analysis of related outcomes at a granular level, making them ideal for analysing the welfare impact of policy changes or economic shocks (Figari, Paulus, and Sutherland, 2015).[2]

Microsimulation models have been widely applied in the literature dealing with the welfare impact of COVID-19 and the related income protection policies adopted by national governments. Several such studies focused on European countries have utilised EUROMOD, a static and non-behavioural tax-benefit microsimulation model for the European Union.[3,4]

This box seeks to evaluate the microeconomic impact of the wage supplement scheme introduced in Malta in response to the pandemic, for the year 2020.[5] Simulations are carried out using the Maltese economy module in EUROMOD (Vella, Said, and Apap, 2021), re-calibrated in line with the most recent data available at the time of writing.[6]

Simulation Design

The study involves constructing three scenarios: a baseline scenario, calibrated to model a 'no-Covid' outcome for the year 2020, as well as a counterfactual and an actual scenario which are then contrasted to this baseline. The baseline scenario simulates microeconomic conditions in 2020 as forecasted to be in the absence of the pandemic, using the Central Bank of Malta's latest-available pre-COVID-19 forecasts for 2020 to calibrate the levels of incomes, prices and other monetary variables in the model.

The counterfactual, or 'no support' scenario simulates the income and employment effects of COVID-19 in a situation where the wage supplement scheme is not enacted. Adversely affected individuals in this scenario are therefore only protected by the automatic stabilisers

---

[1] Prepared by Glenn Abela, a Research Economist in the Modelling Office within the Research Department of the Central Bank of Malta. The author would like to thank Dr Aaron G. Grech and Noel Rapa for comments and suggestions. The views expressed are those of the author and do not necessarily reflect the views of the Central Bank of Malta. Any errors are the sole responsibility of the author.

[2] Figari, F., Paulus, A., & Sutherland, H. (2015). Microsimulation and policy analysis. In *Handbook of income distribution* (Vol. 2, pp. 2141-2221). Elsevier.

[3] The model is "static and non-behavioural" in that it only simulates first-round effects of policy changes and does not endogenously account for changes in the behaviour and/or the structure of the population over time.

[4] See for example Almeida, V., Barrios, S., Christl, M., De Poli, S., Tumino, A., & van der Wielen, W. (2021). The impact of COVID-19 on households' income in the European Union. *The Journal of Economic Inequality*, 19(3), 413-431, and Christl, M., De Poli, S., Figari, F., Hufkens, T., Papini, A., & Tumino, A. (2021). The cushioning effect of fiscal policy in the European Union during the COVID-19 pandemic. JRC Working Papers on *Taxation and Structural Reforms*, No. 02/2021.

[5] This box summarises work published in Abela, G. (2022). Assessing the impacts of the COVID-19 wage supplement scheme: A microsimulation study. *Central Bank of Malta Working Paper*, WP/06/2022.

[6] Vella, S., Said, R., & Apap, W. (2021). *EUROMOD Country Report Malta (MT) 2018-2021.*

built into the Maltese social security system prior to the pandemic. This scenario sees a share of workers (both employees and self-employed) in each economic sector in the model being simulated to become unemployed for a determined proportion of the year, losing a corresponding share of earned income and benefiting from statutory unemployment support according to their eligibility. The employment shocks fed into the model are based on the observed sector-specific shortfalls in GVA in 2020, adjusted for labour intensity in each sector and are shown in Table 1.[7]

The actual, or 'wage supplement' scenario intends to simulate the microeconomic effects of COVID-19 in the presence of the wage compensation scheme enacted by the Maltese government in response to the pandemic. It is important to note that no other COVID-19-related aid, apart from the wage supplement scheme, is studied in this exercise.

The extent of the support offered by Government was sector-dependent, with businesses categorised under three lists or "Annexes" depending on the extent to which their operations were impacted by the restrictions set up in response to the pandemic. All three annexes are simulated in the model, using monthly data from Malta Enterprise indicating the number of workers receiving the wage supplement by nomenclature of economic activities (NACE) category

Table 1
SIMULATED SHARE OF WORKERS MADE UNEMPLOYED (IN 'NO SUPPORT' SCENARIO) AND TRANSFERRED TO WAGE SUPPLEMENT (IN 'WAGE SUPPLEMENT' SCENARIO'

			'No support'	'Wage supplement'		
	EUROMOD sector	NACE Categories	Employment shock (%)	% of workers in Annex A/C	% of workers in Annex B	% of workers on wage supplement
1	Agriculture and Fishing	A	-24.1%	0.0%	0.0%	0.0%
2	Manufacturing, Mining & Quarrying, Utilities	B, C, D, E	-9.7%	0.0%	27.2%	27.2%
3	Construction	F	-4.2%	0.0%	0.0%	0.0%
4	Wholesale and Retail	G	-61.6%	26.7%	13.4%	40.1%
5	Hotels and Restaurants	I	-86.1%	95.1%	0.0%	95.1%
6	Transport and Communication	H, J	-23.9%	15.2%	11.6%	26.9%
7	Financial intermediation	K	0.0%	0.0%	0.0%	0.0%
8	Real estate and Business	L, M, N	-15.3%	33.0%	1.6%	34.6%
9	Public administration and defence	O	-8.8%	0.0%	0.0%	0.0%
10	Education	P	-8.8%	8.1%	0.0%	8.1%
11	Health and Social Work	Q	-8.8%	0.0%	0.0%	0.0%
12	Other	R, S, T, U	0.0%	20.8%	5.9%	26.7%

Source: Author's calculations.

[7] For a detailed explanation of the calculation of the employment shocks simulated see Abela (2022).

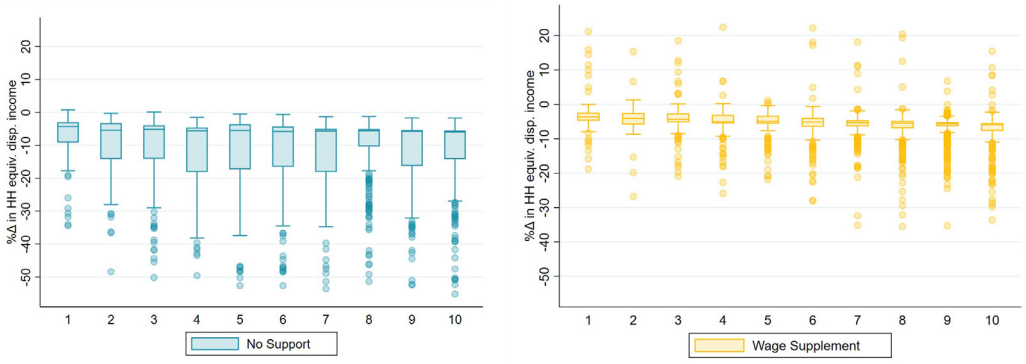
between April and December 2020 to calibrate the shares of workers being transferred onto the wage supplement in the model.[8] In line with the actual implementation of the scheme, the simulation also allows employees under the wage supplement scheme to receive part of their salary from their employers in addition to government support, provided that their total income does not exceed their normal monthly salary. The share of workers simulated to receive the wage supplement in each sector as defined within EUROMOD is shown in Table 1.

Income changes across the household income distribution

The first set of results quantifies the impacts of the scheme across the distribution of equivalised household incomes present in the baseline scenario. Considering only households which in the baseline have at least one employed member ('working households'), estimates suggest that households are invariably better off under the 'wage supplement' scenario compared to the 'no support' case. Households in the top half of the distribution lose between 10.3% and 12.7% of their pre-shock (equivalised) income under the 'no support' scenario, down to between 5.9% and 7.8% under the 'wage supplement' scenario. The wage supplement seems to have had a slightly larger impact on households in the bottom half of the distribution; these lose 7.3% to 12.4% of their income in the absence of the wage supplement scheme, but between 3.3% and 5.3% in a scenario where it is enacted.

Chart 1 delves deeper into these results by looking at the whole distribution of losses suffered by households in each decile. These results suggest two important points. First, it is immediately clear that in the absence of the wage supplement, some households suffer income losses which are markedly greater than those indicated by average losses cited above. In fact, the simulation data shows that 5% of working households suffer losses exceeding 47% under the 'no support' scenario, with some households losing more than half of their pre-shock equivalised income.[9] Second, the dispersion of losses within deciles tends to fall

Chart 1
DISTRIBUTION OF % CHANGES IN HOUSEHOLD EQUIVALISED DISPOSABLE INCOME VIS-À-VIS BASELINE, BY INCOME DECILE, ALL WORKING HOUSEHOLDS



Source: Author's calculations.

[8] A detailed explanation of the calibration process is given in Abela (2022).
[9] Values lying outside the whiskers fall beyond a threshold of 1.5 times the interquartile range away from the nearest quartile value.

significantly under the 'wage supplement' scenario, shown by the considerable narrowing of the box plots. In other words, apart from dampening losses in general, the wage supplement scheme limits considerably the magnitude of losses suffered by the worst-hit households. This observation remains valid if the sample is further limited to households which are directly affected by the shock, i.e., where at least one member was simulated to lose their job.

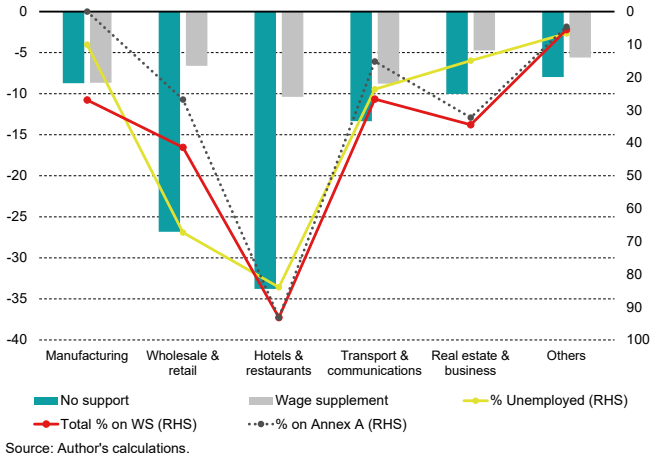
The variability of the income losses suffered within and across income deciles reflects the heterogeneous impacts of the simulated shocks across economic sectors. Sector-specific circumstances determine not only the probability of a particular worker being hit by the economic shock, but also the duration of unemployment (in the 'no support' case), the duration of receipt of the wage supplement, and the share of pre-shock earned income received whilst also receiving the wage supplement. In turn, the relative concentration in different segments of the income distribution of workers active in particular sectors will affect how sectoral impacts play out across the income spectrum.[10] Given these observations, the next section reframes the results obtained from a sectoral perspective, focusing on five key sectors.[11]

Income changes by sector of employment

Chart 2 plots the average shares of income lost by individuals working in each of the five chosen sectors, and the 'Others' category, for both the 'no support' and the 'wage supplement' scenarios vis-à-vis the baseline. In addition, it shows the share of workers by sector that become unemployed in the 'no support' scenario, and both the total share of workers in each sector transferred onto the wage supplement, and the share transferred onto Annex A (the highest benefit category) in the 'wage supplement' scenario.

As expected, in the 'no support' case, the proportional losses correlate well with the size of the unemployment shock. The highest average income losses are registered in the wholesale & retail, and the hotels & restaurants sectors, which also see the highest employment reductions. Meanwhile, the proportion of workers on Annex A in the 'wage supplement' case helps explain what could initially seem to be

Chart 2
MEAN % CHANGE IN INDIVIDUAL DISPOSABLE INCOME, BY SECTOR OF ACTIVITY



Source: Author's calculations.

[10] For instance, data shows that individuals active in sectors 6 (transportation and communications) and 7 (financial intermediation) are noticeably more likely to be in the top half of the earnings distribution than those active in, say, agriculture and fishing (sector 1) or wholesale and retail (sector 4).

[11] When looking at results disaggregated by sector, it is significantly easier to interpret results by looking at the distribution of individuals, rather than households.

inconsistencies in the pattern between the proportion of workers receiving the wage supplement and the share of income lost in each sector.

For instance, Chart 2 shows that a greater proportion of workers in wholesale & retail are transferred onto the wage supplement scheme when compared to manufacturing; however, most of those in the former group are transferred to Annex A, whilst in manufacturing, all shocked workers are transferred onto Annex B. This explains why on average, individuals working in wholesale and retail lose about 6.6% of their pre-shock incomes in the 'wage supplement' scenario, as opposed to 8.7% for those who are active in the manufacturing sector. This also explains why, for example, the overall share of income lost by individuals active in the 'hotels and restaurants' sector is relatively low under the 'wage supplement' scenario despite the very high share of workers affected by the shock.

Looking at affected individuals only, the median share of income lost in the 'no support' scenario is around 30% in four of the five key sectors, being slightly less than 40% in manufacturing. Median losses are reduced to around 10% in the wholesale & retail, hotels & restaurants, and real estate & business sectors in the 'wage supplement' case, remaining close to 20% in both manufacturing and transport & communications. Comparing the distribution of losses in each sector across scenarios again shows that the wage supplement scheme seems to have successfully dampened the losses incurred by individuals and narrowed the discrepancy between the losses suffered by the worst-hit sectors and the rest.

Impact on poverty

To understand the impact the wage supplement scheme has had on poverty rates, the box estimates the at-risk-of-poverty (AROP) rates for each scenario.[12]

Table 2 shows that under a no support scenario, there would have been a widespread increase in the risk of poverty for all household categories. The wage supplement scheme reduced the

Table 2
AROP RATES ACROSS SCENARIOS BY INDIVIDUAL CHARACTERISTICS
(per cent)

	Baseline	No support	Supplement
Overall	17.1	21.9	18.5
Children	16.2	23.1	18.5
Working age	11.5	16.7	12.8
Working age & active	5.3	10.4	6.4
Elderly	35.1	37.2	36.0
Elderly living alone	40.9	41.5	41.5
Single parent	11.7	16.7	13.1
HH with 3+ children	43.1	51.4	45.9

Source: Author's calculations.

[12] The AROP is defined as the proportion of individuals in a population living in households whose equivalised disposable income is below the poverty line. For the purpose of this study, the poverty line is conventionally defined as 60% of the median equivalised disposable household income and maintained at the level of the baseline scenario (€850.47) throughout to ensure comparability.

risk of poverty for almost all categories, with the exception of households composed of elderly persons living alone, who by construction did not receive direct aid through this particular scheme. The most significant improvements in the AROP rates due to the wage supplement scheme are found in households with three children or more, in the single parents and the working age cohorts. On average, the wage supplement scheme is estimated to have reduced poverty rates by more than 3 percentage points.

Conclusion

The results presented suggest that the introduction of a wage compensation scheme in response to the predicted economic fallout of the COVID-19 pandemic and restrictions enacted to curb its spread had several positive effects. First, the scheme meets the primary aim of dampening average income losses, both across the income distribution and within economic sectors irrespective of the extent to which these were impacted. In particular, the results suggest that the scheme's impact across the income spectrum was progressive, in the sense that it shielded the lowest earners relatively more, an outcome which is important from an equity and financial security perspective. Whilst poverty rates measured against a pre-shock standard generally remain higher than in the baseline, they are invariably lower under the wage supplement scenario, suggesting that the scheme was at least partially effective in shielding people from poverty. It could also be argued that the scheme served to limit the dispersion of losses suffered by different households.

These results are not generally sensitive to key assumptions made in the modelling process, such as assumptions on the time taken by the employment shock to be fully realised, affecting the average *length* of unemployment in the no support case. However, changing the assumption on the share of normal salaries that Annex B benefit recipients received on top of the wage supplement has noticeable effects on results for sectors where most or all beneficiaries were receiving Annex B benefits, such as manufacturing. Hence, without additional data on the share of normal hours worked by these beneficiaries, solid conclusions on the effectiveness of this lower tier of benefits may be difficult to draw.