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THE IMPACT OF THE FOOD AND ENERGY CRISIS ON HOUSEHOLD WELFARE IN NORTH MACEDONIA

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EXECUTIVE SUMMARY

The world experienced the beginning of a new political and economic divide with the invasion of Ukraine by the Russian Federation on February 24, 2022. The Western allies responded with a series of sanctions imposed on the invader, despite European economies' considerable dependency on energy supplies from Russia. The invasion occurred when energy production from renewables in Europe – amid the progressive implementation of the Green Deal – suffered a setback due to weather conditions, which pushed up the prices of energy products already in the second half of 2021. The invasion also distorted primary food and fertilizer markets leading to significant price rises. These commodity price rises occurred against the backdrop of still elevated goods prices in the markets that were affected by supply chains disruptions during the COVID-19 pandemic.

North Macedonia is not highly exposed to either Russian or Ukrainian economy in its trade or financial system. The share of the two countries in its trade balance has been below 2 percent, while there has been no financial institution with Russian or Ukrainian headquarters in the North Macedonian financial system. This shielded the economy from a direct influence of the war and ensuing sanctions, however, it suffered indirectly. As a small and open economy, North Macedonia is a 'price-taker', i.e., global and particularly European prices directly and rapidly transmit domestically, and 2022 saw a growth of consumer prices of 14.2 percent, a rate not seen since the transition years of the 1990s. By the end of 2022, also the trade channel worked and the economy showed signs of deceleration. The GDP grew by only 2.1 percent, about half of the pre-war projection and half the potential of the economy.

Rising food and energy prices and decelerating incomes affect household welfare in North Macedonia. Rising prices of primary food products and of the wider consumer basket erode the purchasing power of incomes. This includes the rising prices of electricity, the primary energy input of households, despite still being a regulated price and hence exhibiting slower increases than the global pressures. The latter, however, implied that the larger burden of the energy price hikes was buffered by the government budget.

Rising food and energy prices disproportionally hit vulnerable segments of the population, including children, women and the poor, due to them usually having low(er) incomes and larger shares of food and energy consumption in their budgets. The extreme magnitude of the price shock could put an unbearable strain even on previously non-poor households, disrupting their food and energy security. Household consumption of food and of essential food items – bread, cereals, milk, cheese, eggs and oils – of the poorest tenth of households in North Macedonia has been two thirds and one third of the total income in 2021, respectively, while the average share of spending on energy among the poorest fifth of households is well over 30 percent.

The objective of this study is to assess the impact of the food and energy crisis on households' welfare in North Macedonia, while paying particular attention to the impact on children. By means of simulation, we estimate the likely impact of the crisis on indicators like headline and child poverty, as well as energy and food poverty, hence combining the approaches to poverty from consumption and income sides. The newly published 6.85 USD per day (PPP) threshold by the World Bank is used to measure poverty, alongside the relative threshold. If a household spends more than 10% of its income on energy, then it is considered energy poor; if it spends more than 20% of its income on essential foods, then it is considered to be in food poverty.

Our results suggest that the food and energy crisis already exerted a fairly strong pressure on Macedonian households over 2022, the children having been more severely hit than households without children. We estimate that the food and energy crisis of 2022 threw into poverty about 13 thousand more people, including5 thousand children. It was mainly the rising prices of food which aggravated households' welfare, while the impact of the energy crisis was likely contained by the controlled price of electricity and government energy subsidy program. The burden of the crisis has been particularly heavy for households with three and more children and for those with lower education levels of adult members, which are overlapping categories. For the worst hit households, the deteriorating food poverty is likely to pose a severe hunger risk. At the same time, for the households with three or more children, there has been no change in energy poverty rate, probably because they have been already shielded from energy price increases by the energy subsidy program that was already in place.

Government subsidies and other measures are found to have softened the effects of the price shocks. Due to these measures, child poverty declined more than the headline poverty rate, which suggests that although the measures were not designed to be pro-children, they effectively protected the children to a greater extent than the overall population. We estimate that in 2022 income support measures saved 4.5 thousand individuals, including 1.1 thousand children, who would have fallen into poverty without these measures. Income support measures clearly reduced food poverty, i.e., helped households in coping with the rising prices of the essential food basket, though the magnitude if this impact is fairly low. Income support measures, with the exception of pension income support, were strongly targeted and tilted towards the poor segments of the population, i.e., those most in need of support and most affected by the food and energy crisis. Measures supporting pension income were mostly targeted at all pensioners, irrespective of income, although the second package was somewhat targeted and tilted towards the recipients of low pensions.

The effect of the price measures was stronger than the effect of income support: additional 12.1 thousand people, including 3.4 thousand children, would have fallen into poverty, had these measures not been put in place. Price measures

were critical for containing energy poverty entirely, as well as food poverty to a large extent. However, most of the price measures had a linear effect, i.e., equally helped poor and rich households, hence reducing poverty, but also aiding incomes in places where this was not necessary, and hence wasting valuable budget funds.

The sluggish growth in incomes together with the significant price increases forecasted for 2023 would push additional 20 thousand individuals, including about 5 thousand children, below the poverty line in 2023. This is more adults than in 2022 and about as many children as in 2022. The deceleration of income growth is expected to be stronger than in 2022, while the growth of prices weaker than in 2022, but the combined effect on real incomes is expected to be greater than the squeeze of 2022. Finally, it has to be noted that the simulations for 2023 do not account for any additional interventions, other than the measures that are already in place and that are expected to continue in 2023, but that our simulations suggest that targeted income support measure may produce considerable gains and curtail some of the projected income losses.

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COVID-19	Coronavirus disease of 2019
EBRD	European Bank for Reconstruction and Development
EUR	euro
EWSRC	Energy and Water Services Regulation Commission
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GMA	Guaranteed Minimum Assistance
HBS	Household Budget Survey
IMF	International Monetary Fund
KWh	Kilowatt hours
LPG	Liquid petroleum gas
MKD	Macedonian denar
MK-MOD	Tax and Benefit Microsimulation Model for North Macedonia
MoE	Ministry of Economy
MoF	Ministry of Finance
MoLSG	Ministry of Local Self-Government
MoLSP	Ministry of Labor and Social Policy
MWh	Megawatt hours
PDIF	Pension and Disability Insurance Fund
PPP	Purchasing power parity
SME	Small and medium-sized enterprises
SILC	Survey on Income and Living Conditions
UN	United Nations
UNICEF	United Nations Children's Fund
USD	American dollar
VAT	Value added tax

1. INTRODUCTION

With the invasion of Ukraine by the Russian Federation on February 24, 2022, the political and economic architecture of the European continent began to change in a way that could hardly have been imagined until then. In response to the invasion, the Western allies imposed several packages of sanctions on the Russian Federation, which were mainly aimed at cutting off its economic ties with the countries of the European and American continents. But that meant that although the main impact of such sanctions would be on the Russian economy, consequences would also arise for the imposing countries, as well as for the whole world (Borin et al. 2022). The latter resulted from the fact that Russia was a large exporter of primary products such as cereals, food, some base metals and, of course, energy, while some European economies, such as the German one, had a particular dependence on Russian gas. Although the flow of gas was not only uninterrupted, but also not significantly reduced until the last months of 2022, the new economic relations caused an unprecedented distortion in the markets.

First, there have been critical shortages on the European and global grains and food markets, some due to Russia's blocking grain exports from Ukraine, that directly affected consumers. On average, globally, the increases of prices of corn and wheat only, led to a reduction of real incomes of households by 1.5 percent since the start of the war, with poorer countries suffering more (Artuc et al. 2022). Second, the instability of grains and food markets combined with the shortages of base metals such as copper, nickel and cadmium, added to the woes of many industries, including automotive, that were still suffering from the disruption of supply chains due to the lingering COVID-19 pandemic. Third, the tensions surrounding the supply of gas and other energy products followed the shortfall of energy production on the European continent, primarily the reduced production of electricity from renewable sources during 2021. All these market disturbances had a dominant influence on the prices of a wide range of products, which started to rise sharply in the first half of 2022. This growth followed the pressures on prices that existed at the end of 2021, which were the result of the post-pandemic rebalancing, despite projections that suggested that the pandemic had been progressively subsiding and most of the economies would turn back to their pre-pandemic levels over 2022. Nevertheless, the new economic architecture imposed changes on the demand of households and firms, which faced ever higher prices, meaning that their incomes in real terms (corrected for inflation) began to rapidly decline. This led to pronounced recessionary pressures by the end of 2022 and forecasts that part of the European economies would enter recession from early 2023.

North Macedonia has very weak economic ties with both Russia and Ukraine. For example, in trade, these countries do not participate with more than 1-2% in North Macedonia's foreign trade, and there is no Russian or Ukrainian bank

or other financial institution in our financial system, while Russia's share in foreign direct investment averaged less than a quarter of a percent over the last two decades. This protected the economy from the direct impact of the crisis. Yet, it should be noted that about a fifth of the fertilizers were imported from Russia in 2021, which together with gas and metals comprised most of the imports.

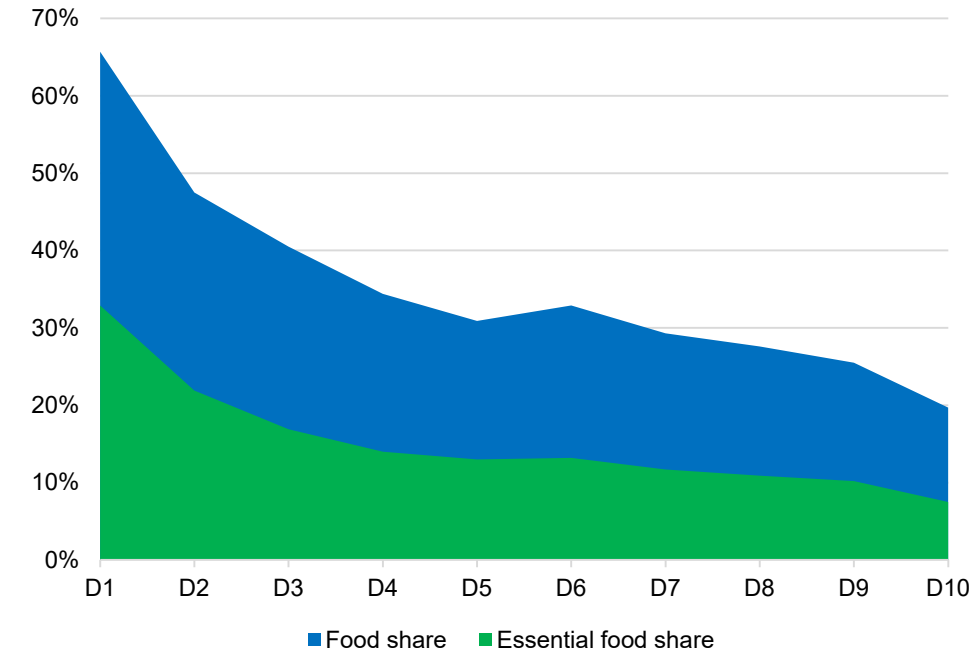
However, the Macedonian economy has been indirectly affected in several ways. First, as a result of considerable trade openness, rising prices of key food and energy products were directly transmitted to the economy already in the first half of the year. From the summer of 2022, inflation accelerated, passing these effects onto the broader consumer basket. By the end of the year, inflation reached 19.5%, with an annual average of 14.2%, a level not seen since country's transition years in the early 1990s, implying that younger generations face such crisis in prices for the first time in their lives (UN, 2022a).

Second, being dependent on the economic well-being of its trading partners, the economy of North Macedonia also fell under the influence of the reduction in external demand, primarily from key trading partners such as Germany, and a slowdown in growth was felt already in the third quarter of 2022. This is why the projection for the whole of 2022 was revised downwards and almost halved (from close to 4% to just over 2%). The pressures in the energy sector are particularly pronounced, given that the country produces only about half of the electricity it consumes, which is anyway predominantly produced from fossil fuels whose energy value has been on the decline.

Third, the dependence on imports of primary food commodities, whereby a third of wheat supplies and nearly all of sunflower oil is imported, has been elevating the risk of accessibility for the country, which coupled with the dependence on fertilizers supply from Russia, may result in a crisis of availability. In addition to energy and fertilizers, prices significantly increased for seeds, feeds and pesticides, which could lead to lower input use and hence lower yields and potentially compromised quality in the next cropping seasons (UN, 2022b).

The crisis is rapidly constraining household budgets. Rising food and energy prices disproportionally hit the vulnerable segments of the population, including children, women and the poor, due to them usually having low(er) incomes and larger shares of consumption in food and energy in their budgets. This may increase the incidence of food insecurity. In addition, extreme magnitude of the price shock could exert an unbearable strain even onto non-poor households. Household consumption of food and essential food – bread, cereals, milk, cheese, eggs and oils – of the poorest decile in North Macedonia is 65.7 per cent and 32.9 per cent of total income, respectively (Figure 1), while the average share of spending on energy among the lowest 20 percent of household by income was well over 30 percent of the total income. Looming economic slowdown together with high inflation already threw the economy into stagflation, with deteriorating business sentiment and declining industrial production (UN, 2022b). This will put further pressure on household incomes, already exhausted fiscal space and financial markets.

Figure 1: Share of food and essential food in income, by decile



Source: Authors' calculations based on the Household Budget Survey (2021).

The decline of headline and child poverty, which was halted by the pandemic of COVID-19, is now at the risk of reversal. Just as the UNICEF's and Finance Think's research projected, COVID-19 increased the relative child poverty rate from 27.8 percent before the pandemic to 30.3 percent in 2020 (Finance Think, 2021). Given the low elasticity of electricity consumption and the difficulties of rapid substitution of fuel sources, the expected increase in the incidence of energy poverty (when a household spends 10 percent or more of its income on energy) is even higher. Not only will adults and children suffer due to declining real incomes, but living in low indoor temperatures or switching back to heating with polluting fuels may also become an additional health hazard (World Bank, 2022).

Emerging studies already suggest devastating effects of the war in Ukraine for the living standards, particularly across Europe. For example, UNICEF (2022) estimated that about 2.5 percent of the total population in the region of Europe and Central Asia will fall into poverty due to the economic consequences of the conflict for the region. For children, the impact is estimated to be more detrimental, at 3.7 percent, highlighting the higher poverty risk for children in this, as has been the case in many previous crises including the pandemic. The global academic literature on the current crisis, albeit nascent, already depicts the eroding living standard due to price hikes and real income declines as the key channel of influence of the war (Kammer et al. 2022), followed by the potential disruptions in trade, supply chains and remittances for the neighboring

countries; and the reduced business confidence which will weigh on the asset prices (Orhan, 2022; Lo et al. 2022; Mbah and Wasum, 2022; Boubaker et al. 2022).

The objective of this study is to assess the impact of the food and energy crisis on the welfare of households' in North Macedonia, while paying particular attention to the impact on children. By means of a simulation, we estimate the likely impact of the crisis on indicators like overall and child poverty, as well as energy and food poverty, thus combining the approaches from both the consumption and income side. The exercise serves a foundation for designing a roadmap for mitigating policy measures at the national level.

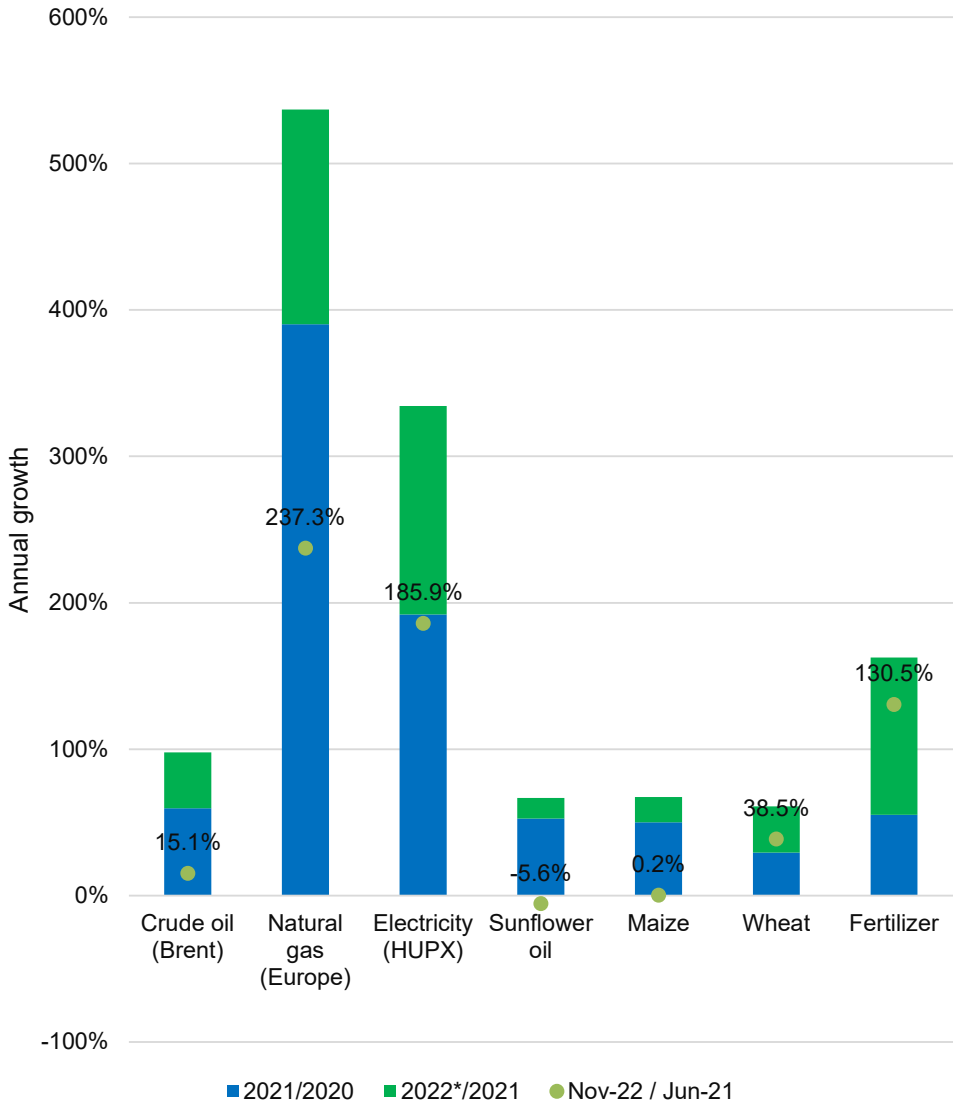
The study is organized as follows. Section 2 briefly reviews the global economic developments to demonstrate the exposure of the domestic economy, particularly with respect to rising prices. Section 3 reviews the developments in North Macedonia, in terms of the economy overall, prices, as well as poverty and household spending indicators. It also reviews the government measures adopted to protect households from the perils of the food and energy crisis. Section 4 discusses all the methodological considerations pertinent to the simulation. Section 5 presents the results of the likely impact of the crisis for the Macedonian households. Section 6 summarizes the conclusions of our analysis and develops policy recommendations.

2. THE GLOBAL ECONOMIC DEVELOPMENTS IN A NUTSHELL

Global food, energy and fertilizer prices have witnessed a rapid increase starting in the second half of 2021 and further accelerating after Russia invaded Ukraine in February 2022. The Green Deal in Europe fostering rapid transition towards renewable sources of energy, combined with the weaker-than-expected weather conditions that reduced renewable energy production in 2021, pushed up electricity prices. At the same time, lingering bottlenecks in the supply chain, to a large extent driven by the stiff zero-COVID policy of China, imposed price pressures onto various commodities. In such conditions, the war in Ukraine led to significant price increases.

Figure 2 shows that for the key primary commodities, these price increases have been significant, especially for the natural gas traded in Europe (predominantly arriving from Russia) and for the electricity purchased on the open market. By magnitude, the next most important price increase has been that of fertilizers. Interestingly, however, by November 2022, global prices of the primary food commodities subsided and particularly the prices of maize and sunflower oil went back to their June 2021 level, though not of wheat. Similarly, the price of the crude oil by November 2022 was only about 15 percent higher than the June-2021 price.

Figure 2: Changes in global real commodity prices



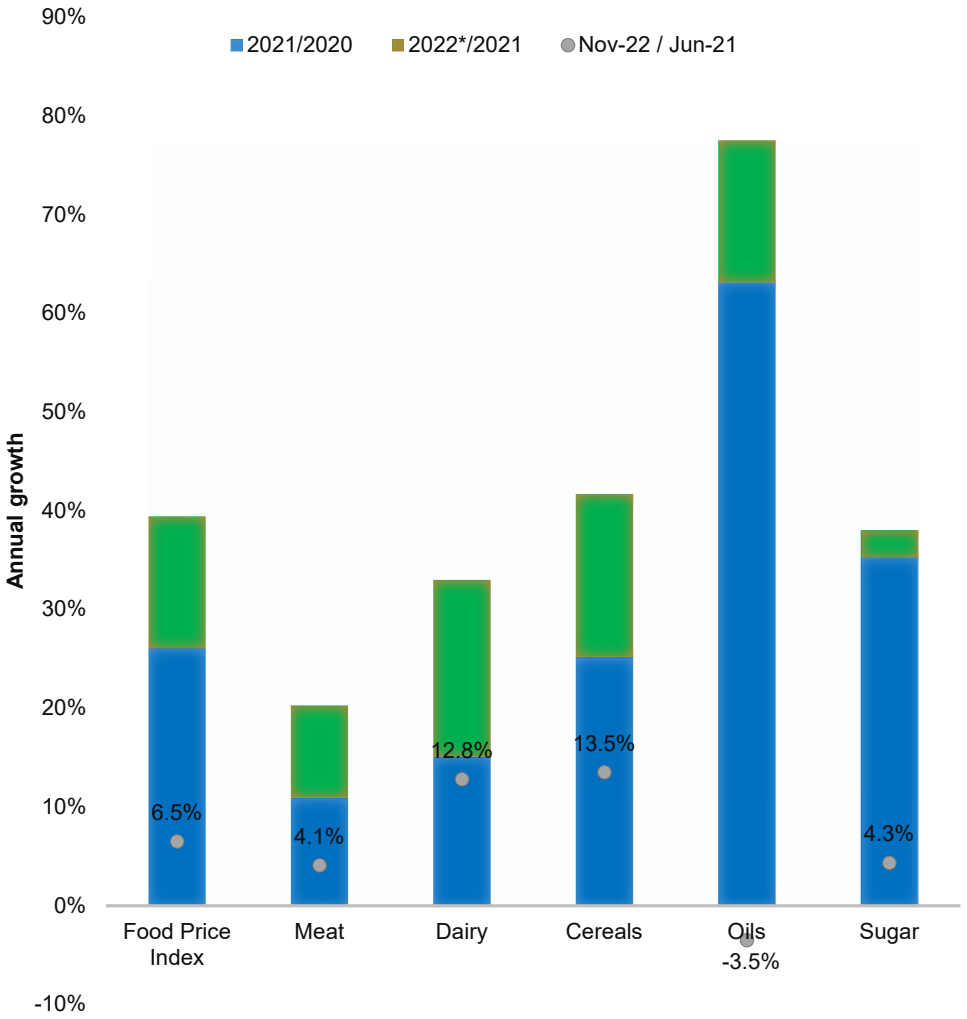
Source: Authors' calculations using data from World Bank Commodity Price Data (The Pink Sheet, https://www.worldbank.org/en/research/commodity-markets) and Hungarian Power Exchange HUPX (https://hupx.hu/en/).

Note: Nominal prices in US dollars (all except the electricity prices expressed in EUR) are converted to real prices, which account for the overall increase in world prices over the specified period, deflated by the US consumer price index.

** Period January-November taken into account.*

This dynamic is largely confirmed by the fluctuations of the FAO Food Price Index (Figure 3) which experienced large annual increases over both 2021 and 2022, but went down to just 6.5% higher than its June 2021 level by November 2022, with the food groups of cereals (13.5 percent) and diary (12.8 percent) mainly holding up its level.

Figure 3: Changes in global real food commodity prices



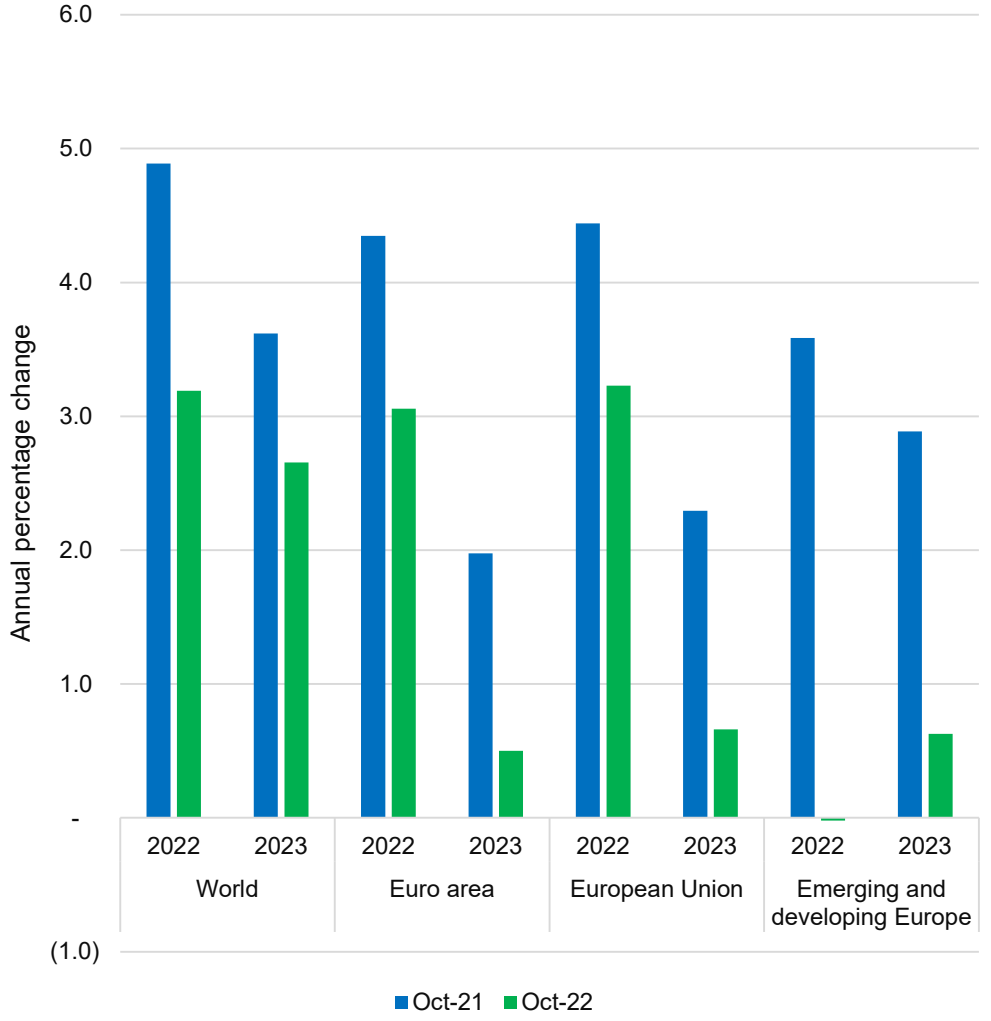
Source: FAO Food Price Index (https://www.fao.org/worldfoodsituation/foodpricesindex/en/).

** Period January-November taken into account.*

The economic outlook, particularly on the European continent, became gloomy. Figure 4 presents the forecasts for the real GDP growth rates in October 2021 (before the escalation of the war in Ukraine) and in October 2022. While downward revisions were made for all the regions and the world as a whole, the projected deceleration to virtual zero percent from projected 3.6 percent

for 2022 and to 0.6 percent from 2.6 percent for 2023is most striking for the emerging and developing Europe (which includes Ukraine and Russia). As the growth prospects in advanced Europe are critical for external demand of the countries in developing Europe, the revisions suggest a prolonged negative impact on (real) household incomes that will aggravate the consequences of price hikes.

Figure 4: Changing forecasts for the real GDP growth



Source: World Economic Outlook, International Monetary Fund.

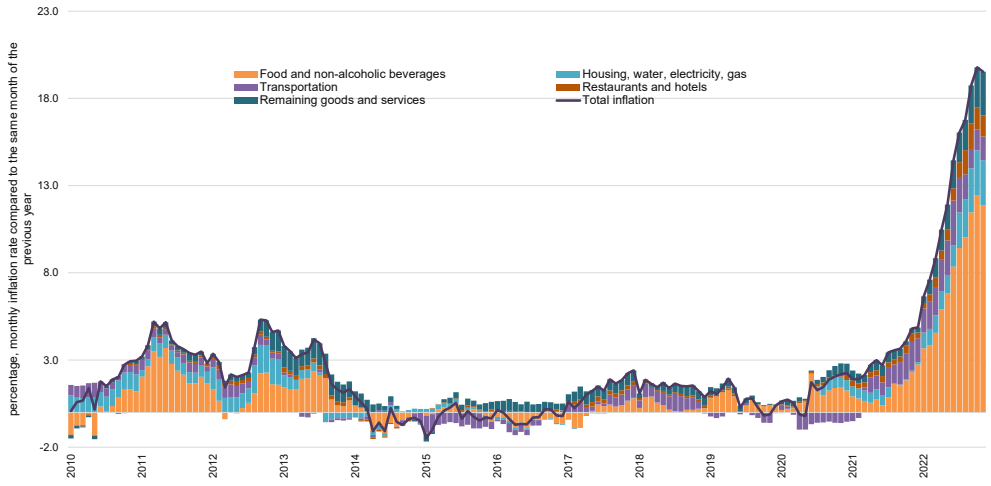
3. DOMESTIC ECONOMIC DEVELOPMENTS AND GOVERNMENT RESPONSE

3.1. Transmission of price hikes in the domestic economy

As small and open economy, North Macedonia is heavily exposed to global developments, and particularly to those on the European continent. By 2021, the country had experienced a long period of subdued price increases; in some years, the consumer price index (CPI) hovered around zero or went negative (Figure 5). The exposure to global developments implied that the global energy crunch and the rising food prices resulting from the post-pandemic rebalancing translated into the domestic economy already in the second half of 2021, and the entire year ended with a CPI inflation rate of 3.2 percent.

In 2022, CPI inflation soared to 14.2 percent, while 2023 forecasts are in the range of 7–9 percent, reflecting strong uncertainly. Food and non-alcoholic beverages drive the total CPI, followed by housing, water, electricity and gas, and transportation costs. The central bank recently estimated that about 89 percent of the in-country inflation is due to the global developments, while what could be considered 'domestic' component is still mainly a transmission effect onto the rest of the consumption basket (Ramadani and Unevska, 2022).

Figure 5: Inflation and its contributing components in North Macedonia

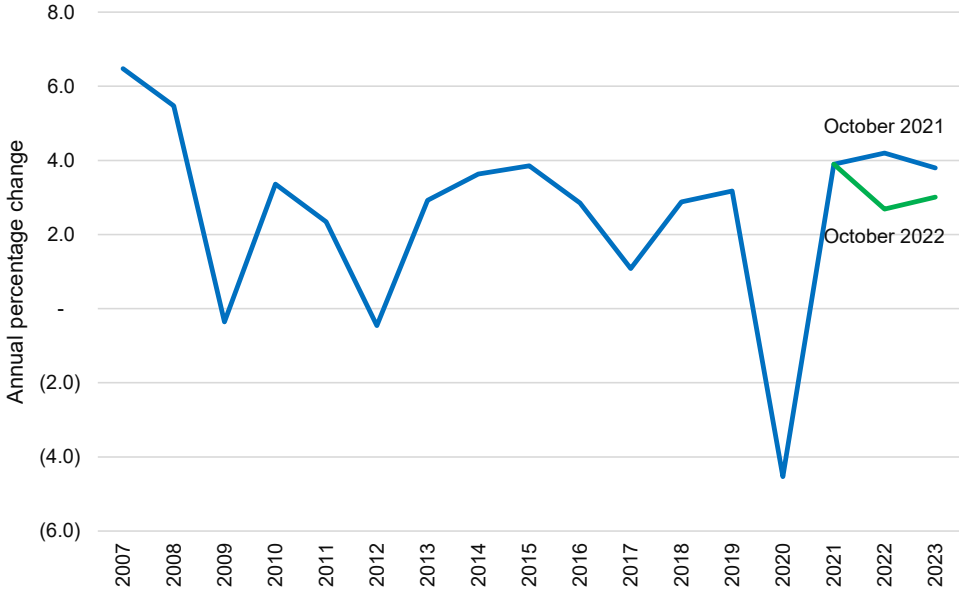


Source: Calculations of Finance Think, based on data from the State Statistical Office.

After the slump of 2020, the economy of North Macedonia started to pick up pace over 2021, as growth rebounded to 3.9 percent. Following the large fiscal spending during the pandemic, which was estimated by the government at about 8 percent of GDP, the government set on the path of fiscal consolidation in 2021, but could not stay the course due the food and energy price crisis of 2022.

Given the geopolitical developments and the immediate transmission of the price shock in the domestic economy, the economic outlook darkened. The economy was projected to grow around 4 percent in 2022 before the war in Ukraine – which is around the economy's potential – but the war caused a downward revision by about one to one and a half percentage points for 2022 and of about one percentage point for 2023 (Figure 6). Although the revision is not as severe as for the whole group of emerging and developing Europe, it is still significant for a country which did not manage to achieve a growth rate above 4 percent in the last decade and a half.

Figure 6: GDP of North Macedonia and its forecasts for 2022 and 2023

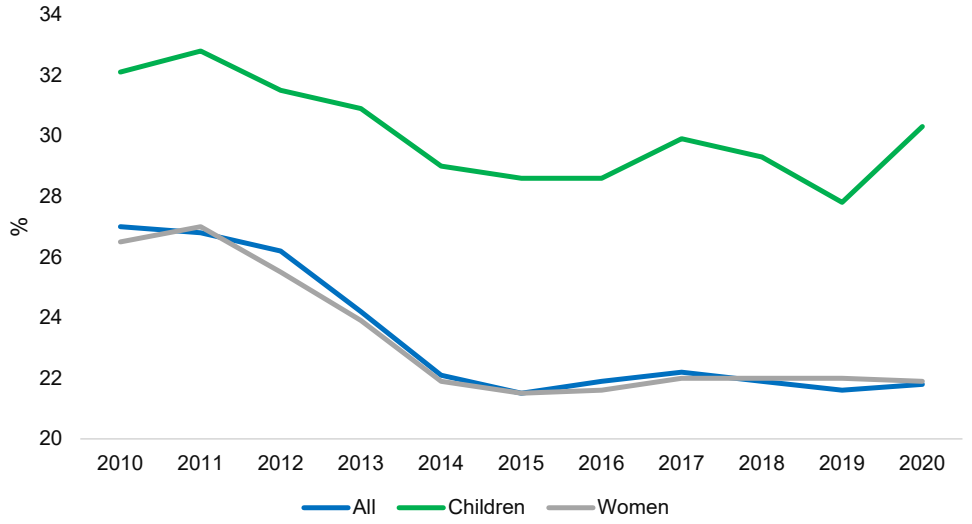


Source: State Statistical Office; International Monetary Fund.

3.2.Poverty profile and a snapshot of household budgets

Increasing prices reduce real incomes of households while looming deceleration of the economic activity poses further risks for the market incomes of individuals and households, hence exposing them to poverty risks. The country experienced a reduction of poverty, from 27 percent in 2010 to 21.6 percent just before the pandemic hit (Figure 7). This trend was halted with the start of the pandemic, but its impact on the population as a whole has been negligible compared to developments in many other countries, mainly due to the massive government intervention.

Figure 7: Headline poverty rate of North Macedonia



Source: State Statistical Office; Laeken indicators based on the Survey on Income and Living Conditions.

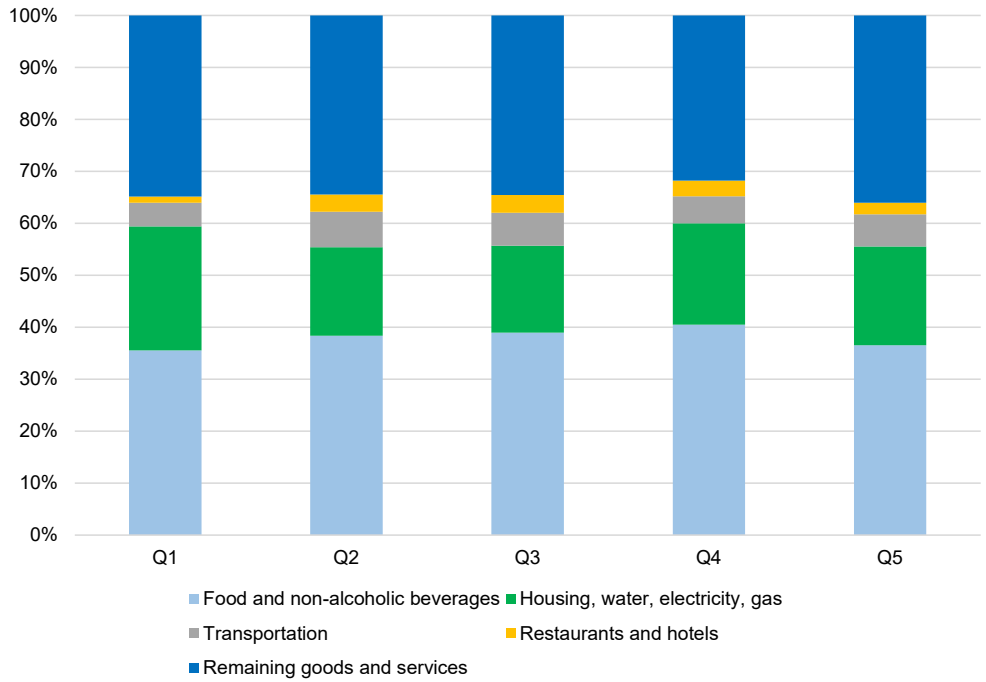
The food and energy crisis may have a stronger negative impact on incomes and budgets, and the poverty level. This is primarily because it erodes incomes of households in both real (rising prices) and nominal terms (declining economic activity) in times when the space for expansionary fiscal policy – a characteristic of the pandemic 2020 – is severely exhausted by the intervention during the pandemic, as well as because it may propel the price-wage spiral or support the inflationary pressure through other channels of loose fiscal spending. The rising prices of food and energy predominantly hit poor households, whose consumption basket is tilted towards food items and whose income is usually low or to a large extent stems from social components like social assistance pension or remittances.

Children and women are particularly prone to poverty risk induced by rising prices. Children have already experienced a rise in poverty rate of 2.5 percentage points during the pandemic (Figure 7). The implications of this rise were modeled and discussed in in the study of UNICEF and Finance Think

(2021). Households with three or more dependent children face the highest poverty rate in the country of 45.6 per cent (2020), followed by single parent households (41.6 percent), while on the other side of the spectrum are single-individual households (4.1 percent), which clearly depicts the dire situation of children and the risk that further aggravation of real incomes poses for them. Whereas women did not experience poverty rate dynamics different from the general population during the pandemic, their exposures to the current crisis may be more significant due to their considerable labor market inactivity and large share of unpaid household work.

The high share of food and energy spending in household budgets suggests that North Macedonians are strongly affected by the sharp rise in food and energy prices. All households spend about half of their budget on food and non-alcoholic beverages, while the share declines for the richest quintile but not by much (Figure 8). Housing costs, where electricity spending belongs, are likewise similar across quintiles in relative sense, while transportation costs slightly grow with income class. This indeed documents that the relative burden from the food and energy price crisis does not necessarily fall onto the poorest households, but is rather spread across all households. Indeed, Finance Think (2022) estimated that the relative burden of the soaring prices declines with the income, while the differences across various income groups are not stark.

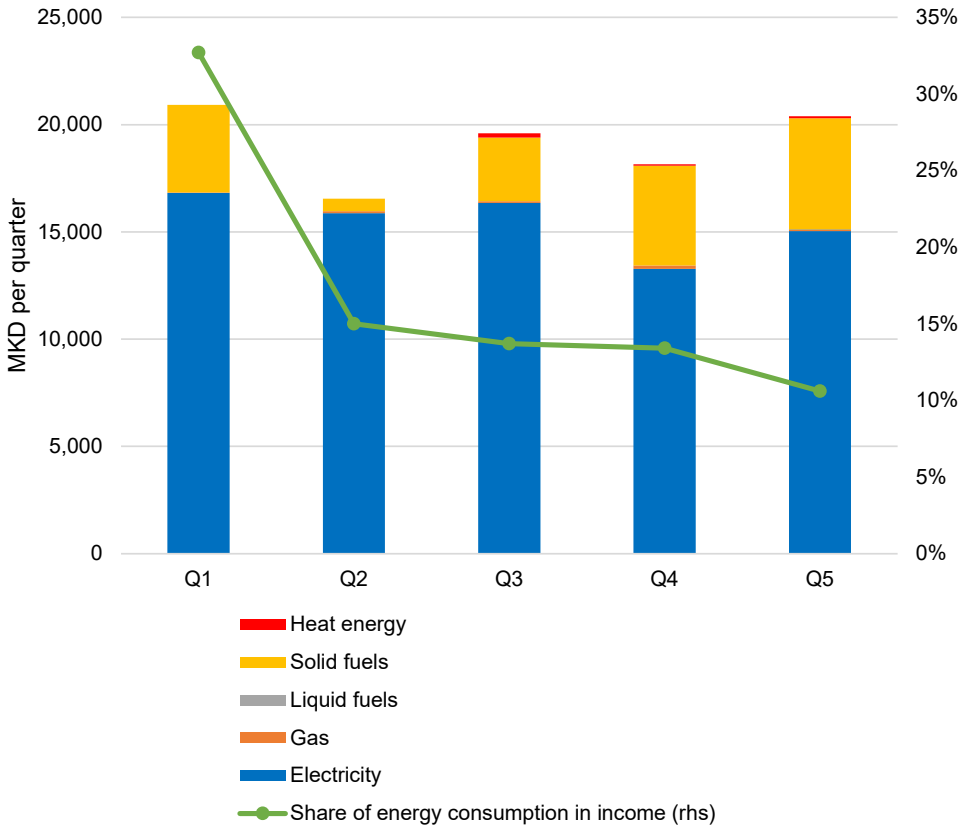
Figure 8: Composition of household budgets in North Macedonia, by income quintiles



Source: Authors' calculations based on the Household Budget Survey (2021).

The differences between quintiles in the structure of energy consumption are somewhat more pronounced than in the overall consumption. The share of electricity consumption in total energy consumption is larger among poorer households (Figure 9). Our analysis here may be limited by the design of the Household Budget Survey (HBS) which collects data over 15-day periods, and may, therefore, be introducing noise into the data on less frequent energy purchases (e.g. of solid fuels). What this disaggregation unequivocally shows, is the extremely high average share of energy spending in the income of the poorest quintile of 37.5 percent (for households with non-zero energy consumption in HBS). This is way above the usual threshold of 10 percent above which households are considered being in energy poverty and clearly shows that the poor are most vulnerable to energy price increases.

Figure 9: Composition of energy consumption in North Macedonia, by income quintiles

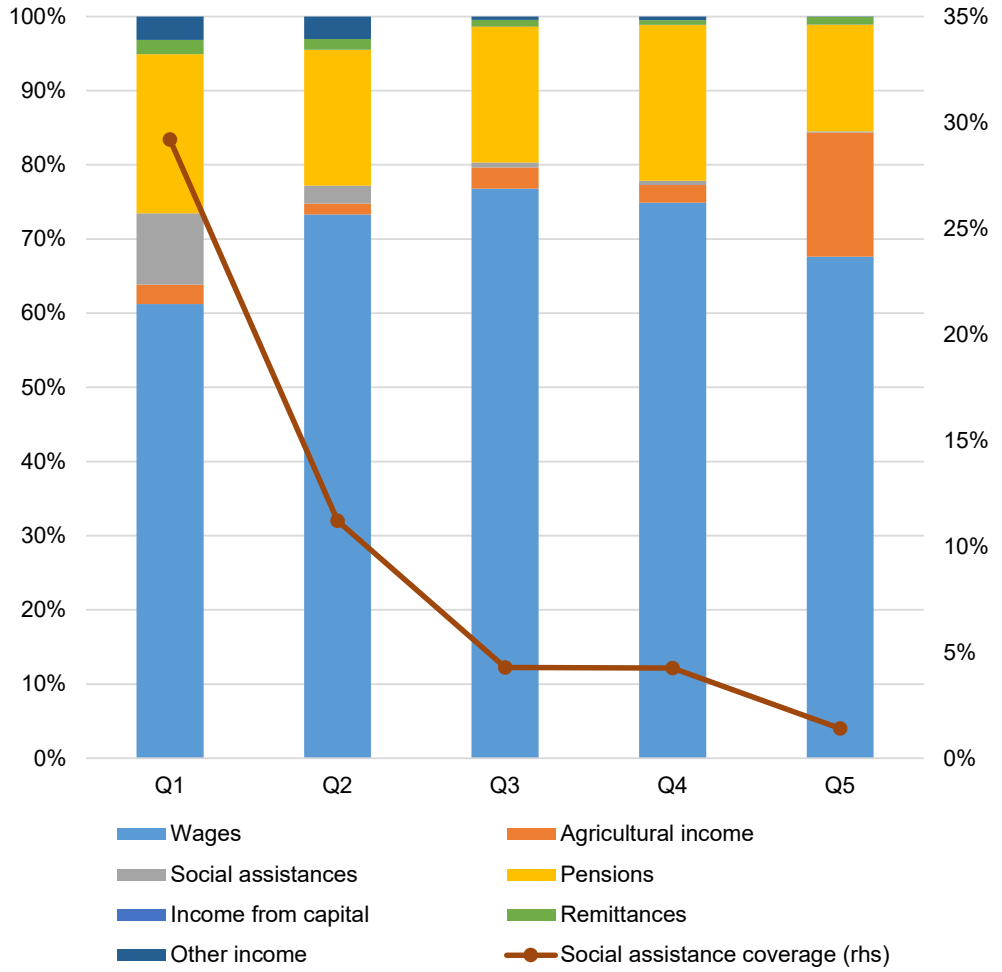


Source: Authors' calculations based on the Household Budget Survey (2021).

Poor households are more exposed to the crisis because they disproportionally depend on social assistance and less on agricultural and capital income (Figure 10). 29.2 percent of households in the poorest quintile are recipients of some form of social assistance and this share rapidly declines with the increase of

income, but not to zero, staying at about one percent for the richest households receiving some form of social assistance.

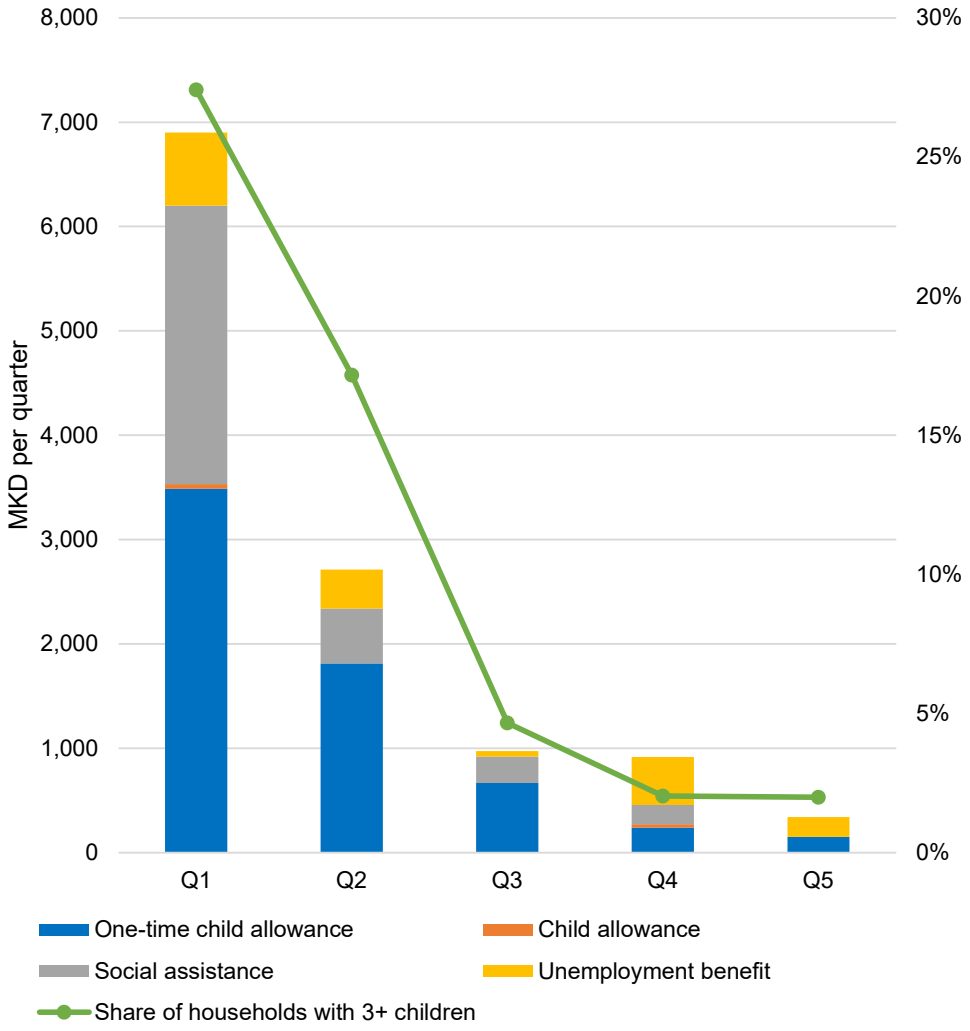
Figure 10: Composition of income in North Macedonia, by income quintiles



Source: Authors' calculations based on the Household Budget Survey (2021).

The disproportionate exposure of children to the current crisis is best explained by a disaggregation of the social income (except pensions) of households. Social assistance and child allowances are clearly concentrated in the poorest quintile (Figure 11), which also has the largest share of households with three and more children (27.3 per cent). The one-time child allowance – that is not means-tested – is present across all income categories, and so is unemployment benefit that also has a significant share in the higher quintiles where labor market activity is more concentrated.

Figure 11: Composition and size of social income in North Macedonia, by income quintiles



Source: Authors' calculations based on the Household Budget Survey (2021).

3.3. Government mitigation measures: A review

To prevent electricity and central-heating shortages during the winter of 2021/22, the Government declared a state of 'energy crisis' that allowed it to allocate additional funds from the central budget to electricity production and central heating companies. The government moved in to help the central heating company ensure gas supply for heat production, although the dependence on gas in North Macedonia is low (about 7% of the energy mix). This step can be considered the first of the series of government measures to handle the food and energy crisis.

To ensure continuity of electricity supply in 2022, the Government extended the 'energy crisis' state, announced a plan to increase domestic production of electricity by 20% and introduced savings measures to reduce electricity consumption in the public sector by 15%. Indeed, the electricity production increased by 15% in the first half of 2022 compared to the same period of the previous year, but the additional funds channeled from the state budget were used to purchase additional coal for the thermo-power plants in Bitola and Oslomej, as well as petroleum jelly for the restarting of the thermo-power plant in Negotino. By the end of the year, the government took over the management of the central-heating supply in Skopje.

Following the management of the energy crisis which effectively started in the middle of 2021, the government passed two further packages of crisis-management measures after the outbreak of the war in Ukraine: the first in March 2022 and the second in October 2022. The package of March 2022 (Table 1) contained 27 measures, which we split into three groups: measures directly attributable to the food and energy crisis (15), measures that contribute to the crisis management but predating it (7) and measure mainly unrelated to the crisis (5). The estimated financial envelope of the package was EUR400 million. The first sub-group has been the most important, the majority of these measures (12 of 15) being linear, usually affecting prices, hence applicable to all consumers who pay these prices. Most of these measures (12), were still in force at the end of 2022.

The second sub-group of measures contains mainly programs for subsidizing energy-efficient investment by households and companies, with a mix of linear and targeted components. All of them were still in place at the end of 2022, mainly reflecting the longer-term nature of such projects. The third sub-group includes measures which were already in place before the crisis and are weakly related to crisis management, most notably financing instruments for companies.

Table 1: Government measures adopted in March 2022

	Linear (L) or targeted (T)	Affects: prices (P), income (I), other (O)	Responsible institution	Still in place at the end of 2022
Measures directly attributable to the food and energy crisis				
1. Reduction of the preferential VAT rate for basic food products from 5 to 0 percent, for bread; sugar; flour; edible sunflower oil; long-life milk; fresh meat; rice and eggs.	L	P	MoF	No
2. Autonomous measure for the import of basic food products and raw materials that have customs duties from all countries	L	P	MoF / Customs Office	Yes
3. Freezing the profit margins of basic food products	L	P	MoE	Yes, although the scope of the measure changed
4. Vouchers for basic products of MKD1,000 per month for a period of 3 months for 35,000 citizens from the most vulnerable categories	T	I	MoLSP	No
5. Subsidies for pensioners of MKD1,000 per month for a period of 3 months	L	I	MoLSP / PDIF	No
6. Extension of the application of the preferential VAT rate of 5 percent to the sale of electricity to households	L	P	MoF	Yes, though it increases to 10 per cent from January 2023

7. Subsidizing the price of electricity for the regulated market (for households and small business consumers) – enacted at the end of 2021	L	P	Government through ESM – Electricity production company	Yes, though the electricity price increased and quotas were introduced (see next measure)
8. Changing the methodology for determining the price for households and small business consumers who are on the regulated electricity market	T	P	EWSRC	Yes
9. Subsidizing the price for central-heating energy	L	P	Government through ESM Toplina – ESM subsidiary for heat production	Yes
10. Reduction of the VAT rate from 18% to 10% for the sale of energy sources: diesel, unleaded gasoline, gas oil, liquid petroleum gas (LPG) and methane	L	P	MoF	Yes
11. Recommendation for changing the methodology for harmonizing the prices of derivatives based on the change in stock prices from weekly to daily basis	L	O	EWSRC	Yes
12. Reduction of the excise duty depending on stock market prices	L	P	MoF	Yes
13. Exemption from payment of VAT when importing natural gas and electricity, thermal energy or energy for cooling	L	P	MoF	Yes
14. Recommendation for saving and rational use of electricity and energy sources	L	O	Government / MoE	Yes

15. Energy vulnerability program – 600 and 800 MKD for households depending on type and income category	T	I	MoE	Yes
Measures contributing to the food and energy crisis management, but which existed before and would have existed even without the crisis				
16. Energy poverty program	T	I	MoLSP	Yes
17. Financing of energy efficiency projects for municipalities (World Bank loan)	L	O	MoF	Yes
18. Subsidies for the purchase and installation of photovoltaic panels for the production of electricity up to 4 kilowatts for own consumption by households	T	P	MoE	Yes
19. Postponement of the introduction of the environmental tax for energy producers	L	P	MoF	Yes
20. Loans for investment in projects for energy efficiency and renewable energy sources, with an interest rate not exceeding 1.6%	T	O	Development Bank	Yes
21. New line to support the economy through the European Investment Bank for a green transition	T	O	Development Bank	Yes
22. Green financing through the EBRD, the UNDP and commercial banks	T	O	Development Bank	Yes
Measures mainly unrelated to the food and energy crisis				
23. Recommendation that the municipalities reorganize public transportation so that it is available for the benefit of all citizens	L	O	Government / MoLSG	Yes
24. Subsidizing of contractual interest rate on loans granted by commercial banks to business entities that will reinvest the profit for 2021	T	O	Government / Development Bank	Yes

25. Financial support through direct lending from the Development Bank to companies	L	O	Development Bank	Yes
26. Financial support through commercial banks with interest-free loans for working capital	L	O	Development Bank	Yes
27. Use of the Guarantee Fund at the Development Bank	L	O	Development Bank	Yes

Source: Own compilation based on announcements at www.vlada.mk.

The second package of measures against the food and energy crisis announced in October 2022 contained 19 measures with an estimated value of EUR360 million. However, only five measures were new, while an additional sixth new measure was announced in November 2022 (Table 2). The rest of the measures were just a reiteration or continuation of the measures which were announced in March 2022 (Table 1). Pensions and social assistance payments were also increased to combat the effects of the crisis. All new measures were targeted, of which the first two directly supported the incomes of the vulnerable segments of the population and were worth about EUR20 million. The decision to subsidize (regulate) the electricity price for companies in the food industry adopted in November 2022 was tied with the obligation of these companies to reduce the prices of their final products, which together with some frozen margins still in place, was aimed at reducing retail food prices from December 2022.

Table 2: Government measures adopted in October 2022

	Linear (L) or targeted (T)	Affects: prices (P), income (I), other (O)	Responsible institution	Still in place at the end of 2022
Measures directly attributable to the food and energy crisis				
28. Support for vulnerable categories of citizens, 3,000 MKD for 4 months	T	I	MoLSP	Yes
29. Support for recipients of low pensions, 6,000 MKD and 3,000 MKD for 4 months	T	I	MoLSP / PDIF	Yes
30. Credit line for SMEs to support liquidity	T	O	Development Bank	Yes
31. Inclusion of schools in the regulated electricity market	T	O	Government	Yes
32. Control of the price of electricity for public health facilities and water-supply stations	T	O	Government	Yes
33. Subsidized price of 80 EUR/MWh for food production companies*	T	O/P	Government / MoE	Yes

Source: Own compilation based on announcements at www.vlada.mk.
** Measure added to the package in November 2022.*

4. SIMULATION OF THE POTENTIAL EFFECTS OF THE CRISIS ON HOUSEHOLD WELFARE: METHODOLOGICAL CONSIDERATIONS

4.1. MK-MOD-BASED MICROSIMULATIONS AND THE HOUSEHOLD BUDGET SURVEY

The underlying methodology of this analysis is micro-simulations derived from the MK-MOD Tax and Benefit Microsimulation Model for North Macedonia. It is a static model where individual behavior (labor-market activity, employment, childcare, saving, etc.) is assumed to be exogenous to the tax-benefit system. It belongs to the family of "standard" static models where individuals/households choose to supply labor (hours of work) until the point where the "marginal disutility of work equals the marginal utility of disposable (net-of-tax) income." (Saez, 2010, p.180). In this setting, taxes and social transfers affect the labor-market behavior by changing the relative value of work vs. leisure. MK-MOD has been validated by Petreski and Mojsoska-Blazevski (2017).

MK-MOD allows for simulation of social assistance, child allowances, unemployment benefits, direct taxes and social security contributions. For the purpose of the modelling exercise in this study, we expand MK-MOD by introducing consumption whereby the effects of the food and energy prices could be seen, i.e., their effect on the household budget, rather than on income per se. The consumption is introduced through its disaggregated components (12 grand groups and subgroups where necessary) and its increases are assumed to happen only through changes in prices, i.e., we do not postulate any behavioral or structural changes in consumption. We refrain from granular modelling of income, as we did in the study of the effects of COVID-19 (Finance Think, 2021), but rather just assume the nominal changes of its components.

Nominal changes in consumption due to rising prices, along with nominal changes in income components, are then used to calculate the real income at the household level, given the notion that each household may be differently affected by the changes in consumption and income. Real income is then used to produce the outcome indicators, based on which we observe the differential impacts of the food and energy crisis on Macedonian households.

Therefore, the critical point of this modelling is the switch to using the Household Budget Survey 2021 (HBS), as it includes information on both consumption and income. HBS is a national survey focusing mainly on household expenditure on goods and services undertaken since mid-1990s and earlier used to provide poverty estimates. In North Macedonia, poverty estimation based on HBS was discontinued with the introduction of the Survey on Income and Living Conditions (SILC) in 2010. There is an ongoing discussion in the literature about the potential differences between estimates based on HBS and those based on the SILC, but we will not comment on it as it is not directly relevant to our model.

4.2. Assumptions

There are two sets of assumptions we make in the analysis, one on prices and the other on income items, for both 2022 and 2023. Both are presented in Table 3.

Table 3: Underlying assumptions about prices and incomes

Item	2022 simulation	2023 simulation
Food and essential food prices	Actual price changes	Assumptions based on reasonable transmission of the global price developments, as evidenced by the FAO Food Price index and its components in the domestic economy
Energy (electricity)	Actual price changes	Assumptions based on known moves by authorities with implications for the regulated electricity price for households
Fuels	Actual price changes	Assumptions based on global forecasts
Housing, transport and hotels/ restaurants	Actual price changes	Transmission effects assumed, from the changes observed in food and energy prices over 2022
Other prices	Actual price changes	Transmission effects assumed, from the changes observed in food and energy prices over 2022, but lower than in the case of housing, transport and hotels
Wages and income from employment	Actual increases in wages	Assumed deceleration of wage growth to half compared to 2022, induced by the decelerating economy, abolition of the subsidy for social contributions, but supported by rising minimum wages and wages in some public sectors embedded in the state budget, as well as non-negligible effects of wage pressure from observed price inflation

Social assistance	Annual adjustment with the changes in prices	Annual adjustment with the changes in prices
Pensions	Actual increases in pensions	Annual adjustment with the changes in prices and the average wage
Capital income	Arbitrary increase by 7%	Arbitrary increase by 3.5%, reflecting decelerating economy
Remittances	Actual increases observed in the Balance of payments	Assumed increase of 20%, equal to 2022 increase
Agricultural and other income	An increase of 2.5% assumed, equal the expected growth of the overall economy	An increase of 2.2% assumed, equal the expected growth of the overall economy
Overall assumption	*None.*	*All above assumed changes, taken together result in a CPI inflation rate for the entire 2023 that falls between 7 and 9 percent.*

As for the assumptions of how prices behaved in 2022, we use the actual price developments, which means that they already reflect the government measures (discussed in Section 3.3) which were aimed at prices. Hence, to the above income effects of the food and energy crisis, we also model the impact of the measures affecting income (Table 1 and Table 2), for which we make additional assumptions relevant only to 2022 (Table 4). It is worth noting that the government applied a narrower targeting for some of the measures (e.g., in the third measure, it targeted certain subgroups of the social assistance receivers, which we cannot model due to insufficient information in HBS), which implies that the modeled effects of the income measures may be slightly overestimated.

Table 4: Underlying assumptions about government measures affecting income

Measures affecting incomes	
Measure	Modeling assumption
Vouchers for basic products of MKD1,000 per month for a period of 3 months for 35,000 citizens from the most vulnerable categories	Recipients of social assistance received a total of additional MKD3,000 over 2022
Subsidies for pensioners of MKD1,000 per month for a period of 3 months	Pensioners received a total of additional MKD3,000 over 2022
Support for vulnerable categories of citizens, 3,000 MKD for 4 months	Recipients of social assistance received a total of additional MKD12,000 over 2022
Support for recipients of low pensions, 6,000 MKD and 3,000 MKD for 4 months	Recipients of pension up to MKD11,500 monthly, receive a total of MKD6,000 for 2022, while those with a pension between MKD11,500 and MKD14,000 receive a total of MKD3,000.

In a separate step, we isolate the impact of these measures and also gauge

the impact of the measures affecting prices, to the extent possible. Namely, we take the measures which are affecting prices and narrow them down by considering those which are quantifiable, which results in discarding two of them from further analysis. We make the following assumptions with regard to their incorporation in the simulations (Table 5). We should note that these assumptions are conservative, i.e., their effects might have been larger, given that for some of the measures (like the subsidizing of electricity production), the true effect on the final price (including differential effect for different end-users) may be hard to gauge.

However, the potential overestimation of the income measures effect compensates, at least partially, for the potential underestimation of the price measures effect, so the total effect should be sufficiently close to reality.

Table 5: Underlying assumptions about government measures affecting prices

Measures affecting prices	
Measure	Modeling assumption
Reduction of the preferential VAT rate for basic food products from 5 to 0 percent for bread, sugar, flour, edible sunflower oil, long-life milk, fresh meat, rice, and eggs.	The price increase of these products (essential food list) was higher by 5 p.p. times 3 of the 12 months during which the measure was in place
Autonomous measure for the import of basic food products and raw materials	*Not quantifiable, not modelled*
Freezing the profit margins of basic food products	The price increase of these products (essential food list) was higher by additional 5 p.p. * 6 of the 12 months during which the measure was in place (on average)
Extension of the preferential tax rate of 5 percent to the sale of electricity to households	The price increase of electricity was higher by 13 p.p. due to having a full VAT rate
Subsidizing the price of electricity for the regulated market (for households and small consumers) – enacted at the end of 2021	The price increase of electricity was higher by additional 10 p.p., as conservative lower bound to reflect production costs of domestic production plants
Changing the methodology for determining the price for households and small consumers who are on the regulated electricity market	Not modelled due to insufficient information in HBS for the electricity consumption expressed in KWh.
Subsidizing the price for central-heating energy	The price increase of heating was higher by additional 10 p.p., as conservative lower bound to reflect production costs of domestic production plants
Reduction of the VAT rate from 18% to 10% for the sale of energy sources: diesel, unleaded gasoline, gas oil, liquid petroleum gas (LPG) and methane	The price increase of these products was higher by 8 p.p. due to having a full VAT rate

4.3. Poverty indicators and associated caveats

The new simulated income sets are used for the calculation of poverty rates. Three poverty indicators are used: the relative one based on the share of population living in households whose real income falls below the 60th percentile of the median equivalent income; and two absolute poverty rates – based on the income thresholds of USD3.65 per day and USD6.85 per day (2017 PPP terms), known as the lower-middle-income and upper-middle-income poverty thresholds, respectively. These are two of the three[1] commonly used absolute poverty lines suggested by the World Bank,[2] and recently updated in 2017 purchasing power parity (PPP) terms.[3] The relative poverty line is based on the per-adult equalized median household income, while the absolute poverty lines – on per household member income; for simplicity, we base all three indicators on the 'per member' principle, inter alia because in this manner we were better able to approximate the relative poverty rate obtained through the Survey on Income and Living Conditions (SILC). In any case, it is well known that poverty rates based on the Household Budget Survey (HBS) are usually lower than those obtained from SILC, which is nowadays the only relevant source for the official poverty statistics, which suggests that the most robust approach is the one focusing on poverty rates differentials across scenarios, rather than on their levels.

The next two additional indicators we calculate combine information on consumption and income. The energy poverty rate is defined through the share of households whose spending on energy exceeds 10 percent of their income. This relies on Boardman (1991) who proposed that "a household is in energy poverty when it has to spend more than 10% of its income on all domestic energy use, including appliances, to heat the household to a level sufficient for health and comfort". Since this seminal contribution, the "10% Boardman rule" is extensively used in cross-country studies. The rule acknowledges that households differ the effort required to sustain their energy needs, with a more effects required in lower-income households (Boardman, 2012).

[1] We are not using the extreme poverty line of USD2.15 per day (2017 PPP), because the incidence of it in North Macedonia is significantly below 1% based on HBS.

[2] A discussion on this could be found here: https://blogs.worldbank.org/developmenttalk/richer-array-international-poverty-lines

[3] See more here: https://www.worldbank.org/en/news/factsheet/2022/05/02/fact-sheet-an-adjustment-to-global-poverty-lines#10

The usage of HBS for calculating energy poverty rate has an important challenge though. Namely, half of the households reported zero energy consumption due to the way in which HBS data are collected, i.e., through a 15-day diary. Hence, if the electricity bill, for example, was not received (and paid) within the reporting period, the diary included zero consumption of energy. A similar, yet more aggravating problem may arise with the purchases of solid fuels, e.g., firewood, which households make less frequently and regularly. Not only do households using solid fuels report lower energy consumption, but their total reported consumption is also severely underreported. This happens because expenditures incurred during but paid outside the reporting period, as well as expenditures which are irregular in nature (e.g., durables) are not reported. Hence, we introduce a caveat that the calculated energy poverty rates may not be correct in absolute terms put the emphasis on the comparison between the current and simulated values, as well as on comparisons between simulated scenarios and population groups.

The second additional indicator is food poverty rate. We did not have guidance from the literature on this, because most calculations in this domain focus on the nutritional value of the consumption basket, rather than on its monetary value. Nutritional value cannot be calculated with HBS data, at least not in a sufficiently precise manner. Hence, we introduce a loose parameter by taking the monetary value of food items from three basic/essential groups: bread and cereals (1) milk, cheese and eggs (2); and oils (3), and calculate their share in household income. We set an arbitrary cut-off rate of 20 percent and count the households that exceed the threshold, considering them to be in food poverty. Again, the parameter could be contested due to its construction, but more than in its level, we are, again, interested in the changes across simulations.

5. SIMULATION RESULTS

5.1. The impact of the food and energy crisis in 20222

The first set of results estimating the impact of the food and energy crisis on household welfare is presented in Table 6. The five poverty indicators are presented for the entire population, for children, and then for a few disaggregations of the entire population (gender, number of children and education of the head of household) and of children (gender and age).

Baseline poverty rate of 2021 is 19.2 percent, suggesting that about a quintile of the entire population lived below the relative poverty line in 2021. This is not the official poverty rate published by the State Statistical Office based on SILC, yet similar in magnitude. Though, as pointed out earlier, we are more interested in establishing the baseline as well as in comparisons between different population groups. Group poverty indicators are color coded: in each row the indicators with the highest values are shown against red background, and indicators with the lowest values – against green background. For example, in the first row, relative poverty rate is the highest among households with three or more children (also confirmed by SILC), at 51.2 percent, followed by households headed by adults with low level of education, at 33.3 percent. On the opposite side, poverty incidence is the lowest in households where the head has tertiary or higher education, at 4.2 percent.

At 29.2 percent, child poverty is more prevalent than general poverty, which we also know from SILC. It is lower for girls and for children above 15. Energy poverty is, interestingly, of similar magnitude across various groups, hovering at about 27 percent, yet is the highest among low-educated households and households with the highest number of children. These households are also more exposed to food poverty, with food poverty levels 10 and more percentage points higher than the average 19 percent of all households that spend more than a quintile of their income on essential food. Food poverty is also more prevalent among children (23.4 percent) and among women (20 percent).

The second panel of indicators in Table 6 captures simulated poverty outcomes for 2022, given the assumptions discussed in Section 4.2. The differential effect of the crisis is reflected in the third panel, which gives the differences, in percentage points, between the baseline and the simulated poverty rates. This is where we focus our attention to gauge the impact of the food and energy crisis and mitigating government measures over 2022.

Relative poverty worsens by 0.7 percentage points (p.p.), which is a non-negligible deterioration. Namely, it predicts that the food and energy crisis of 2022 threw into poverty about 13 thousand more people. Child poverty worsens even more, by 1.3 p.p., which corresponds to additional 5 thousand children

thrown into poverty due to the food and energy crisis. The impact is gender neutral. Households with three and more children, who are anyway subject to multiple deprivations, experience further perils from the crisis, as their poverty deepens by 0.9 p.p., while the rate in households where the head is a low-educated adult worsens by 1 p.p. Girls are more affected than boys, while the impact is the strongest for children under 5, at astonishing 2.2 p.p., which corresponds to about 2 thousand children. This pattern is generally similar when the absolute poverty is evaluated through both lower- and upper-middle income thresholds, but differences in the case of the lower-middle income poverty are negligible, because its level is already fairly low.

The increase in energy poverty ranges from 0.6 p.p. for boys to 2.6 p.p. for children under 5. But these increases are not large given the levels of energy poverty, likely because of the mitigating measures, like the direct and indirect subsidizing of electricity and heating prices, in a linear fashion, i.e. for all households, as well the targeted energy subsidy for the social assistance recipients (in place for a couple of years already). Notably, there is no change in the energy poverty rate for households with three or more children, probably because these households had been already shielded through the energy subsidy program predating the crisis.

On the other hand, the worsening of the food poverty is severe. Food poverty rate soars by 8.2 p.p. for all households and 9.4 p.p. for children. Women are slightly stronger hit, while the increase is staggering among households with three or more children, at 14.5 p.p. It clearly depicts the risk of hunger among the members of households with more children. Girls are stronger hit than boys, and younger children more than older ones.

Table 6: Results – impact of the food and energy crisis in 2022

	Entire household									Children				
	All	Children	Gender		Number of children		Education of head			Gender		Age groups		
			Men	Women	2 and fewer	3 and more	Primary or less	Secondary	Tertiary or more	Boys	Girls	Under 5	6 to 14	Above 15
Pre-crisis (baseline) outcomes (2021)														
Relative poverty	19.2%	29.2%	19.8%	18.6%	15.4%	51.2%	33.3%	13.4%	4.2%	30.2%	28.2%	28.5%	30.3%	17.2%
Lower middle-income poverty	1.7%	3.7%	1.9%	1.6%	1.2%	5.9%	3.6%	0.9%	0.0%	4.6%	2.7%	5.2%	2.9%	1.3%
Upper middle-income poverty	6.6%	11.1%	6.7%	6.5%	4.9%	20.9%	12.6%	3.8%	2.1%	11.5%	10.8%	12.8%	9.7%	5.8%
Energy poverty	27.5%	27.0%	27.1%	27.9%	27.3%	28.8%	32.5%	25.1%	23.8%	26.7%	27.2%	26.6%	27.4%	27.6%
Food poverty	19.0%	23.4%	18.0%	20.0%	17.7%	29.9%	30.8%	14.0%	7.3%	22.7%	24.2%	23.5%	24.0%	18.1%
Crisis (simulated) outcomes (2022) (incorporates measures)														
Relative poverty	19.9%	30.5%	20.5%	19.3%	16.0%	52.1%	34.3%	14.1%	4.2%	31.2%	29.7%	30.7%	31.1%	17.8%
Lower middle-income poverty	1.8%	3.7%	1.9%	1.6%	1.3%	5.9%	3.7%	0.9%	0.0%	4.6%	2.8%	5.2%	2.9%	1.4%
Upper middle-income poverty	7.9%	13.0%	8.1%	7.6%	6.3%	21.0%	14.1%	5.1%	2.1%	13.6%	12.3%	13.9%	12.0%	6.9%
Energy poverty	29.4%	28.2%	28.9%	29.9%	29.4%	28.8%	33.6%	27.5%	25.5%	26.9%	29.5%	29.2%	28.0%	29.5%
Food poverty	27.2%	32.8%	25.9%	28.5%	25.1%	44.4%	38.9%	22.8%	12.5%	31.7%	33.9%	32.6%	32.3%	26.2%
Changes in outcomes (percentage points)														
Relative poverty	0.7	1.3	0.7	0.7	0.6	0.9	1.0	0.7	0.0	1.0	1.5	2.2	0.8	0.6
Lower middle-income poverty	0.04	0.05	0.01	0.06	0.04	-	0.10	-	-	-	0.09	-	-	0.04
Upper middle-income poverty	1.3	1.9	1.4	1.1	1.4	0.1	1.5	1.3	-	2.1	1.5	1.1	2.3	1.1
Energy poverty	1.9	1.2	1.8	2.0	2.1	-	1.1	2.4	1.7	0.2	2.3	2.6	0.6	1.9
Food poverty	8.2	9.4	7.9	8.5	7.4	14.5	8.1	8.8	5.3	9.0	9.7	9.1	8.3	8.1

Source: Authors' calculations based on HBS 2021 and MK-MOD.

Note: Coloring reflects the magnitude of the number when compared to the numbers in the same row, ranging from dark green – most favorable within the row, to dark red – least favorable within the row.

5.2 The impact of government measures in 2022

Whereas the estimates in Table 6 effectively show the combined impact of the crisis and government measures on household welfare, the next step in our analysis is to isolate the impact of government measures and evaluate its differential effect on the welfare of various groups of households. We divide the measures into those affecting income and those affecting prices and simulate their impact based on the assumptions discussed in Section 4.2.

The first panel in Table 7 shows the impact of income measures. Income measures alleviated absolute poverty. While the relative poverty increased, this indicator is less informative, because income measures, particularly those without a targeted component, increased also the median income, which resulted in higher relative poverty. Income-support measures reduced both lower- and upper-middle income poverty in our simulations. For example, when observed through the latter, income-support measures saved 4.5 thousand individuals from falling into poverty, including 1.1 thousand children. It's interesting to note, though, that the anti-crisis income measures did not improve the position of households with three or more children. Poverty among these households is aggravating, so that even additional income support provided through the 2022 income measures did not drag them out of poverty.

This group of measures did not contribute to mitigating energy poverty, one plausible reason being that such poverty had been already addressed by the energy subsidy. However, they clearly reduce food poverty, i.e., help households in coping with the rising prices of the essential food basket, though the magnitude of this impact is fairly low, on average, less than half percentage point.

The second panel presents the impact of the price measures. They slightly increased relative poverty, which is fully reflecting their linear component that resulted in shifting the median income against which relative poverty is estimated. Their impact of price measures has been more powerful than the impact of income measures, since additional 12.1 thousand people would have fallen into poverty, including 3.4 thousand children, had these measures not been put in place. Similarly, these measures did not contribute to improving the relative position of households with three or more children, as their already deep poverty was not alleviated by lower prices.

Price measures had a significant impact on energy poverty, reducing it by 1.1 p.p. for the households with tertiary-educated head and up to 3.1 p.p. for households with three or more children. Likewise, price measures worked for food poverty alleviation across the board. Low variation between groups articulates the non-regressive structure of price measures, whereby, in relative sense, they have similar impact on all households, or even lower impact on the wellbeing of the most vulnerable households, like those with three or more children.

When both groups of measures are combined, they produce plausible results (third panel of Table 7). Absolute poverty generally declines for most of the

subgroups. The two groups of measures reinforce each other in mitigating energy and food poverty. The regressive nature of the measures related to energy poverty is brought into relief. It is important to note that combined income and price measures lead to a greater decline of child poverty rates than of the general poverty rates, which suggests that despite not being pro-children by design, these government measures have effectively protected children to a greater extent than the overall population.

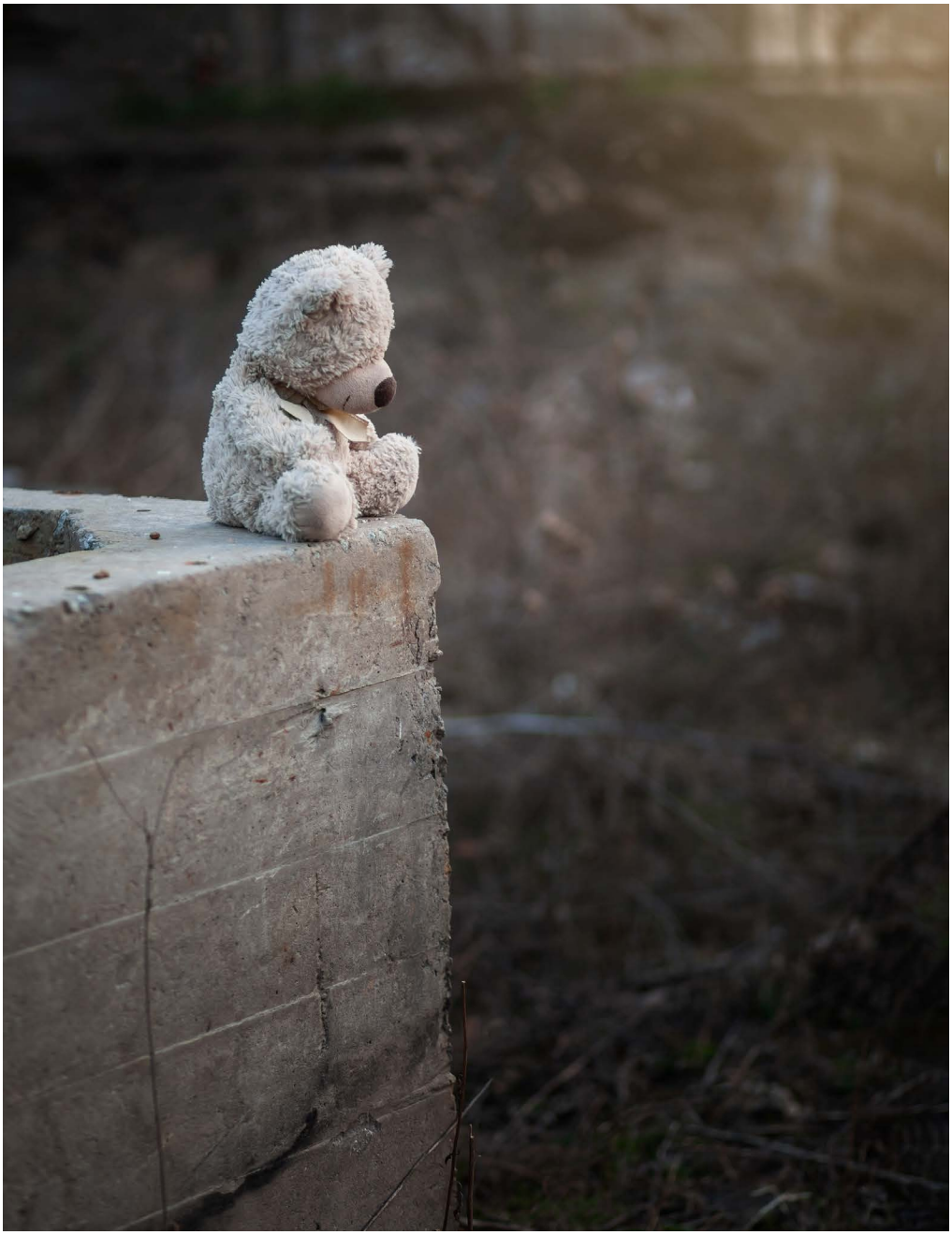


Table 7: Results – impact of government measures in 2022

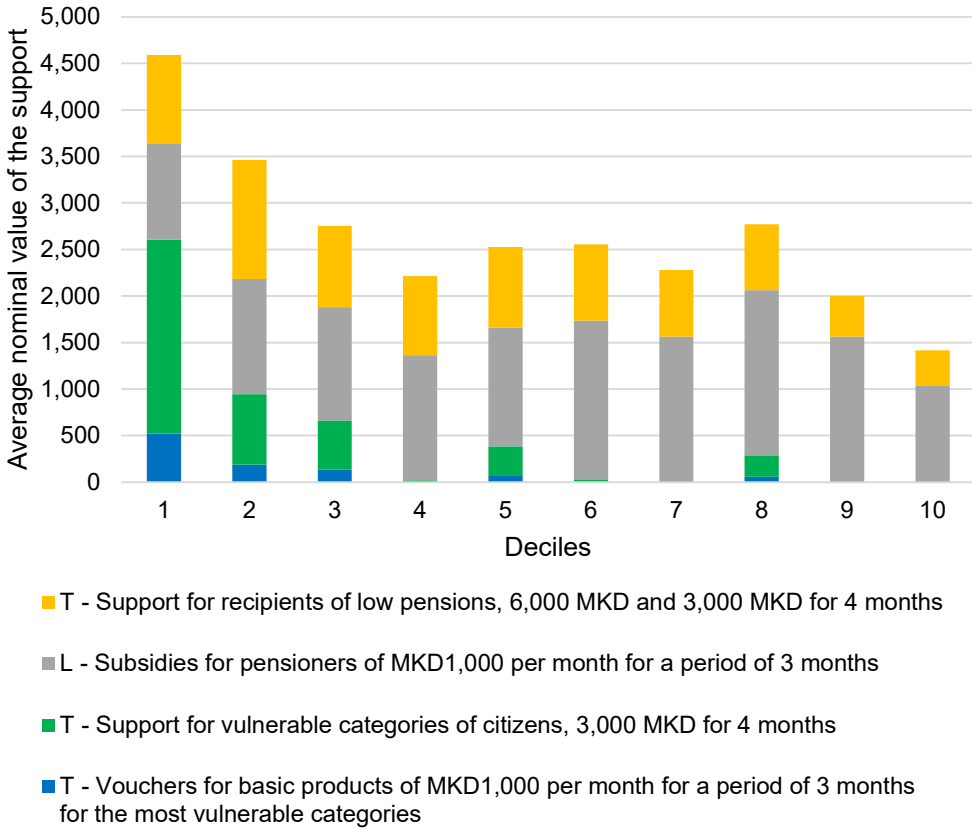
	Entire household									Children				
	All	Children	Gender		Number of children		Education of head			Gender		Age groups		
			Men	Women	2 and fewer	3 and more	Primary or less	Secondary	Tertiary or more	Boys	Girls	Under 5	6 to 14	Above 15
Impact of income measures														
Relative poverty	0.2	0.9	0.3	0.2	0.2	-	0.4	0.3	-	0.8	0.9	1.9	0.4	0.1
Lower middle-income poverty	(0.12)	(0.16)	(0.12)	(0.13)	(0.14)	-	(0.37)	-	-	(0.05)	(0.29)	-	(0.21)	(0.13)
Upper middle-income poverty	(0.3)	(0.3)	(0.2)	(0.3)	(0.3)	-	(0.7)	(0.0)	-	(0.7)	-	-	(0.7)	(0.2)
Energy poverty	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Food poverty	(0.4)	(0.6)	(0.4)	(0.5)	(0.4)	(1.4)	(0.8)	(0.3)	(0.3)	(0.7)	(0.6)	(0.8)	(0.8)	(0.4)
Impact of price measures														
Relative poverty	0.1	0.6	0.2	0.1	0.1	-	(0.3)	0.5	0.0	0.6	0.5	1.1	0.3	0.1
Lower middle-income poverty	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper middle-income poverty	(0.7)	(0.9)	(0.7)	(0.7)	(0.8)	-	(1.5)	(0.3)	-	(1.5)	(0.3)	(1.7)	(0.7)	(0.6)
Energy poverty	(2.4)	(2.6)	(2.4)	(2.4)	(2.4)	(3.1)	(2.2)	(2.8)	(1.1)	(1.9)	(3.4)	(3.0)	(2.4)	(2.4)
Food poverty	(1.8)	(2.0)	(1.7)	(1.9)	(1.9)	(1.4)	(1.5)	(2.4)	(0.3)	(1.8)	(2.3)	(1.2)	(2.7)	(1.8)
Combined impact of income and price measures														
Relative poverty	0.1	0.5	0.2	-	-	-	(0.4)	0.4	-	0.5	0.5	1.1	0.2	-
Lower middle-income poverty	(0.180)	(0.260)	(0.190)	(0.170)	(0.200)	-	(0.370)	(0.098)	-	(0.240)	(0.290)	-	(0.400)	(0.170)
Upper middle-income poverty	(0.8)	(1.0)	(0.9)	(0.8)	(0.9)	-	(2.0)	(0.3)	-	(1.5)	(0.4)	(1.7)	(0.7)	(0.8)
Energy poverty	(2.4)	(2.6)	(2.4)	(2.4)	(2.4)	(3.1)	(2.2)	(2.8)	(1.1)	(1.9)	(3.4)	(3.0)	(2.4)	(2.4)
Food poverty	(2.0)	(2.1)	(1.9)	(2.1)	(2.1)	(1.4)	(1.8)	(2.5)	(0.3)	(2.0)	(2.3)	(1.2)	(2.7)	(2.0)

Source: Authors' calculations based on HBS 2021 and MK-MOD.

Note: Coloring reflects the magnitude of the number when compared to the numbers in the same row, ranging from dark green – most favorable within the row, to dark red – least favorable within the row.

Figure 12 portrays the amount of government income support received in 2022 through deciles, to observe any distributional pattern. It is clear that the measures supporting incomes of vulnerable groups were the ones which reduced lower-middle income poverty and were strongly targeted and tilted towards the poor segments of the population, i.e., to those most in need and most affected by the food and energy crisis. On the other hand, however, the two measures supporting pension income are distributed more evenly along the entire income distribution, despite the fact that pension support of the second package was more targeted and tilted towards low pension recipients. Income support measures clearly elevate the median income, hence, technically explaining the increase of relative poverty.

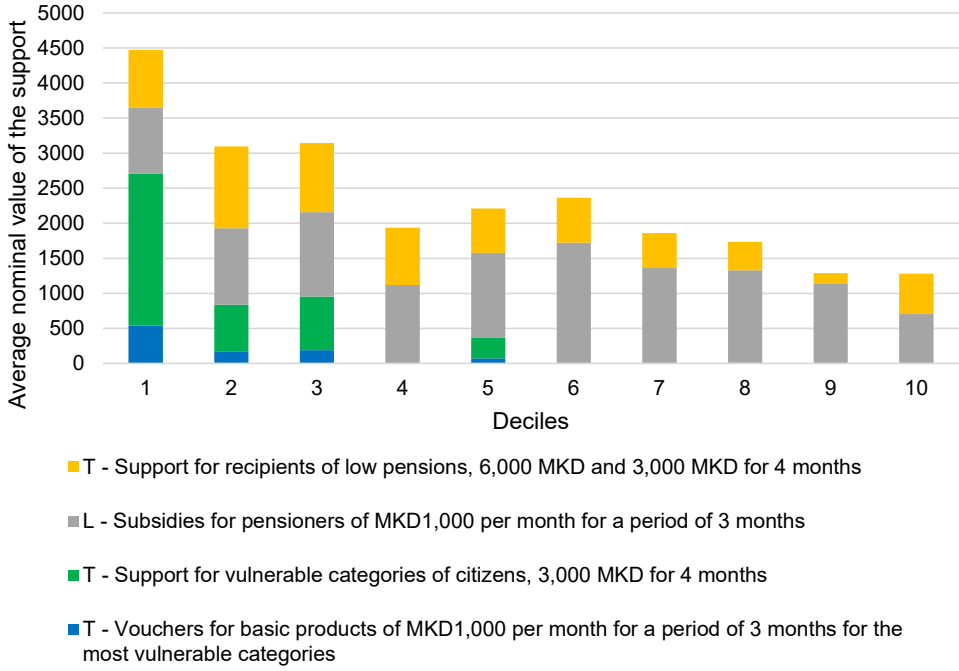
Figure 12: Distributional impact of the income measures, by deciles



Source: Authors' calculations based on HBS 2021 and MK-MOD.
Note: T refers to a targeted measure; L refers to a linear measure.

Although none of the government measures targeted children directly and explicitly, Figure 13 shows that income support measures were quite pro-children, particularly in the poorer segments of the population. The measures supporting incomes of the recipients of social assistance could be entirely attributed to helping children.

Figure 13: Distributional impact of the income measures for children, by deciles

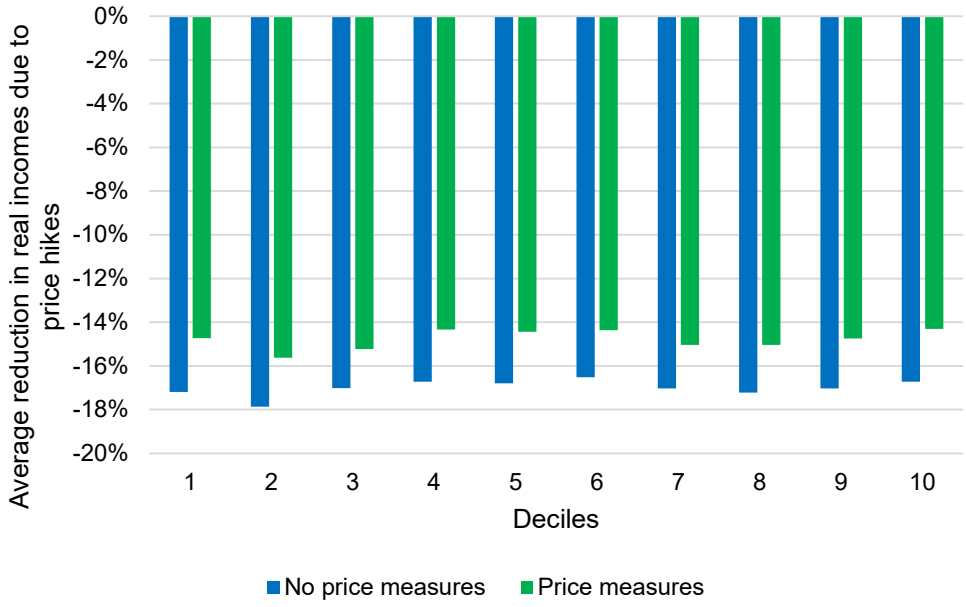


Source: Authors' calculations based on HBS 2021 and MK-MOD.

Note: T refers to a targeted measure; L refers to a linear measure.

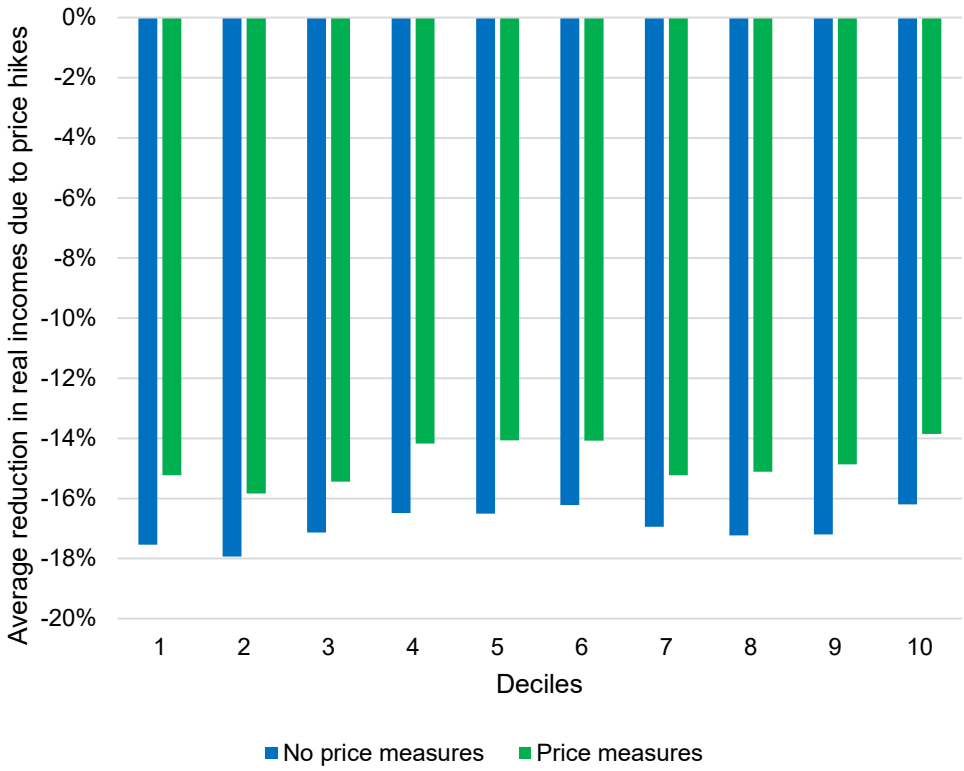
Price measures, on the other hand, are clearly linear, as they reduce real incomes across the board in a similar fashion, which can be shown for entire population (Figure 14), as well as for children only (Figure 15).

Figure 14: Distributional impact of the price measures, by deciles



Source: Authors' calculations based on HBS 2021 and MK-MOD.

Figure 15: Distributional impact of the price measures for children, by deciles



Source: Authors' calculations based on HBS 2021 and MK-MOD.

5.3. The impact of the food and energy crisis in 2023

The estimated impact of the food and energy crisis on the household welfare in 2023 and is presented in Table 8. The first panel contains the estimated indicators for 2022 (same as in Table 6), as they serve as the basis for our simulations for 2023, i.e. we estimate the additional impact of the food and energy crisis in 2023 on top of the effect we estimated for 2022. Then, the second panel presents the simulations for 2023, based on the assumptions stipulated in Table 3. The third panel gives the differential effect, which is where we focus further discussion.

The simulation suggests that the food and energy crisis will continue exerting a pressure on real budgets of households over 2023. The relative poverty is projected to reduce by 0.5 p.p. for the entire population and for most of the sub-groups, which is a reflection mainly of the expected adjustments in social assistance with price growth in January and in pensions adjustments with the price and wage growth in March and September. This also explains the no-change situation in the case of the lower-middle income poverty line. A clearer

poverty-related effect emerges when the poverty is observed through the upper-middle income threshold. Clearly, the sluggish growth (in income) together with the still significant price increases would drive poverty up by an important 1.1 p.p. overall and 1.4 p.p. for children. This will correspond to the descend below the poverty line of 20 thousand individuals, including about 5 thousand children. The lingering crisis effect is estimated to be the strongest for households with low adult education, and for children below 5. This suggests that if these groups are left without targeted government support over 2023, they will be the ones that bear the brunt of the protracted crisis.

Energy poverty is simulated to increase only infinitesimally, since no changes in regulated prices of electricity are assumed except the partial increase of VAT from 5 per cent to 10 per cent, as well as the reduction in the subsidy for central heating, but the latter is hardly visible as central-heating households are usually not below the energy poverty line. On the other hand, food poverty is expected to ease, particularly within households with three or more children, as decelerating global food prices (a trend that started in 2022) continue to transmit onto domestic prices over 2023.

Table 8: Results – impact of extended food and energy crisis in 2023

	Entire household									Children				
	All	Children	Gender		Number of children		Education of head			Gender		Age groups		
			Men	Women	2 and fewer	3 and more	Primary or less	Secondary	Tertiary or more	Boys	Girls	Under 5	6 to 14	Above 15
Previous-year (simulated) outcomes (2022)														
Relative poverty	19.9%	30.5%	20.5%	19.3%	16.0%	52.1%	34.3%	14.1%	4.2%	31.2%	29.7%	30.7%	31.1%	17.8%
Lower middle-income poverty	1.8%	3.7%	1.9%	1.6%	1.3%	5.9%	3.7%	0.9%	0.0%	4.6%	2.8%	5.2%	2.9%	1.4%
Upper middle-income poverty	7.9%	13.0%	8.1%	7.6%	6.3%	21.0%	14.1%	5.1%	2.1%	13.6%	12.3%	13.9%	12.0%	6.9%
Energy poverty	29.4%	28.2%	28.9%	29.9%	29.4%	28.8%	33.6%	27.5%	25.5%	26.9%	29.5%	29.2%	28.0%	29.5%
Food poverty	27.2%	32.8%	25.9%	28.5%	25.1%	44.4%	38.9%	22.8%	12.5%	31.7%	33.9%	32.6%	32.3%	26.2%
Next-year (simulated) outcomes (2023)														
Relative poverty	19.4%	29.6%	19.8%	18.9%	15.4%	52.5%	33.1%	13.8%	4.1%	29.9%	29.3%	29.4%	30.6%	17.3%
Lower middle-income poverty	1.8%	3.8%	1.9%	1.6%	1.3%	5.9%	3.7%	0.9%	0.0%	4.6%	2.8%	5.2%	2.9%	1.4%
Upper middle-income poverty	9.0%	14.4%	9.2%	8.7%	7.5%	21.0%	16.4%	5.6%	2.1%	15.2%	13.6%	16.2%	12.9%	8.0%
Energy poverty	29.8%	28.8%	29.3%	30.4%	29.9%	29.0%	34.3%	27.9%	25.6%	27.6%	30.2%	31.0%	28.1%	29.9%
Food poverty	23.7%	26.6%	22.5%	24.8%	22.6%	32.3%	35.7%	18.9%	9.8%	26.1%	27.2%	29.2%	25.6%	23.0%
Changes in outcomes (percentage points)														
Relative poverty	(0.5)	(0.9)	(0.7)	(0.4)	(0.6)	0.4	(1.2)	(0.3)	(0.1)	(1.3)	(0.4)	(1.3)	(0.5)	(0.5)
Lower middle-income poverty	0.0	0.0	0.0	-	0.0	-	0.1	-	-	0.0	0.0	-	0.0	0.0
Upper middle-income poverty	1.1	1.4	1.1	1.1	1.2	-	2.3	0.6	-	1.6	1.3	2.3	0.9	1.0
Energy poverty	0.4	0.6	0.4	0.5	0.5	0.2	0.7	0.4	0.1	0.7	0.7	1.8	0.1	0.4
Food poverty	(3.5)	(6.2)	(3.4)	(3.7)	(2.5)	(12.1)	(3.2)	(3.9)	(2.8)	(5.6)	(6.7)	(3.4)	(6.7)	(3.2)

Source: Authors' calculations based on HBS 2021 and MK-MOD.

Note: Coloring reflects the magnitude of the number when compared to the numbers in the same row, ranging from dark green – most favorable within the row, to dark red – least favorable within the row.

6. CONCLUSIONS AND RECOMMENDATIONS

The objective of this study was to assess the impact of the food and energy crisis on households' welfare in North Macedonia, paying particular attention to the impact on children. By the means of simulation, we estimate the likely impact of the crisis on indicators like overall and child poverty, as well as energy and food poverty, thus combining approaches from both the consumption and income sides.

Our results suggest that the food and energy crisis has already exerted a fairly strong pressure on Macedonian households over 2022, and the welfare of children has been especially severely impacted. We estimate that the food and energy crisis of 2022 threw into poverty about 13 thousand more people, including about 5 thousand children. It was mainly the rising prices of food which aggravated households' welfare, while the impact of the energy crisis was likely contained by the controlled price of electricity and the government's energy subsidy program. The crisis burden has been particularly heavy for households with three and more children and for households with lower education levels of adult members. Given that these two categories overlap, the worsening of the food poverty has been projected to pose a serious hunger risk for some households. Girls and younger children have been more severely hit.

Government measures are estimated to have softened the effects of the crisis, and to a greater extent for children, even though they were not designed as pro-children. Estimates suggest that income support measures saved 4.5 thousand individuals from falling into poverty, including 1.1 thousand children. The impact of the price measures has been assessed as more powerful, since additional 12.1 thousand people would have fallen into poverty, of which 3.4 thousand children, had these measures not been put in place. Price measures were critical for containing energy poverty entirely, as well as food poverty to a large extent. However, part of the income measures and most of the price measures were found to have a linear effect, i.e., in relative sense they equally helped poor and rich households, thereby reducing poverty, but also supporting incomes in places where this was not necessary, hence wasting valuable budget funds.

A sluggish growth in incomes together with the still significant price increases forecasted for 2023 would push additional 20 thousand individuals of which about 5 thousand children below the poverty line over 2023. This impact is stronger than in 2022 for adults and similar for children. The lingering crisis of 2023 is expected to be characterized by a stronger than in 2022 deceleration of income growth and weaker than in 2022 acceleration in price growth with a resulting higher pressure on real incomes than in 2022. Also, it goes without

saying, that the simulations for 2023 do not incorporate any other mitigation measures than those already announced and expected to continue beyond 2022. The simulations nevertheless convincingly demonstrate that any targeted income-support measures are likely to produce fairly large welfare gains and curtail some of the projected income fallouts. Our recommendations discussed below are based on these results.

Recommendations primarily relating to income poverty outcomes

- Income support measures should be strictly targeted to produce anti-poverty gains in times of strained budget. As the impact of the 2022 measures varied, their better targeting may be accompanied with expansion of targeted vulnerable groups, so that the effect of the measures is sufficiently felt also in the third or fourth income decile;

- Targeted income support measures are particularly relevant for continuous shielding of the most vulnerable groups during 2023 who, if left without government income support, will be the prime bearers of the burden of the extended crisis;

- Generally speaking, a crisis response measure that has shown to be very effective in the past is relaxing the eligibility criteria to the key poverty fighting cash benefit – the Guaranteed Minimum Assistance (GMA). Our past analyses have shown that this measure – in combination with expanding of the energy subsidy – was very effective in addressing the secondary impact of COVID-19 on households, and it is highly likely to be effective in dealing with the food and energy crisis as well.

- For effective poverty relief the GMA needs a clear labor market related reference value (e.g., the average wage or similar market-driven indicator).

- A more frequent indexation of the cash benefits, e.g., at least twice a year (as for pensions), in accordance with the rise in prices should be adopted to ensure that they preserve their value vis-à-vis market developments.

Recommendations primarily relating to energy poverty outcomes

- The linear price measures on energy products need to be gradually phased out, not only because they negatively affect the state budget, but also because they support the (probably unavoidable in the short-run) proliferation of the current account deficit. The gradual phasing-out needs to be compensated with the expansion of existing or new well-targeted measures. Energy poverty targeting should include households which may not be poor by income, but which may be still vulnerable

to energy poverty due to household size, inefficient heaters, etc. The impact on institutions, like schools and kindergartens which currently use subsidized electricity, should also be. Carefully considered, as rapid and careless phasing out of current subsidies may indirectly expose children to learning and health risks.

- The expansion of the energy subsidy that predates the latest crisis in terms of coverage and size may produce clear gains in reducing poverty. Its size and coverage may be subject to further analysis in the evolving context to be followed by adjustments and fine-tuning.

- This analysis may be extended to the effects on vulnerable households of the progressive energy pricing methodology, introduced in July 2022, if data on the electricity consumption in KWh is obtained from the Energy and Water Services Regulatory Commission. While the progressive methodology is supposed to penalize excessive use of electricity by households for luxury purposes (e.g., heating large houses, swimming pools, etc.), it may also punish several vulnerable groups of households, such as families with three and more children – which are already in deep poverty or severely exposed to the risk of poverty.

Recommendations primarily attributable to the food poverty outcomes

- As households with three or more children are the most deprived segment of the population, their explicit targeting above any other group appears to be necessary. For example, the current linear food price measures for essential food items should be replaced with vouchers for the purchase of these food items distributed to the vulnerable segments of the population,

- Given the soaring risk of hunger in several groups of households, the government should consider the introduction of free school feeding programs which will address both food poverty and nutrition outcomes. North Macedonia recently made initial progress in this direction with the introduction of a free school snack in primary education, but the time has come to examine the possibility of introducing a more substantial free regular meal for primary school students.

Recommendations primarily relating to the fiscal space

- Price measures should be gradually reduced, as they serve all households, including those who could weather the impact of the crisis without government assistance. This is particularly important in times of fiscal consolidation and financial market stringency.

- Certain price measures may be retained, viz. measures which serve other purposes than addressing (the risks of) poverty, e.g. the freezing of profit margins, which aims to prevent traders from maintaining excessively high prices when food price pressures on the global market diminish;

- Despite the rising pressures on the national and municipal budgets, the authorities should strive to protect social spending and increase its efficiency, effectiveness and equity. In particular, all efforts must be made to keep schools open and warm even amidst the soaring prices of electricity and heating. This is key to reducing and even eliminating the associated risk of further deepening the learning crisis which commenced during the COVID-19 pandemic, as well as the risk that school closures might leave children from vulnerable households to face the winter in cold homes.

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