



# The impact of unexpected inflationary shock in 2022 and 2023 on the welfare of families

*The case of Slovakia*

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## The impact of unexpected inflationary shock in 2022 and 2023 on the welfare of families: The case of Slovakia<sup>1</sup>

by Jana Valachyová<sup>2</sup> and Matúš Senaj<sup>3</sup>

### ABSTRACT

We analyse the impact of an unexpected and steep increase in price level on the purchasing power of Slovak families in 2022 and 2023. This is the first and the only paper that looks at distributional impacts of an inflationary shock in Slovakia. We combine a microsimulation model SIMTASK with the data on expenditure from the Household Budget Survey to quantify the net effect of an inflationary shock together with the cushioning effects of government measures and economic adjustments in the form of inflation-induced wage growth and an additional valorisation of social benefits. We show that in 2022, the government measures were well targeted and succeeded in offsetting a significant part of a purchasing power drop for low-income families. For high-income families, economic adjustments were the crucial component offsetting a significant part of their purchasing power drop. However, the overall net effect on purchasing power was negative (6 % for an average family) and it holds true for each income decile and family type. The story is different in 2023. It turns out that despite the high inflation, the macroeconomic adjustment hand in hand with adopted government measures, including a generous price cap on energy prices, more than compensate for the effects of unexpected inflation (3 % increase for an average family). This holds true for all analysed income categories, except for the lowest income decile. When looking at family types, the best off are families without children, often consisting of pensioners.

**KEYWORDS:** *microsimulation, inflationary shock, distributional effect, tax and transfer policy*

**JEL CLASSIFICATION:** *C81, D31, E31, H24, I38*

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## 1. Introduction

The Russian invasion of Ukraine and resulting energy crisis have led to an unprecedented increase in inflation and the living costs of European households, with an above-average manifestation in Slovakia. The aim of this paper is to quantify to what extent the government measures and macroeconomic adjustments in the form of inflation-induced wage growth and an extra valorisation of social benefits helped the families to cope with the drop in their purchasing power. In Slovakia, this is the first paper that combines a microsimulation model with the data on expenditures according to their purpose (COICOP classification) to analyse the effects of an inflationary shock.

A standard analytical data source used by researchers to assess the impact of inflation on households is the Household Budget Survey (HBS), a national-level survey on consumption expenditure on goods and services. HBS data enable researchers to estimate the consumption baskets of different types of households and to compute the specific inflation rates these different types of households are facing and thus assess the impact of inflation on specific households.

There is a growing literature on the impacts of the recent high inflation episode on European consumers. The Bruegel think tank created an inflation inequality dataset (Claeys et al., 2022a), where they computed inflation rates faced by households in different income brackets for each EU country. Their main findings are formulated in Claeys et al. (2022b). In countries experiencing the highest rates of inflation, low-income groups faced a much higher inflation rate than high-income groups. However, the Bruegel researchers admit there are outliers from this pattern, and they formulate three main factors explaining why inflation inequality can be lower for a given inflation rate. The first reason is similar consumption patterns between high and low-income groups. The second one is the offsetting effect of large price increases of the goods and services consumed more by the high-income group. And the third reason is national policies affecting specific prices.

Causa et al. (2022) use HBS and price data for OECD countries and come to the same conclusion that in all considered countries, inflation burdens relatively more low-income than high-income households. They show that a drop in households' purchasing power in 2022 varies between countries (from 3 % in Japan to 18 % in the Czech Republic). In most of the countries the drop is driven by energy prices (Denmark, Italy, and the United Kingdom); for other countries (the Czech Republic and the United States) the inflation is more broad-based.

Sologon et al. (2022) analyse the distributional pattern of price changes since the start of the cost-of-living crisis in early-2021 and mid-2022 in selected European countries. Using the HBS data, they confirm that the impact of inflation depends on a combination of the price increase and goods' specific budget shares. Since budget shares for necessities such as food, domestic fuels or electricity are higher in poorer countries, in combination with a higher price growth in these necessities, this has resulted in a higher inflation in poorer countries. Distributional impacts differ substantially across countries. The authors conclude that similar levels of regressivity of inflation<sup>4</sup> may come out from a different interplay between the level and the disproportionality of inflation across the income distribution.

National governments have adopted a variety of measures to protect their citizens from rising inflation, some of them supporting citizens through targeted payments, others reducing taxes or setting price caps. Bruegel's researchers created a dataset on national fiscal policy responses to the

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<sup>4</sup> In the academic literature, inflation is considered to be highly regressive, falling hardest on low-income groups while high-income groups have more capacities to adapt to soaring prices.

energy crisis (Sgaravatti et al., 2021). Their main findings are formulated in the Bruegel Blog post (Sgaravatti et al., 2023). At an aggregate level, only a third of the fiscal interventions of European governments were targeted at vulnerable population groups. EU governments have largely favoured untargeted price-distorting measures (73 %) compared to targeted income-supporting measures (27 %).

An analytical approach combining the HBS data and microsimulation models enables researchers to assess the effect of inflation on purchasing power of households along with the effect of government measures adopted to insulate the households from these effects. This approach is taken by Curci et al. (2022), who analyse the impact of the increase in inflation on Italian households' purchasing power. The authors use a static and non-behavioural microsimulation model developed at Banca d'Italia, which allows them to simulate the Italian tax and benefit system using the sample data from the Banca d'Italia Survey on Household Income and Wealth. Data on consumption, derived from the HBS data, are integrated into the microsimulation model using the statistical matching method. Under the simplistic assumption that households' consumption choices remain unaltered, they can evaluate the upper bound of the welfare loss suffered by households as a result of the inflationary shock.

According to Bańkowski et al. (2023), using the microsimulation model EUROMOD, the government measures cushioned about one-quarter of euro area household real income loss due to high inflation in 2022. First, measures targeted to cope with price increases have temporarily lowered consumer prices. Second, measures aimed at supporting household income contributed to the increase in households' nominal disposable income. Overall, a 5.8 % increase in disposable income compensated for around 60 % of the 2022 rise in inflation in the euro area. Increases were mainly due to the rise in the market component of household income (3.6 %) and reflected the indexation of public wages and pensions. Discretionary government income support measures accounted for an increase in disposable income of 0.9 percentage points. Commonly used measures included cash transfers to households, transfers to families with children, students or pensioners; increases of transport subsidies for commuters; and income tax allowances or reductions that were assumed to be of a temporary nature.

The approach presented in this paper is similar to Curci et al. (2022). We analyse the impact of the increase in inflation on Slovak families' purchasing power.<sup>5</sup> We use the microsimulation tool developed in the Office of the Council for Budget Responsibility, which allows us to simulate the Slovak tax and benefit system using sample data from Statistics on Income and Living Conditions (SILC). Data on consumption, derived from the HBS, are integrated into the microsimulation model by estimating parametric Engel curves. In line with Curci et al. (2022) we evaluate to what extent the adopted government measures helped Slovak households to cope with the drop in their purchasing power. In addition, we assess how the consequent economic adjustments contributed to the changes in purchasing power. For 2022 we quantify the contribution of the inflation-induced growth in wage level. While there was no "extra" valorisation effect in 2022 (previous year inflation plays a major role), we quantify the contribution of such an "extra" benefit valorisation for 2023.

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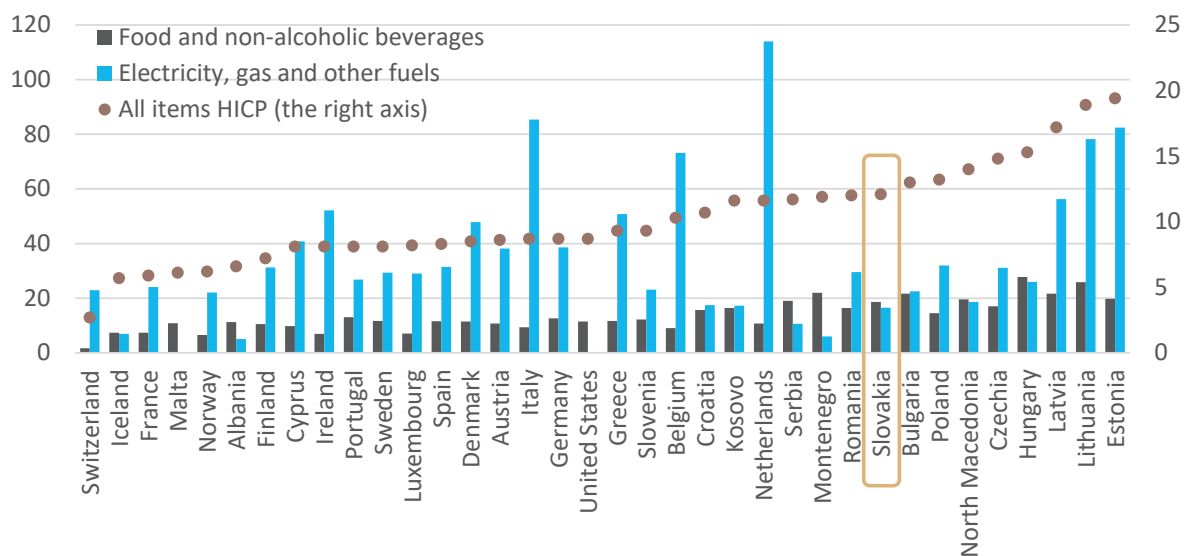
<sup>5</sup> While the economic literature usually considers a household to be the most important economic unit, we will use the term "family" in the rest of this paper. The Slovak social system relies on "family" units, which are usually smaller than households. A family consists of one or two parents or partners and their underaged children, if any. Thus, several families can form one household – e.g., parents with children being one family and grandparents being another family.

## 2. Inflationary shock and government response

Slovakia, like other European countries, has been confronted with an extremely high inflation rate since the second half of 2021. In 2021 the increase in price level was related to the post-pandemic economic recovery. In 2022 the most decisive drivers of high inflation, common for all European countries, have been high energy prices, induced by the Russian invasion of Ukraine. Due to the war, international trade has been hampered, the prices of commodities and inputs increased, thus leading to the increase of final product prices as well.

Compared to other European countries, Slovakia faced above average inflation in 2022 (HICP of 12.1 for Slovakia vs. 8.4 for European average, see Figure 1). The same is true for the increase in food prices (18.6 vs. 10.5). Due to strict regulation settings in network industries, energy prices for households did not rise as much as in other European countries (16.5 vs. 46). Increased market electricity and gas prices were only partially reflected in the prices for households in 2022, as in Slovakia the regulated prices are adjusted just once a year (in January). Thus, an increase in market prices over 2022 would only be transmitted into the customer prices in 2023. Obviously, final consumer prices were indirectly affected by the high energy prices via increased costs of other consumer goods and services.

Figure 1: Inflation rate (HICP) - international comparison in 2022

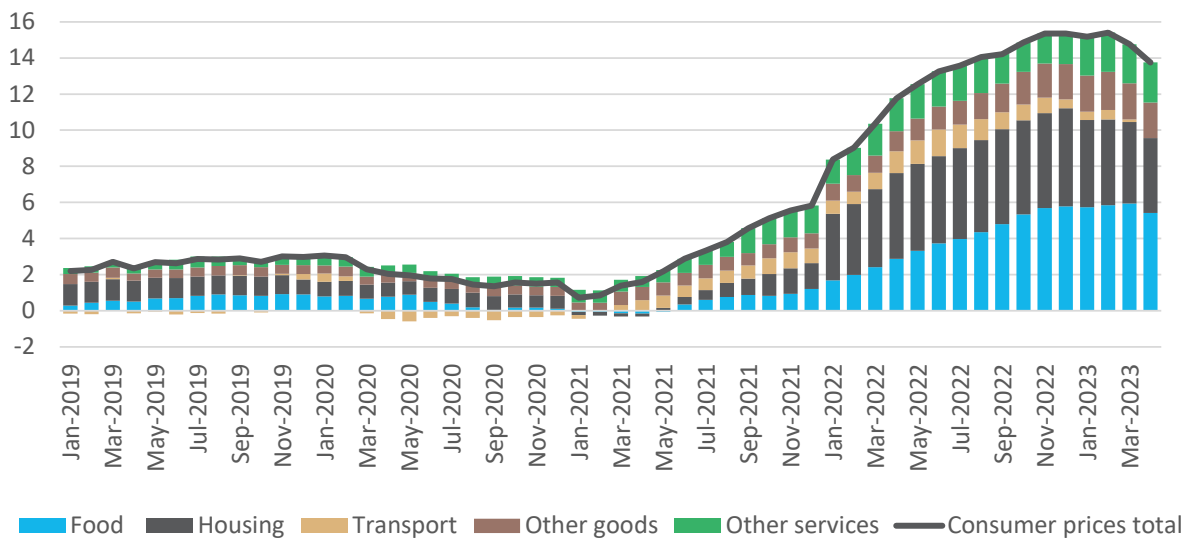


Source: Authors' calculations based on Eurostat data

Although not as dramatic in international comparison, the rise in energy prices was one of the main contributors to the total inflation rate growth in 2022, along with the increase of the price level of food items (see Figure 2). The energy prices jumped in January 2022 and their contribution to the total price level changed from 3.3 p.p. in January to 4.5 p.p. in December. On the other hand, Slovak households were witnessing a steady growth of food prices during 2022, with a contribution to total inflation starting at 1.7 p.p. in January and reaching 5.8 p.p. in December. The year-on-year increase in food prices was almost 30 % at the end of the year 2022.



Figure 2: Contributions to annual headline inflation rate in Slovakia (CPI), Jan 2019 - Apr 2023



Source: Authors' calculations based on the OECD data

Since the beginning of 2022, the government has adopted several types of measures to increase the disposable income of families or to set price caps on energy prices. Some of them can be classified as measures related directly to the inflationary shock and were adopted as a response to higher food and energy prices.<sup>6</sup> These measures are included in our analysis on assessing the effect of the inflationary shock. Moreover, the government has also adopted several measures that are unrelated to the inflationary shock and would have been adopted regardless of the inflationary shock. Those measures significantly increased the disposable income of affected families. Therefore, they are included in our analysis when looking at the year-on-year changes in purchasing power.

When looking at total budget allocation to support Slovak households (see Table 1), more than half of the financial help is allocated to untargeted price measures (54 %). In 2022 most of the government support is directed to targeted income support measures (it is 100 % if we do not consider the impact of the reduced distribution fee). In 2023 the situation is reversed, with 63 % of measures directed to untargeted price measures. If looking strictly at anti-inflationary measures, 76 % of measures are untargeted at the two-year horizon, which is in line with the results reported by Sgaravatti et al. (2021).

<sup>6</sup> Our analysis incorporates the consensual view of economic experts in Slovakia, who participated in our opinion poll. In the poll we asked about their opinion on which of the policy measures adopted by the government in 2022 and 2023 they consider a direct policy response to the high inflation.

**Table 1: Categorization of measures adopted by Slovak government (in mil. euros)**

Measure	Tar- geted	Related to shock	Allocated budget			Included in the analysis
			Total	2022	2023	
Anti-inflation Package 1	yes	yes	101	101		yes
Anti-inflation Package 2	yes	yes	9	9		yes
Vaccination incentive bonus	yes	no	278	278		yes
14th pension benefit	yes	yes	208	208		yes
Support directed to families with children						
Child benefit	yes	no	462	30	432	yes
Child Tax Credit	yes	no	704	90	614	yes
Energy price cap for households	no	yes	2 640		2 640	yes
Advance indexation of pensions	yes	yes	522		522	yes
One-off aid to the poorest	yes		1		1	no
Reduced electricity distribution fee	no		97	97		no
Selling electricity to selected groups of vulnerable customers at a fixed price						no
2023 Budget: Energy cap for municipalities	no		150		150	no
<b>All measures</b>			<b>4 925</b>	<b>717</b>	<b>4 208</b>	
<i>Targeted measures</i>			46 %	100 %	37 %	
<i>Untargeted measures</i>			54 %	0 %	63 %	
<b>Anti-inflationary measures</b>			<b>3 481</b>	<b>319</b>	<b>3 162</b>	
<i>Targeted measures</i>			24 %	100 %	17 %	
<i>Untargeted measures</i>			76 %	0 %	83 %	

Source: Authors' calculations.

Note: A table from Sgaravatti et al. (2021) was adjusted so that it considers measures concerning households only. The fiscal effects were adjusted using the most available and accurate information.

In 2022 two rounds of income support measures were adopted by the government, consisting of one-off benefits paid to vulnerable households, uniformly 100 euro per household. Exception was made for families with children when the support was per child. We also include the assessment of a one-off income support targeted at pensioners, the so-called 14th pension. Another two measures adopted in 2022 can be classified as measures unrelated to the inflationary shock. First, a vaccination incentive bonus to those citizens who got vaccinated against COVID-19 disease and were older than 60 years. Second, income support measures targeted at families with children (a permanent increase of a child tax credit and child benefit).<sup>7</sup> Details on the structure of income support measures can be found in Table A 3 in the Appendix.

In 2022 there were no direct government measures capping energy prices for households. Nevertheless, the Regulatory Office for Network Industries succeeded in reducing the costs of electricity distribution and transfer (by 4 %) for households, which mitigated the increase in the final price of electricity for households. For simplicity reasons, in our analysis we abstract from this measure reducing electricity distribution fees in 2022.

Regarding 2023, the most significant measure to be assessed is the price cap on energies for households. As the regulated energy prices are fixed for Slovak households for each calendar year, a dramatic increase was expected in 2023. We estimate that without the price cap, the regulated prices

<sup>7</sup> In our analysis we consider family income support measures to be unrelated to the inflationary shock, mainly because of their permanent character. However, it might be argued that if it would not have been adopted, the government would adopt some kind of anti-inflationary measures, ideally of transitory character, to help families to cope with price increase.

of electricity would have increased by 67 %, the prices of gas by 200 % and heating by 112 %. By adopting two Government Regulations, a memorandum with the main electricity supplier and via subsidies, the Slovak government capped energy prices for households in 2023. These measures hold electricity prices for households almost flat, while natural gas and heating prices are higher by approximately 15 %.<sup>8</sup> Households would have paid 1 320 euros more, on average, for energy in the absence of these measures (2.64 billion euros in total). The second important measure related to the inflationary shock in 2023 was an amended mechanism of indexation of pensions, bringing forward an increase of pensions. This measure ensures that pensioners have their pensions increased in advance by 6 months (in July 2023 instead of January 2024).

The most important measure unrelated to the price shock in 2023 is an income support measure targeted at families with children, adopted already in 2022 but extended in 2023 by significant increases in the child tax credit and child benefit (see Table A 2 in the Appendix).

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<sup>8</sup> A lot of houses and blocks of flats in Slovakia, particularly in cities, are heated by centralized heating systems. The price of heat energy unit is also regulated, and the price increase was capped similarly with natural gas.

### 3. Methods and data

#### 3.1. Modelling approach

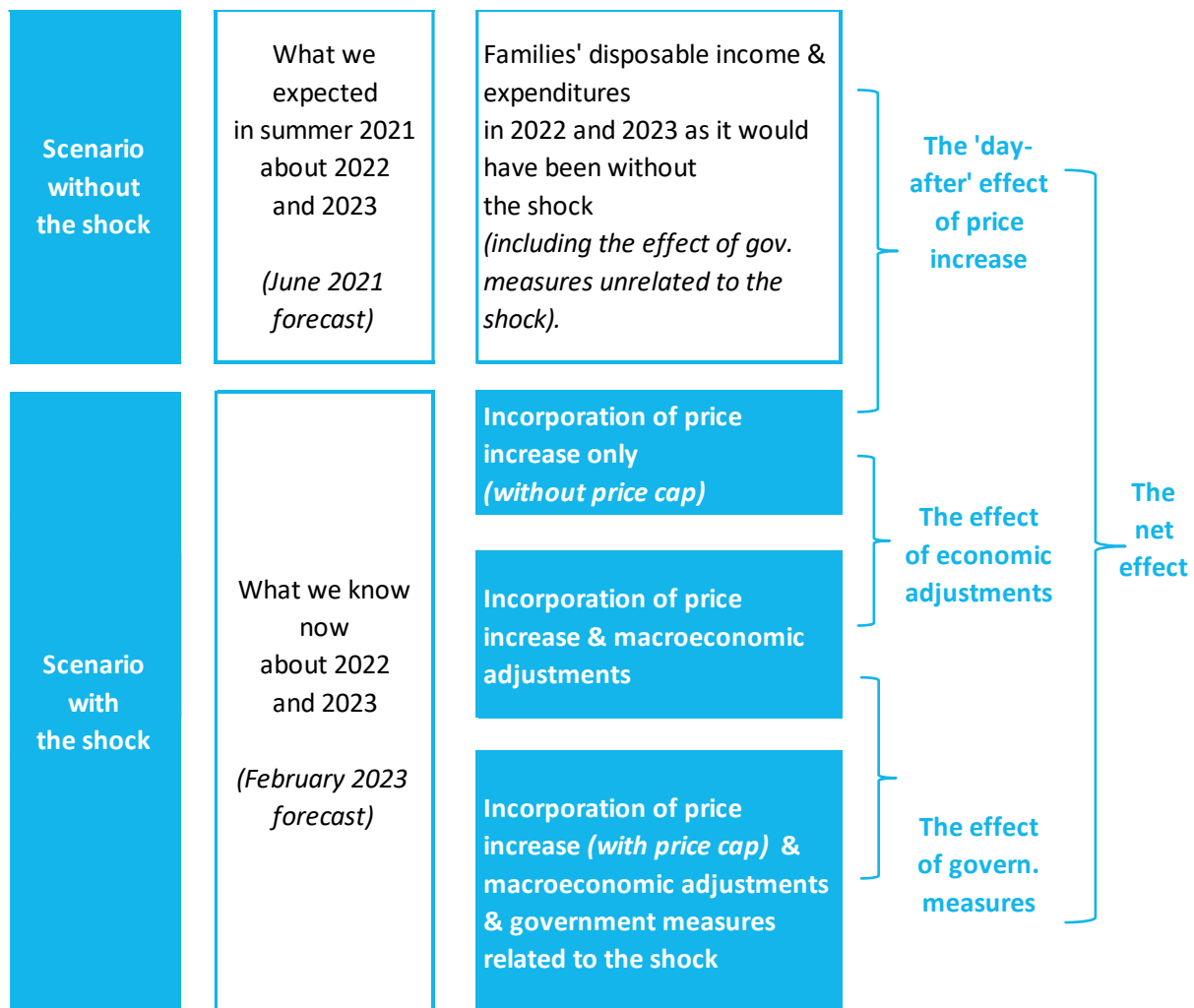
In our modelling approach we create two worlds – one without the occurrence of the inflationary shock and the other one with the shock (see Figure 3). We assume that the world without the shock corresponds to the opinion of macroeconomic experts on economic development as of the summer of 2021. Thus, macroeconomic indicators, inflation and wage growth, are according to the pre-shock forecast of the Macroeconomic Forecasting Committee<sup>9</sup> in June 2021. The world with the inflationary shock represents the more recent opinion of macroeconomic experts on economic development, or in other words, macroeconomic indicators correspond to the forecast of Macroeconomic Forecasting Committee in February 2023 (macroeconomic forecast).

In order to disentangle the individual effects, the world with the inflationary shock is built gradually. First, we want to see the uncompensated effect of surprise inflation, without any government measures related to the shock or consequent economic adjustments. Therefore, if there is a price cap on energy prices, we regard it as a government measure and, in this scenario, we introduce a price increase without the price cap. In the next step, we add the effect of economic adjustments. By these we mean the difference in economic indicators according to the pre-shock and after-shock forecasts – for example a wage growth in the inflation scenario above the originally expected wage growth. In the final step we add the effects of government measures. We chose to add this scenario at the end, because the effect of some of the government measures may depend on final wages or pensions. In this scenario we also include the energy price cap. Simulating these four scenarios, and by their differences, we obtain all the effects we want to evaluate: the uncompensated effect of price increase, the cushioning effect of economic adjustments, the cushioning effect of government measures and the resulting final net effect.

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<sup>9</sup> The Macroeconomic Forecasting Committee is an advisory body to the Ministry of Finance. A preliminary forecast is prepared by the Ministry of Finance and committee members express their opinion by assessing it as conservative, realistic, or optimistic. The June 2021 and February 2023 forecasts were approved as realistic.

Figure 3: Modelling approach applied to assess the net effect of the inflationary shock



Source: Authors' calculations based on the OECD data

Note: The order of scenarios matters. First macroeconomic adjustments and then government measures, as the eligibility for child credit depends on wages. In 2023, in scenario 2 we model total price increase, in scenario 4 we model price increase after the price cap.

To assess the impact of the inflationary shock on Slovak households, we use the microsimulation tools developed by the Office of the Council for Budget Responsibility (Siebertová et al., 2016 and Horváth et al., 2019). We incorporate the information on households' expenditure using HBS 2015 dataset into a static microsimulation tax-benefit model SIMTASK (for details see Siebertová et al., 2018). SIMTASK itself uses the SILC 2019 data on income and demographic characteristics to simulate tax-benefit policies.

While in both data sources (SILC and HBS) there is information on households' incomes and their characteristics, we use the expenditure allocation model that applies the parametric regression technique and imputes the households' expenditure for all twelve COICOP categories.<sup>10</sup> Before the imputation, both datasets are adjusted to the economic situation in 2021 using the official aggregate

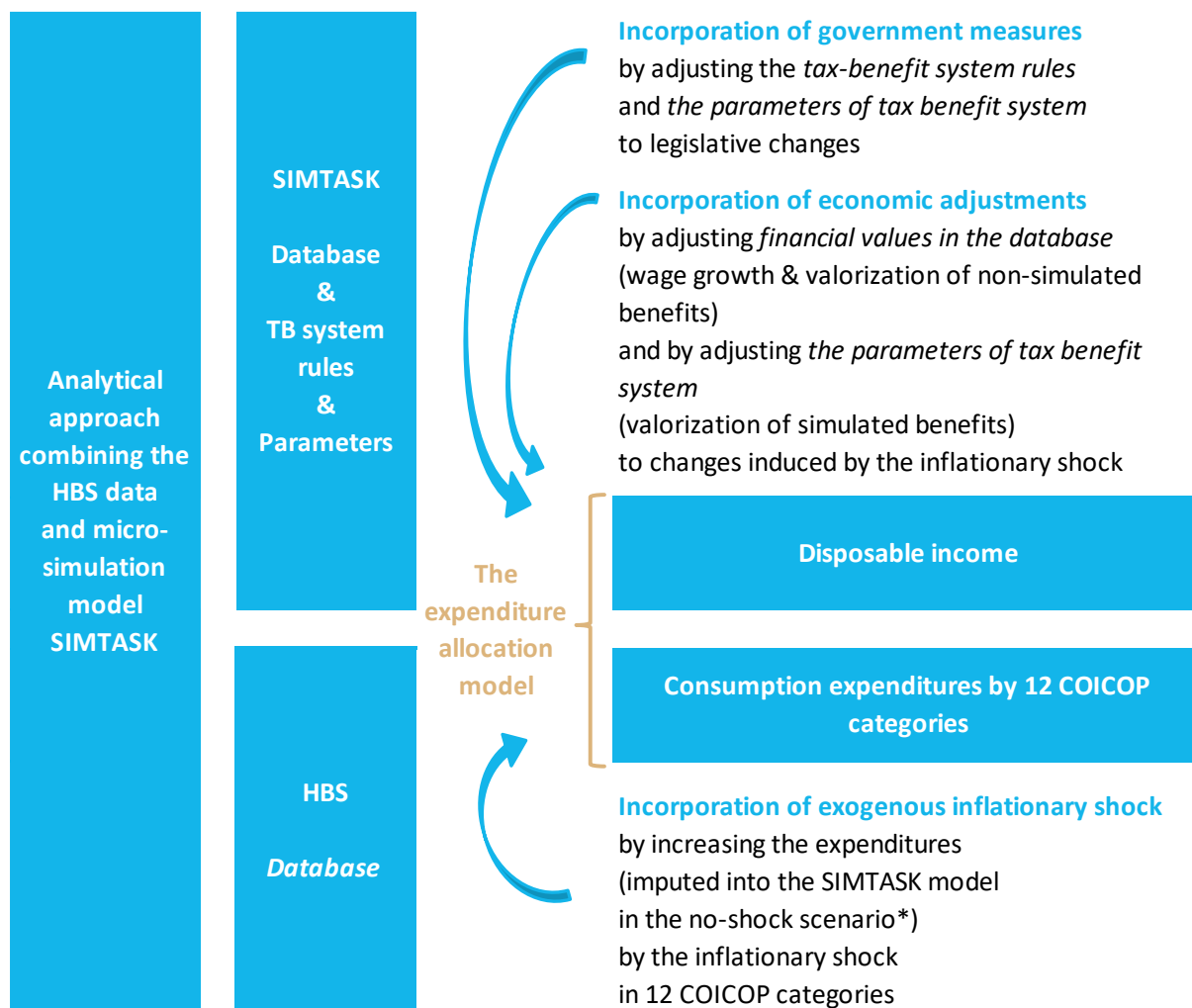
<sup>10</sup> In this paper we use our model estimated for Slovakia, to impute expenditures for twelve COICOP categories. However, there are other possibilities, for example statistical matching, that would allow to impute even higher number of expenditure categories.

statistics (e.g. demography and labour market statuses, 2019-2021) and using the national account statistics (household disposable incomes and final consumption by COICOP categories, 2015-2021). This means that the household consumption is imputed in the dataset representing the year 2021.

We treat higher inflation as an exogenous shock to the Slovak economy. This means that household expenditures are updated to 2022 and 2023 price levels according to macroeconomic scenarios defined in Table A 4 in the Appendix. As a result, the average propensity to consume may change in 2022 and 2023 depending on the growth of income and consumption. Not only expenditure but also various types of incomes are updated according to macroeconomic scenarios.

The expenditure is imputed at the level of households as defined in both, SILC and HBS, surveys. If necessary, we transform the expenditure imputed at the original household level to a specific family level. We divide the household expenditure to family level proportionally according to the disposable income of the families.

**Figure 4: Analytical approach combining HBS data and microsimulation model SIMTASK**



Source: Authors' calculations based on the OECD data

\*We assume there is no behavioural reaction of economic agents.

## 3.2. Assumptions applied in the model

We do not consider the behavioural reactions of economic agents due to several restrictions of the model we use. First, the amount of household consumption in each COICOP category is fixed to 2021 volumes. So, the families in the model are not able to adjust their consumption habits even if the prices are different. Second, the average propensity to consume is given by the assumptions on income and price growth. That means that families cannot adjust their saving rate.

In a richer setup, wealthier families would have more options to cope with higher inflation, they could decrease their savings or change their consumption habits and buy cheaper alternatives of the products they were used to. Therefore, the results presented in the paper represent an upper bound of direct (“day after”) effects on purchasing power.

### 3.2.1. Assumptions on the inflationary shock

At the aggregate level, we define an inflationary shock as a difference between the actual or forecasted inflation rate in 2022 and 2023 respectively and the inflation rates expected before the consumer prices began to grow. We assume that the hypothetical no-shock inflation rate is the rate expected in the macroeconomic forecast in June 2021.

In June 2021, before the prices started to grow significantly, the macroeconomic forecast expected 2022 inflation of 2.9 %. However, the actual rate reached 12.8 %. For 2023, the original forecast expected inflation rate of 2.4 %, while a revised forecast in February 2023 expects 9.8 %. This rate already includes the government price cap on energy prices, without which the total inflation rate would have been 19.7 %.

Thus, the assumed size of the inflationary shock is 9.9 p.p. in 2022 and 17.3 p.p. in 2023 (or 7.4 p.p. if considering the effect of price cap).

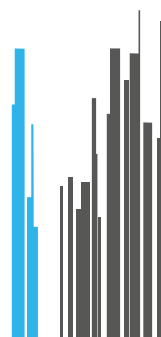
**Table 2: Forecasted values of headline inflation**

		2022	2023	
Jun-21	inflation rate without the shock	2.9	2.4	
Feb-23	inflation rate with the shock	12.8	19.7	(9.8 with price cap)
	Inflationary shock	9.9	17.3	(7.4 with price cap)

*Source: Authors’ calculation based on the forecasts of the Macroeconomic Forecasting Committee.*

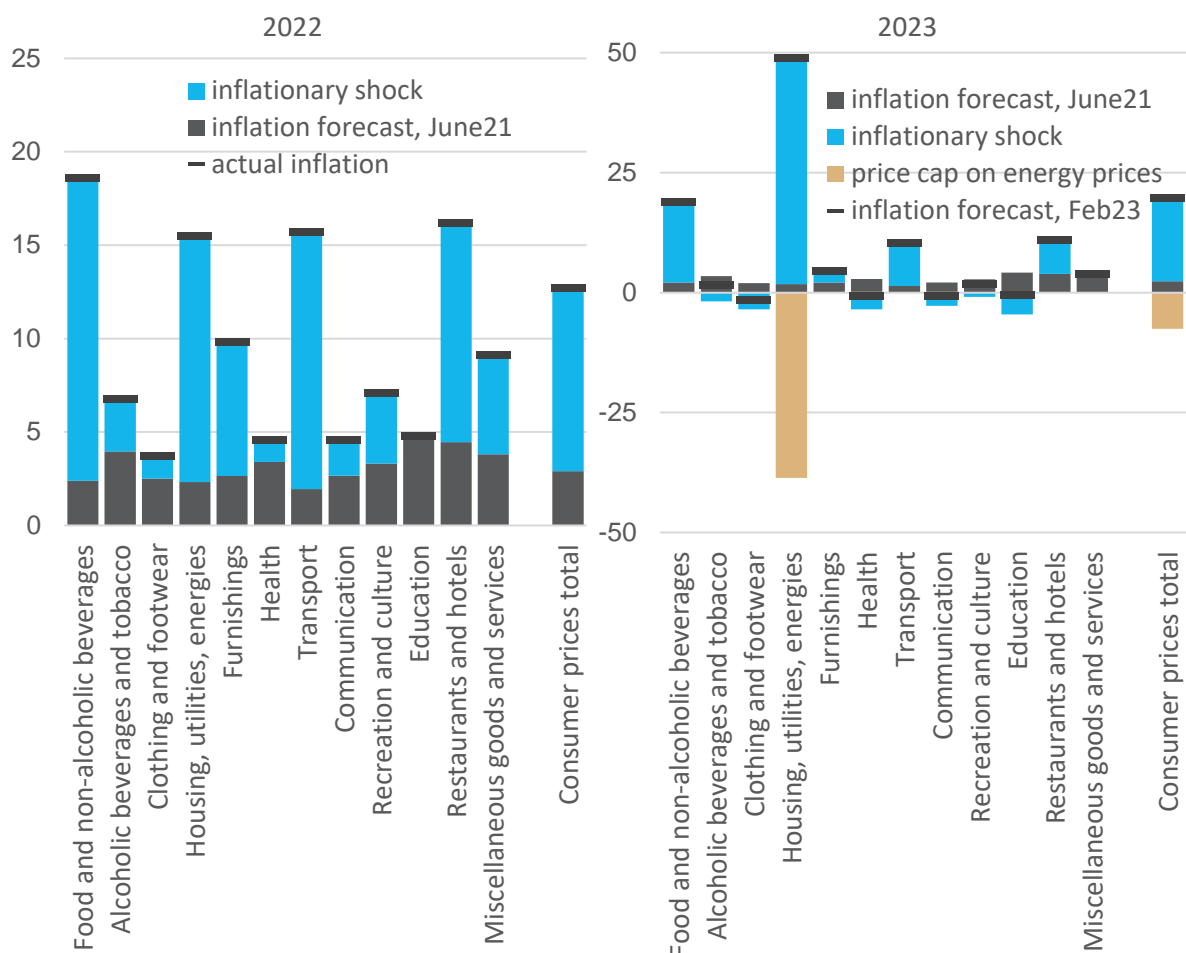
In order to capture the variability in the impact of inflation across families, we need to create inflationary shock for every COICOP category. Historical data on inflation can be found in COICOP division, however the situation is different with inflation forecasts. Except for food prices, they are available at an aggregate level only, therefore the assumption on inflation rate by COICOP categories is needed. To do so, we compute the long-term deviations of price increase trend in each COICOP category from headline inflation and consequently apply these deviations to the forecasted level of non-food price increase expected in June 2021 (3 % and 2.5 % in 2022 and 2023 respectively). Regarding food prices, we use the forecasted value. For details see Figure 5.

To define inflationary shock in 2023, apart from the necessity to disaggregate the total inflation rate to COICOP categories, we need an additional assumption on a hypothetical inflation rate in the category *Housing, water, electricity, gas and other fuels* without the government price cap on energy



prices for households. Here we use the differences between actual prices of gas and heat energy and the prices set by the Regulatory Office for Network Industries at the end of 2022, before the price cap on energy was adopted by the government. For electricity, the regulatory office did not set the maximum prices before the government approved the price cap on electricity. In this case we replicate the regulatory framework applied in the previous year to estimate the maximum prices of electricity for households valid in 2023 without any price cap. It turns out that the price increase in this category would have been 39 p.p. higher without the price cap and the headline inflation would have been higher by 7.5 p.p. without the price cap.<sup>11</sup> To decompose the inflation rate in 2023 with the government price cap on energy prices for households we use the following procedure. We use the differences between the price increase in each COICOP category (except for food prices) and the headline inflation in 2022 and we apply those differences to the inflation forecast expected in February 2023 (9.8 % for 2023). Regarding food prices, we use the forecasted value.

**Figure 5: Headline inflation and inflationary shock by COICOP in 2022 and 2023**



Source: Authors' calculations based on the data of the Statistical Office of the Slovak Republic.

Note: Left picture shows the actual inflation rate and the inflation rate expected in June 2021. The picture on the right depicts the inflation rate in 2023 forecasted in June 2021 and Feb 2023. Government measure known as price cap on energy prices cushions the inflation rate in the COICOP category Housing, water, electricity, gas and other fuels.

<sup>11</sup> We assume that the inflation rate in other categories is not influenced by the energy price cap, as it is applied to households only, not to intermediate producers.



### 3.2.2. Assumptions on the inflation-induced wage growth

Because of high inflation, there was additional pressure from employees to increase their wages. The increased price level has been partially transmitted to the wage level throughout 2022, although wages did not grow as fast as prices. We assume that the difference in the wage growth between the values expected in the macroeconomic forecast in June 2021 and the values expected in February 2023 is an inflation-induced wage growth. Such definition of inflation-induced wage growth also includes the effect of wage indexation in the state and public sector.<sup>12</sup> We do not assume any further wage-price spiral, as the original price shock remains strictly external.

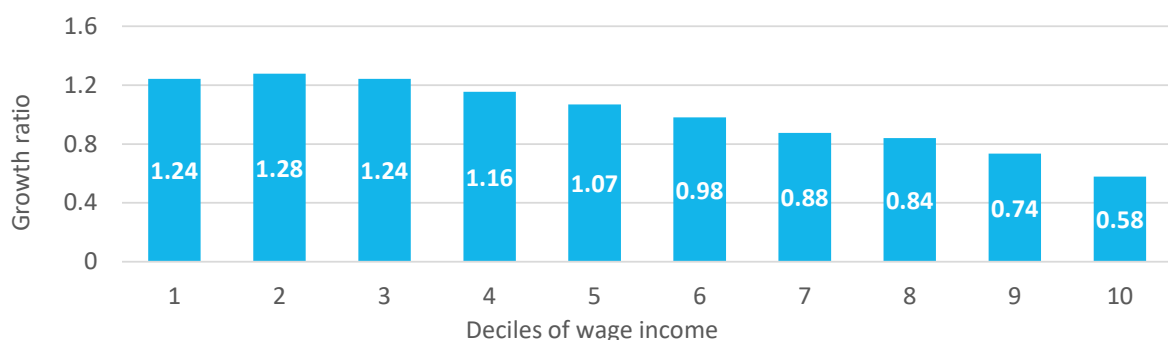
**Table 3: Forecasted values of wage growth**

		2022	2023
Jun-21	wage growth without the shock	4.1	4.9
Feb-23	wage growth with the shock	8.1	10.5
	Inflation-induced wage growth	4.0	5.6

*Source: Authors' calculation based on the forecasts of the Macroeconomic Forecasting Committee*

To incorporate income growth heterogeneity into our analysis, a non-uniform wage indexation is applied. Instead of standard labour income indexation, where the income of every person in the sample is increased by the same rate, we index income separately for each income decile. Individual data from the Social Security Agency (2014-2022) were used to compute the medians of year-on-year changes for each income decile.<sup>13</sup> Consequently, we computed the ratios of the median wage growth in each decile to the growth of average wage. By applying these ratios, we can allocate the growth of average wage to all income deciles. Data confirm that wages in lower income groups are rising faster than in higher income groups.

**Figure 6: Ratios of the median wage growth in income deciles to the average wage growth**



*Source: Authors' calculation based on the Social Security Agency data (2014-2022)*

<sup>12</sup> Wages of state and public employees have risen by 7 since January 2023 and by another 10 % since September 2023, the wages of public teachers have risen even more (by 10 since January 2023 and 12 % since September 2023).

<sup>13</sup> We use median values of wage growth for each decile rather than mean values because they are not influenced by extreme values. In the lowest income deciles, the mean values of wage growth would be higher as there are shifts from lower to higher income deciles year-on-year. On the other hand, for high income deciles, the mean values would be lower as there are shifts from high to lower income deciles. When computing the median values of wage growth, we consider only those observations with monthly income exceeding the minimum wage. This helps us to avoid the effect of changing part time to full time to be included in the wage growth.

### 3.2.3. Assumptions on the extra valorisation of social benefits

The second channel through which inflation is being transferred into the increase in family income is the automatic indexation of social benefits. As there is a long delay in the indexation mechanism, there is no extra valorisation effect in the year 2022, but only in 2023. An extra valorisation for recipients of pension benefits is higher (8.8 %) than an extra valorisation for the recipients of other social transfers (4.6 %). The reason is that different price statistics are applied in the indexation mechanisms.<sup>14</sup>

**Table 4: Forecasted values of pensioners' inflation**

		2022	2023
Jun-21	without the shock	1.3 *	3.0
Feb-23	with the shock	1.3	11.8
Extra valorisation of pensions		0.0	8.8

*Source: Authors' calculation based on the forecasts of the Macroeconomic Forecasting Committee.*

\* Value in 2021 is fixed the same for both forecasts

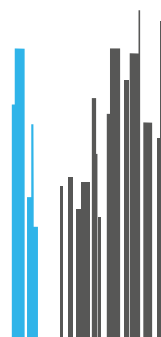
**Table 5: Forecasted values of minimum living income growth**

		2022	2023
Jun-21	without the shock	1.5 *	2.9
Feb-23	with the shock	1.5	7.5
Extra valorisation of social transfers other than pensions		0.0	4.6

*Source: Authors' calculation based on the forecasts of the Macroeconomic Forecasting Committee.*

\* Value in 2021 is fixed the same for both forecasts

<sup>14</sup> The additional increase in the pensioners' benefit in 2023 due to shifting the date of valorisation from January 2024 to July 2023 is in our analysis included as the effect of adopted government measures and is not considered here in the effect of automatic indexation.



## 4. Results

First, we show the isolated impact of the inflationary shock on Slovak families in 2022 and 2023. We look at the impact of increased prices on the purchasing power of Slovak families, and we show to what extent the drop in purchasing power was offset by anti-inflationary measures adopted and economic adjustments induced by the inflationary shock. The direct impact of increased prices is decomposed into three components: compensation by government measures, compensation by economic adjustments (in the form of an extra wage growth induced by the inflationary shock and in the form of an extra automatic valorisation of social benefits due to the inflationary shock) and the resulting net impact of the inflationary shock that the families need to adjust to.

Second, we show how the purchasing power of Slovak families changed year-on-year. Thus, we also include the changes that would have occurred without the existence of the inflationary shock. The year-on-year changes in purchasing power can be decomposed into the no-shock and shock component.

We look at the impact on Slovak families according to their income (we categorize families<sup>15</sup> into ten income deciles) and according to family structure (we categorize “single parent” families and “two parents” families according to the number of children they have).

### 4.1. Assessing the distributional impact of the inflationary shock by income deciles

#### 4.1.1. Impact of the inflationary shock by income deciles in 2022

First, we look at the direct effect of increased prices on families in 2022, without considering government measures or economic adjustments induced by inflation. We interpret the direct effect on families as an increase in their expenditure, or in other words a drop in their purchasing power.

On average, a Slovak family faced an unexpected increase in its expenditure by 10 % in 2022 because of the inflationary shock (see Figure 7). If we look at families across income distribution, we see a regressive pattern. Families with the lowest income faced an increase in expenditure of 11 %, while for families with the highest income the increase was 9 %. In comparison to other European countries, the regressivity is flat, one of the reasons being a modest rise of energy prices in 2022 in Slovakia compared to some other European countries, where the energy contracts for households already incorporated the increased prices throughout the year. Claeys et al. (2022a), looking at the difference in quintile specific inflation rates, shows that inflation inequality was driven mainly by the prices of food and energy, while prices of transport had an opposite direction.

To help Slovak families cope with the high inflation, the government adopted targeted income measures in 2022. In relative terms, these measures compensated for the drop in purchasing power mostly in low-income families. If not implemented, families in the first income decile would have faced a drop in their purchasing power of 11 %. Government measures compensated 5 p.p. of this loss, thus leaving the low-income families facing a drop in their purchasing power of 6 %. The amount of

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<sup>15</sup> For the comparison, in Appendix A4 we offer a look at the assessment of the impact by income deciles also at households' level.

government measures directed at families with higher income was diminishing. Their contribution in the tenth decile was insignificant, thus leaving these families with a 9 % drop in purchasing power.

The anti-inflationary government measures per se helped mainly at the lower end of the income distribution.<sup>16</sup> On top of that, economic adjustments helped families to compensate for the drop in their purchasing power too. We assume that without the inflationary shock, wages would have grown at a slower pace in 2022. The extra growth in wages as a result of inflationary pressure compensated for the increase in expenditure by 3 p.p. for an average Slovak family. The effect of economic adjustments thus exceeds the effect of government measures of 1 p.p. The effect of economic adjustments is regressive as it reduces the drop in purchasing power more for high-income families (4 p.p.) than for those with lower income (2 p.p.). In 2022 there is no effect of extra valorisation of social benefits. Therefore, the contribution of economic adjustments in 2022 is solely through the wage channel.

The final effect of the inflation shock on family purchasing power in 2022 is the result of an interplay between a progressive effect of government measures and a regressive effect of economic adjustments. The resulting U-shape across income distribution is due to the fact that for low-income families the effect of adopted government measures prevails, while for high-income families the effect of economic adjustment is stronger. Families with the lowest and highest income are facing a drop in their purchasing power of 4 % and 5 % respectively, whereas the families in the middle of the income distribution face a decrease in their purchasing power of 8 %.

#### 4.1.2. Impact of the inflationary shock by income deciles in 2023

In 2023, had the market prices of energy been left to fully affect regulated prices, a Slovak family would have faced an increase in its monthly expenditure on average by 19 % prior to government measures and economic adjustments (see Figure 7). As energy prices contribute positively to inflation inequality, it would have increased significantly in 2023. The difference in the inflation of low and high-income families would be 7 p.p. compared to just 2 p.p. in 2022. Families with the lowest income would have faced an increase in expenditure of 23 %, while the purchasing power of the highest income families would have dropped by 16 %.

The most substantial measure to prevent the drop in family purchasing power in 2023 was setting a price cap for energy contracts for households. It prevented a drop in purchasing power by 10 p.p. on average. As low-income groups allocate higher budget shares to energy, we can see a progressive pattern in the effect of setting a price cap. In relative terms, the price cap helps more the families with the lowest income, for which it reduces the drop in purchasing power by 13 p.p. compared to 9 p.p. for the families with the highest income. However, this measure is more expensive for families with higher incomes since in nominal terms they spend more on energy compared to low-income families (see Figure A1 in the Appendix).

There were no one-off measures in 2023, the inflation in the previous year had already been transmitted to the level of social benefits thanks to the automatic indexation mechanism.<sup>17</sup> In 2023

<sup>16</sup> If benefits are higher for low-income groups than for high-income groups, their effect is progressive. The effect of taxes or benefits is progressive if it is acting to reduce the level of inequality. Conversely, their effect is regressive if it is acting to increase the level of inequality.

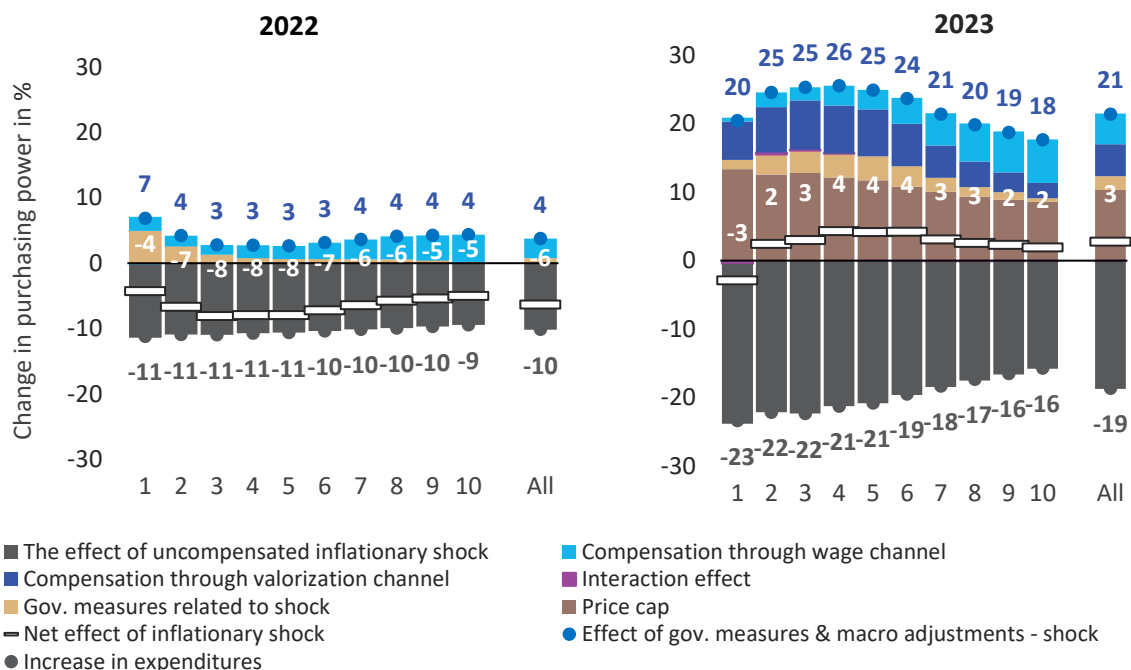
<sup>17</sup> The additionally adopted one-off measures are not included in the analysis.

government adopted an advance indexation of pensions and benefits. The effect of increased pension benefits across the income distribution is driven by the occurrence of pensioners in individual income deciles.

The effect of economic adjustments in 2023 is a result of the effects stemming from both the wage and valorisation channel. Thanks to the inflation-induced wage growth and the extra valorisation of benefits due to high inflation, disposable income of families increases. It helps an average family to reduce the gap in expenditure by 9 p.p. The effect from the wage channel is regressive, helping the families in the first decile by 1 p.p. and the families in the tenth decile by 6 p.p. The effect of social transfers valorisation is progressive (6 p.p. for the 1st decile, 2 p.p. for the 10th decile).<sup>18</sup>

For an average family, the cushioning effects of government measures and economic adjustments in 2023 more than compensate for the drop in purchasing power. This holds true for all income categories, except for the lowest income decile. While for an average family, the net effect is an increase in purchasing power of 3 %, the families with lowest income face a decrease in their purchasing power of 3 %. This drop can be explained by income structure of the families in the first decile. Compared to other income deciles, the share of pensions in their income is much lower. Thus, these families benefit less from pension indexation that helped the families in the other income deciles.

Figure 7: The effect of the inflationary shock by income deciles in 2022 and 2023 (% , p.p.)



Source: Authors' calculations

Note: Income deciles are based on equalized monthly family income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the family, of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years). The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.

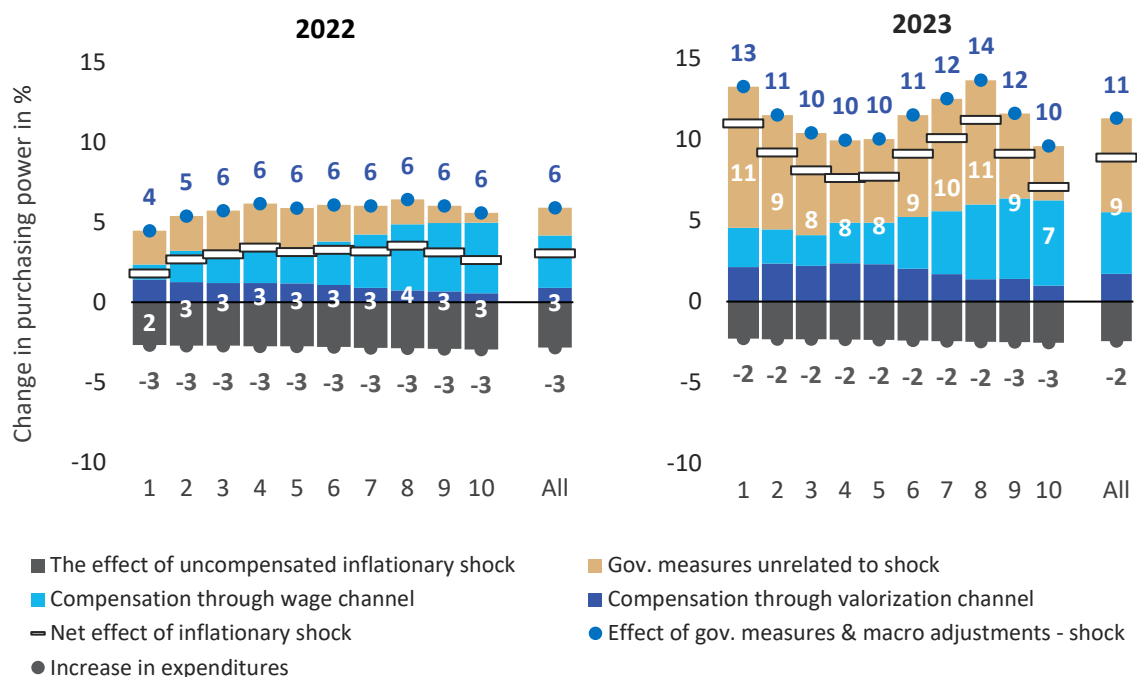
<sup>18</sup> The progressive effect is slightly distorted by the fact that valorisation of minimum living income affects also personal income tax burden, leading to an increase in disposable income for the families with labour income. Apart from affecting the sum of tax allowances, the threshold for higher income tax rate is shifted too.

#### 4.1.3. Change in purchasing power in comparison with the previous year

The sections above look at the changes in purchasing power of Slovak families that were induced by the inflationary shock. However, the purchasing power of Slovak families would have changed year-on-year even without the occurrence of the inflationary shock. The effect would have been determined by the interplay between the change in prices of consumption baskets and the change in their disposable income. Changes in disposable income would have been driven through the wage indexation and benefit valorisation.<sup>19</sup> On top of that, government measures that would have been adopted without the occurrence of the inflationary shock would have affected the disposable income too.

Without the occurrence of the inflationary shock, price increases would have led to a year-on-year drop in purchasing power of 3 % and 2 % in 2022 and 2023 respectively. The economic adjustments would have compensated for this drop by 4 p.p. and 5 p.p. respectively. On top of that, government measures unrelated to the inflationary shock would have led to an increase in disposable income and would have strengthened purchasing power by 2 p.p. and 6 p.p. respectively. A stronger effect of government measures in 2023, when compared to 2022, is the consequence of a gradual increase of child benefit and child tax credit. In 2022 the measures also include a vaccination bonus paid to senior citizens in order to motivate them to get vaccinated against COVID-19. As a result, an average Slovak family would have faced a year-on-year net increase in purchasing power of 3 % in 2022 and 9 % in 2023.

**Figure 8: Year-on-year change in purchasing power by income deciles in 2022 and 2023 without the occurrence of the inflationary shock (% p.p.)**



Source: Authors' calculations.

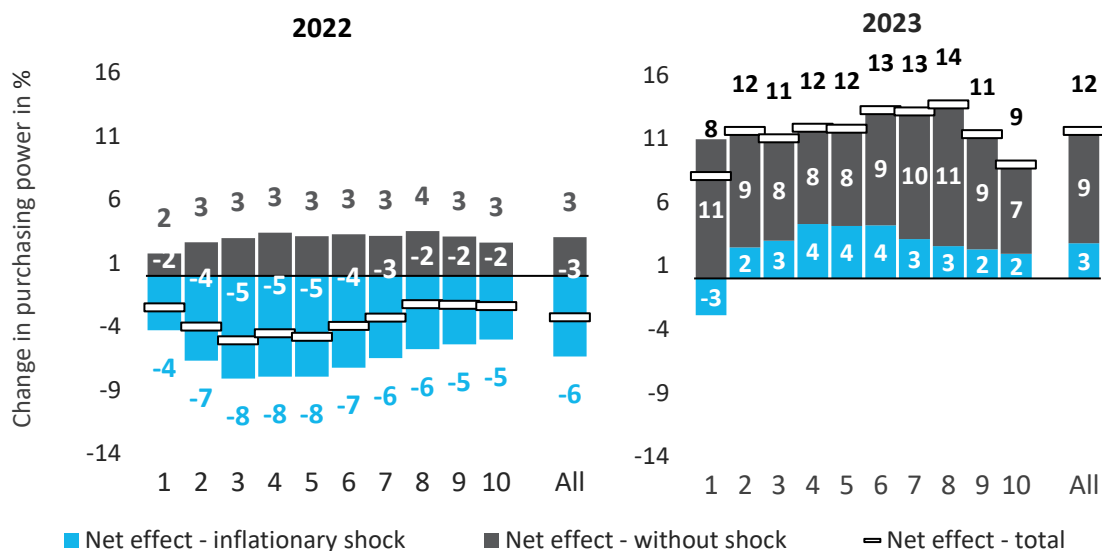
<sup>19</sup> Change in the disposable income also includes the interaction effect of wages on benefits (the effect of benefit erosion).

*Note: Income deciles are based on equivalized monthly family income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the family, of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years). The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.*

When looking at the total effect, including the inflationary shock, we see that the contribution of inflationary shock to the year-on-year change in purchasing power was negative in 2022 across the whole income distribution. For an average Slovak family, it contributed to a drop in purchasing power of 6 p.p. Added to the positive increase in purchasing power in the no-shock scenario, an average Slovak family faced a drop in purchasing power of 3 p.p. The resulting net effect across income distribution maintains the U-shape induced by the inflationary shock, with families in all income categories facing a drop in purchasing power.

In 2023 the contribution of the inflationary shock to the year-on-year change in purchasing power is positive for all income categories except for families with the lowest income. Added to the positive increase in purchasing power in the no-shock scenario, families across the whole income distribution face an increase in purchasing power. An average Slovak family faces an increase in purchasing power of 12 %. The changes induced in the no-shock scenario, including generous pro-family measures, contribute most significantly to the final net year-on-year change in purchasing power in 2023.

**Figure 9: Year-on-year change in purchasing power by income deciles in 2022 and 2023, total effect with the occurrence of the inflationary shock (% p.p.)**



Source: Authors' calculations.

*Note: Income deciles are based on equivalized monthly family income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the family, of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years). The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.*



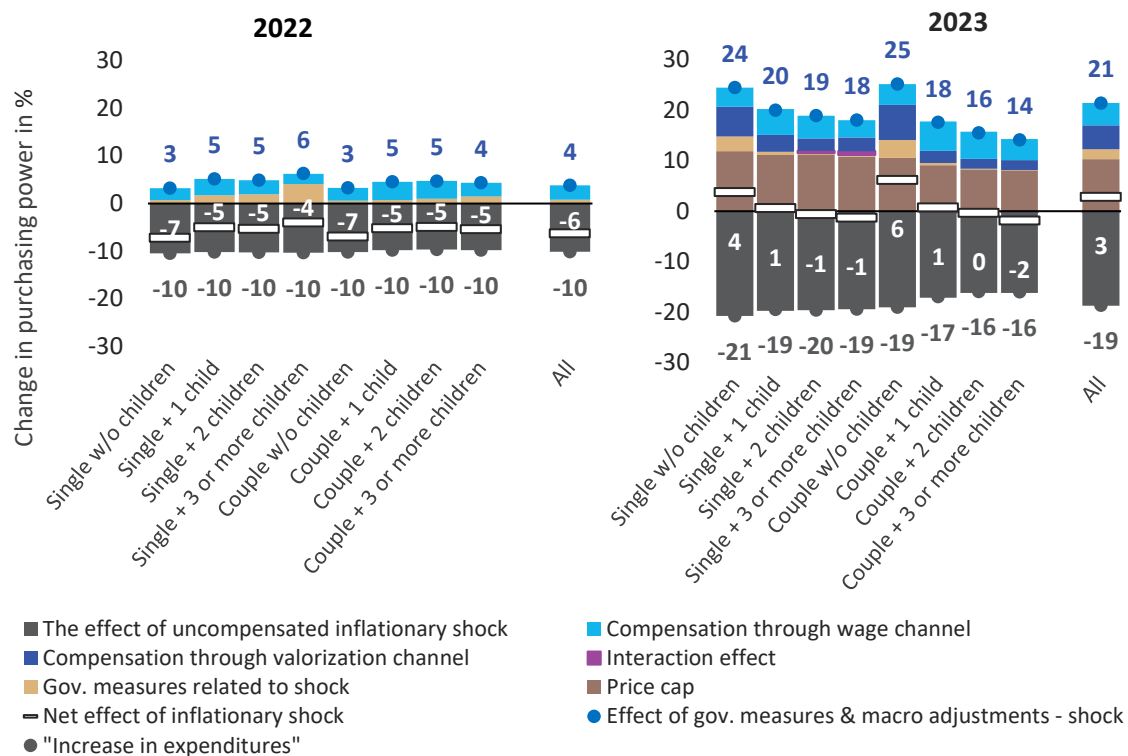
## 4.2. Assessing the distributional impact of the inflationary shock by family types

### 4.2.1. Impact of the inflationary shock by family types in 2022

In the alternative view we look at the impact of the inflationary shock on Slovak families categorized according to the number of children in a family, while distinguishing “single parent” families and “two parent” families.

When assessing the net effect of the inflationary shock, after the cushioning effects of government measures and economic adjustments, families in all analysed categories faced a drop in their purchasing power in 2022 (see Figure 10). The more children a family has, the stronger is the cushioning effect of government measures. This is a result of the fact that the anti-inflationary measures were disproportionately targeted at families with children. The share of all one-off payments allocated to the child benefit reached 75 %, with families receiving a one-off benefit per each child. However, government measures along with economic adjustments were not sufficient to outweigh the effect of increased prices. As a result, families in all categories faced a drop in purchasing power, ranging from negative 4 % (single parents with 3 and more children) to negative 7 % (single parents without children).

Figure 10: The effect of the inflationary shock by family types in 2022 and 2023 (% , p.p.)



Source: Authors' calculations.

Note: Net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.



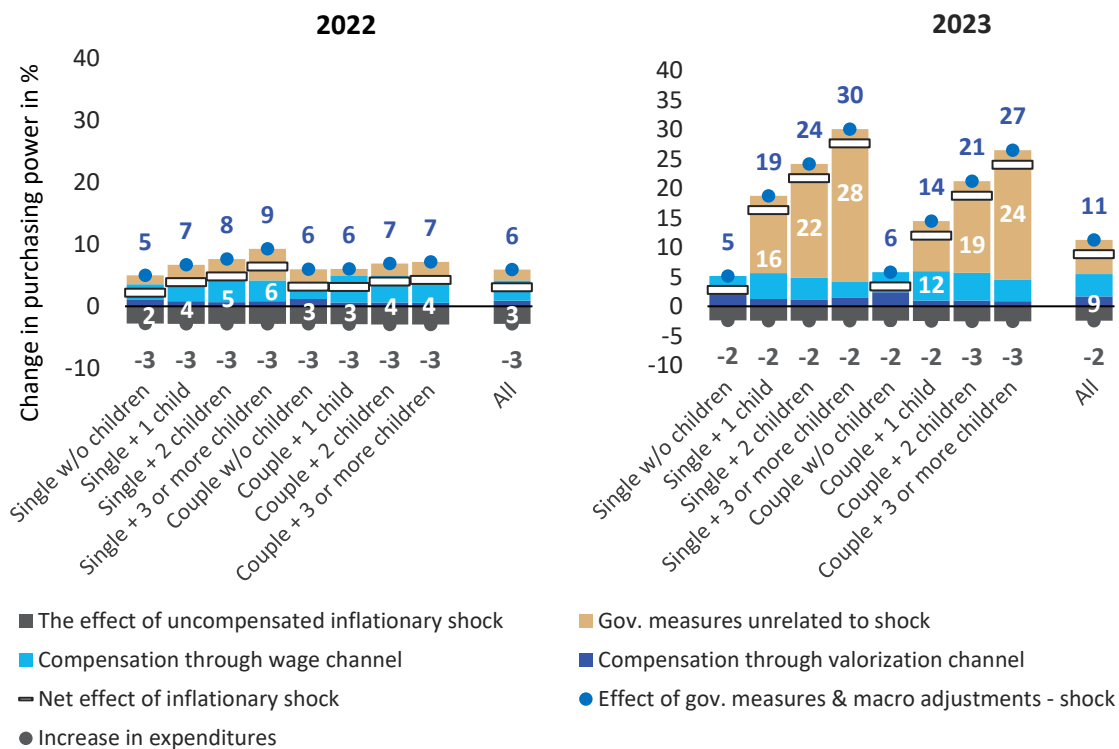
#### 4.2.2. Impact of the inflationary shock by family types in 2023

The increase of prices in 2023, without the cushioning effects of government measures and economic adjustment, would hit “single parent” families harder (19 – 21 %) than “two parent” families (16 – 19 %). In 2023 the price cap significantly compensates for the drop in purchasing power. The shape of resulting net impact on purchasing power is determined mainly by the effect of valorisation. Beyond the extra valorisation of social benefits due to high inflation in the previous year, the government decided to index pension benefits in advance. The categories “single without children” and “couple without children”, where the old-age pension recipients are included, face a net increase in purchasing power of 4 % and 6 % respectively. The effect for the other categories is closer to zero or below zero.

#### 4.2.3. Change in purchasing power in comparison with the previous year

Without the occurrence of the inflationary shock, families in all analysed categories would have faced an increase in purchasing power in both years 2022 and 2023. Positive effect would strengthen with the number of children in a family, which is a consequence of an adopted government measure, which permanently raised the amount of the child tax credit and the child benefit for each dependent child. As both government measures and economic adjustments are stronger in 2023, the resulting net effect is more substantial in this year.

**Figure 11: Year-on-year change in purchasing power by family types in 2022 and 2023 without the occurrence of the inflationary shock (% , p.p.)**

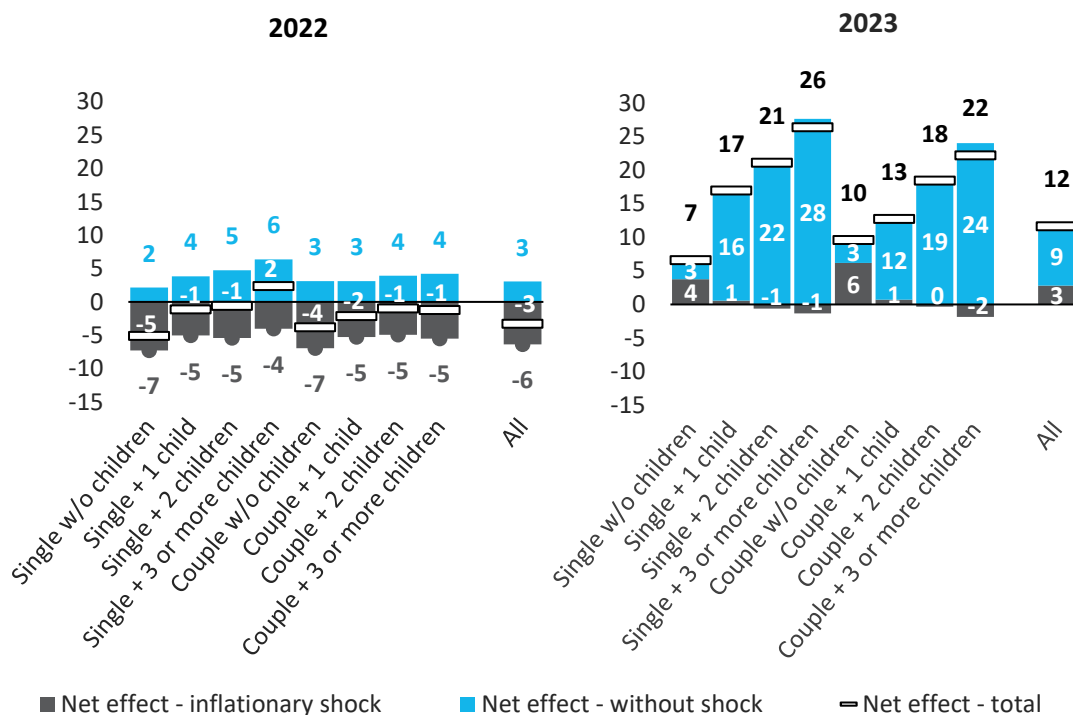


Source: Authors' calculations.  
Note: The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.

In 2022 the contribution of the inflationary shock to the year-on-year change in purchasing power is negative and exceeds the positive contribution of the no-shock scenario for each of the analysed family categories. Finally, purchasing power drops year-on-year in each of the categories except for single parents with 3 or more children. As the shapes of the resulting effects of both inflationary shock and no-shock scenario are driven by the number of children in a family, the resulting change in purchasing power follows the same shape.

In 2023 the most significant contribution to the year-on-year change in purchasing power are the changes implied by the no-shock scenario. For an average family, purchasing power increases in the no-shock scenario by 9 p.p. and because of inflationary shock by another 3 p.p. Thus, an average family faces a 12 % increase in purchasing power. The resulting year-on-year increase in purchasing power is stronger as the number of children in the family increases, thanks to the generous family-oriented measures adopted by the government. While family units without children face an increase under 10 %, family units with 3 or more children face an increase above 20 %.

**Figure 12: Year-on-year change in purchasing power by family types in 2022 and 2023, total effect with the occurrence of the inflationary shock (% p.p.)**



Source: Authors' calculations.

Note: Net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.

## 5. Discussion and conclusions

We analyse the impact of an unexpected and steep increase in price level on the purchasing power of Slovak families in 2022 and 2023. The combination of a microsimulation tax and benefit model SIMTASK with the detailed data on consumption expenditure from the Household Budget Survey is used to quantify the net effect of exogenous inflationary shock after the cushioning effects of adopted government measures and economic adjustments in the form of inflation-induced wage growth and an extra valorisation of social benefits.

The change in welfare is defined as the change in purchasing power. That is a consequence of the limiting assumption we must adopt, as the data do not allow us to incorporate the effect of behavioural changes into our analysis. Thus, the results tell us how much more Slovak families would have to spend if they maintained the same amount and structure of consumption. Or in other words, how their purchasing power changed because of the inflation shock. The resulting variation in the impact of the inflationary shock across categories of families analysed is due to different inflation rates resulting from different consumption baskets consumed by families.

The resulting impact of inflationary shock per se depends on how the policies relevant to the inflationary shock are defined. We adopted a view that anti-inflationary measures are those measures that were declared by the government to help citizens cope with the increased costs of living due to the inflationary shock and have a transitory character. As opposed to the measures that would have been adopted anyway or have a permanent character.

The purchasing power of Slovak families would have dropped by 10 % in 2022 in the absence of cushioning effects of government measures and economic adjustments. We show that the government measures were targeted and succeeded in offsetting a part of a purchasing power drop – mostly for low-income families. The relative impact for the bottom decile was almost 6 times larger than the average support, while the impact for the top decile was less than one third of the average support. For high-income families, economic adjustments were the component that helped to offset a significant part of their purchasing power drop. However, the overall net effect on purchasing power was negative in every income decile. An average Slovak family, according to our estimate, faced an unexpected drop in purchasing power of 6 % in 2022.

The story is different in 2023, when the increase in prices would push up the expenditures by 19 % for an average Slovak family. It turns out that despite high inflation, the compensating effects of macroeconomic adjustment, hand in hand with a generous price cap on energy prices and government measures, more than offset a drop in purchasing power for an average family. The recipients of pension benefits are the part of the population that receives the highest compensation. Thanks to the automatic indexation mechanism, high inflation from the year 2022 is transferred into the pension benefit levels. On top of that, pensioners receive an extra increase in pensions thanks to the adopted measure indexing pension benefits earlier than usual. According to our estimates, the overall net effect on purchasing power for an average family is positive and reaches 3 %. However, the results show that families with the lowest income face a drop in purchasing power, mainly due to the fact that the share of pensions in their income is much lower when compared to other income deciles. When looking at the two-year horizon (Figure A 4 in the Appendix), families in all categories analysed face a drop in purchasing power.

Looking at the year-on-year changes in purchasing power, we include the effect of changes that would have occurred without the occurrence of the inflationary shock too. In both years 2022 and 2023, without the occurrence of the inflationary shock, the purchasing power of Slovak families would increase across the whole income distribution. This effect comprises the effect of wage increase, benefit valorisation and adopted government measures unrelated to the inflationary shock. In 2022 the positive effect of the no-shock scenario diminishes the negative effect of inflationary shock. However, purchasing power drops for families across the whole income distribution in comparison with the previous year. In 2023, purchasing power would increase significantly without the occurrence of the inflationary shock, thus driving the overall positive change. Compared to the previous year, the purchasing power of an average Slovak family increases by 12 %. The variation in the final positive effect is much lower if we look at families across income distribution (8 – 14 %) than if we distinguish families according to the number of children they have (7 – 26 %). That is a consequence of the generous set up of family benefits effective since 2023.

In our paper, the results are reported for the average values only. Looking at the results presented in box plots in Figure A 5 and Figure A 6 in the Appendix, we can conclude that the messages drawn about the direction of the effects are robust. The messages drawn on the average values are the same for most of the observations between the 25 – 75th percentile in each income category or family type category.

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Appendix

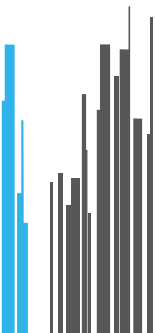


Table A 1: Anti-inflationary packages in 2022

Anti-inflation Package 1	Date start	Date end	Support in €	Expenditures in mill. €	Targeted
<b>One-off automatic increase of benefit</b>					
Child benefit	6/1/2022	6/30/2022	74*	83.01	Paid to parents, payment per child
Foster care allowance	6/1/2022	6/30/2022	100	0.65	Paid once to parent providing foster care
Material need benefit	6/1/2022	6/30/2022	100	5.95	Paid per household
Benefit for the personal assistance	6/1/2022	6/30/2022	100	6.31	Paid to assistant
<b>One-off support on request - for vulnerable groups</b>					
Personal care assistants	6/1/2022	8/31/2022	100	} 5.53	Paid to personal care assistants
Personal assistants	6/1/2022	8/31/2022	100		Paid to personal assistants not receiving the cash benefit for the assistance
Seniors over 62 years	6/1/2022	8/31/2022	100		Paid if person does not receive pension or have labour income
<b>Total</b>				<b>101.45</b>	

Note 1: \*Total of 100€ was paid, but regular benefit amount was 25.88€. So, the anti-inflation support in this case is considered as  $100 - 25.88 = 74.12$ €.

Note 2: One-off income support to vulnerable households has been legislatively secured by two Government Regulations and presented to public as anti-inflation packages. The first one, adopted in June 2022, authorized one-off payment of 100 euros. Support was paid automatically by increasing the social transfers like child benefit, material need benefit or foster care allowance in June. In addition, certain vulnerable groups with no regular social transfers were identified – for example seniors over 62 years without pensions or personal assistants of disabled persons not receiving cash benefit and for these groups an income support of 100 euros conditional on submitting a request was established.

Anti-inflation Package 2	Date start	Date end	Support in €	Expenditures in mill. €	Targeted
<b>One-off automatic increase of benefit</b>					
Child benefit	11/1/2022	11/30/2022	70*	1.66	Paid to parents, payment per child - for children born between June 2022 and October 2022
Material need benefit	11/1/2022	11/30/2022	100	1.43	Paid per household - that did not receive support in Package 1
Replacement alimony	11/1/2022	11/30/2022	100	0.13	Paid to children not receiving orphan pensions
Benefit to compensate for the increased expenditures due to severe disabilities	11/1/2022	11/30/2022	100	2.94	Paid to benefit recipient

<b>One-off support on request - for vulnerable groups</b>					
Child support	10/29/2022	12/31/2022	100	} 3.33	Paid to parent of child for whom the alimony has been stated at max amount 150 €
Former clients from children's homes	10/29/2022	12/31/2022	100		Paid to children previously in children's homes
Foster care conclusion	10/29/2022	12/31/2022	100		Paid to children previously in foster care who became major from April 2020 to October 2022
<b>Total</b>			<b>9.48</b>		

*Note 1: \*Total of 100€ was paid, but regular benefit amount was 30€. So, the anti-inflation support in this case is considered as 100-30=70€.*

*Note 2: The second anti-inflation package, adopted in October 2022, provided one-off payment 100 euros to those beneficiaries of social transfers and vulnerable groups that did not receive support in June 2022.*

*Source: Authors*



Table A 2: Support directed to families with children in 2022-2023

Support directed to families with children	Monthly payment, in €			Expenditures, in mil. €	
	until June 2022	from July 2022	from Jan 2023	2022	2023
<b>Child benefit</b>				<b>29.5</b>	<b>432</b>
Child benefit	25.88	30	60		
Additional Child benefit	12.14	30	30		
<b>Child Tax Credit</b>				<b>90.2</b>	<b>614</b>
Tax Credit for child up to 6 years	47.14	70	140		
Tax Credit for child from 6 to 15 years	43.60	70	140		
Tax Credit for child over 15 years	23.57	40	140		
Tax Credit for child over 18 years	23.57	40	50		
<b>Total</b>				<b>120</b>	<b>1,046</b>

*Note: Income support directed to families with children has been realized through an increase of the child benefit and child tax credit. Initially, the increase of children-related benefits, announced by policy makers, was proposed as to cope with the income poverty of families with children. Later, these measures started to be officially interpreted as government interventions to cushion the effects of high inflation. Child benefit and child tax credit were substantially increased from July 1st, 2022, and in the second step from January 2023. The child benefit is a flat payment per dependent child to parents and the increase is adopted in the legislation as permanent. Working parents with dependent children are eligible to receive child tax credit (only one of the parents can apply). Child tax credit has also been increased from July 2022 and in the second round from January 2023 but, as opposed to the child benefit, this measure is valid temporarily until the end of 2024.*

Source: Authors

**Table A 3: Support directed to pensioners in 2022-2023**

Support directed to pensioners	Date start	Date end	Support in €	Expenditures in mil. €	Targeted
Vaccination incentive bonus	Dec 2021	Jan 2022	100 - 300	278	Seniors over 60 years who got vaccinated against COVID-19 disease, payment depended on number of doses of the vaccine received.
14th pension benefit	Dec 2022	Dec 2022	35 - 210	208	Payment targeted to pensioners receiving old-age, early retirement, disability, widow/er or orphan pension. Those having low pensions could get max amount 210€, support decreased with rising pension. The average payment was 143€.
Advance indexation of pensions	July 2023			522	Advance indexation of all types of pensions in July 2023 instead of January 2024. All pensions are increased by 10.6 %.
<b>Total</b>				<b>1,008</b>	

*Note: Income support directed to pensioners has been introduced in 2022 through two measures considered in our evaluation framework. Pensioners receiving old-age, early retirement, disability, or survivors' pensions got the one-off payment in December 2022, the so-called 14th pension (Since pensioners receive the 13th pension regularly every year, this payment is not considered as a special one-off to cope with high inflation.). Based on the amount of the pension, the one-off support, ranging from 35 to 210 euros, has been paid (pensioners with lowest pensions got the highest support). The average payment per pensioner was 143 euros and the total cost of this support reached 208 mil. euros. In addition, in January 2022 senior citizens over 60 years, who got vaccinated against COVID-19 disease, got the so called "vaccination bonus". The bonus ranged from 100 to 300 euros, was granted by an automatic procedure, and the total expenses reached 278 mil. euros. In 2023 the parliament changed the valorisation rules for all types of pensions. As a result of new legislation and due to the high inflation rate at the beginning of 2023, advance indexation of pensions occurred in July 2023. All types of pensions were increased by 10.6 % and the estimated costs of advance indexation are at 522 mil. euros in 2023.*

Source: Authors

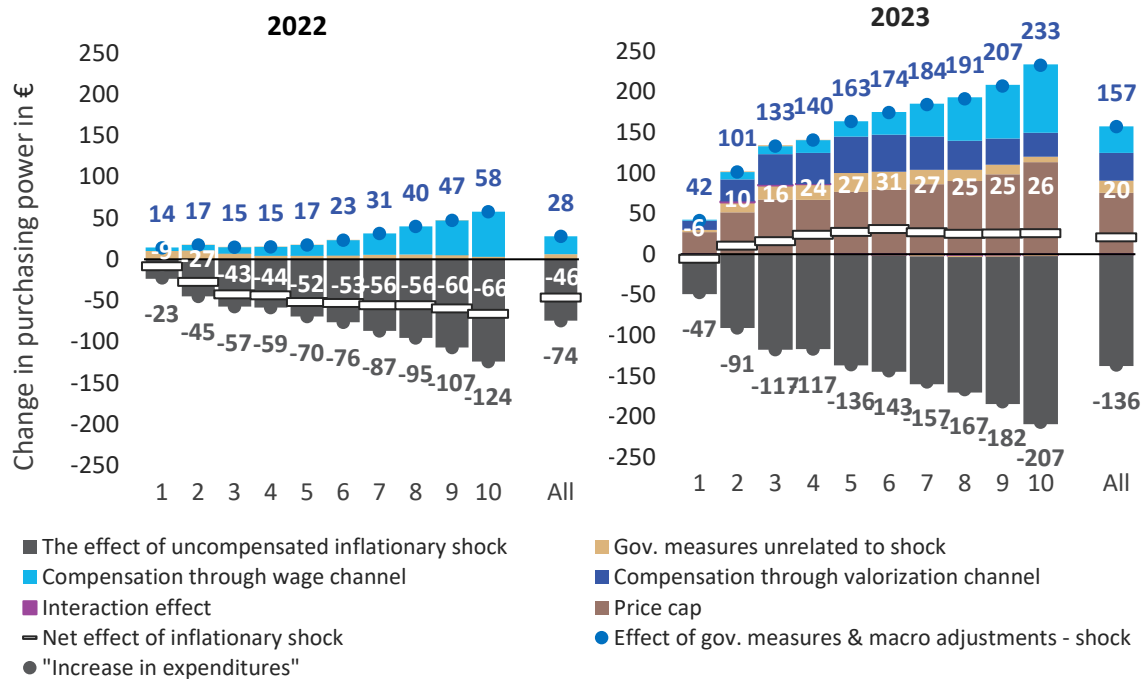
Table A 4: Definitions of scenarios

		2022	2023
<b>Hypothetical scenario without inflationary shock</b>	Database update	Using June 2021 forecast (adjusted for complete 2021 numbers)	Using June 2021 forecast (adjusted for complete 2021 numbers)
	Tax ben. policies	With gov. measures unrelated to shock	With gov. measures unrelated to shock
	Tax ben. parameters	According to June 2021 forecast (adjusted for complete 2021 numbers)	According to June 2021 forecast (adjusted for complete 2021 numbers)
	Increase in expenditures	Equals to inflation according to June 2021 forecast (by COICOP categories)	Equals to inflation according to June 2021 forecast (by COICOP categories)
<b>Hypothetical scenario with inflationary shock</b>	Database update	Using June 2021 forecast (adjusted for complete 2021 numbers)	Using June 2021 forecast (adjusted for complete 2021 numbers)
	Tax ben. policies	With gov. measures unrelated to shock	With gov. measures unrelated to shock
	Tax ben. parameters	According to June 2021 forecast (adjusted for complete 2021 numbers)	According to June 2021 forecast (adjusted for complete 2021 numbers)
	Increase in expenditures	Equals to inflation according to Feb 2023 (by COICOP categories)	Equals to inflation according to Feb 2023 (by COICOP categories and without the price cap on energy prices)
<b>Hypothetical scenario with inflationary shock &amp; economic adjustments</b>	Database update	Using Feb 2023 forecast	Using Feb 2023 forecast
	Tax ben. policies	With gov. measures unrelated to shock	With gov. measures unrelated to shock
	Tax ben. parameters	According to Feb 2023 forecast	According to Feb 2023 forecast
	Increase in expenditures	Equals to inflation according to Feb 2023 (by COICOP categories)	Equals to inflation according to Feb 2023 (by COICOP categories)
<b>Real scenario with inflationary shock &amp; government measures &amp; economic adjustments</b>	Database update	Using Feb 2023 forecast	Using Feb 2023 forecast
	Tax ben. policies	With all gov. measures	With all gov. measures
	Tax ben. parameters	According to Feb 2023 forecast	According to Feb 2023 forecast
	Increase in expenditures	Equals to inflation according to Feb 2023 (by COICOP categories)	Equals to inflation according to Feb 2023 (by COICOP categories)

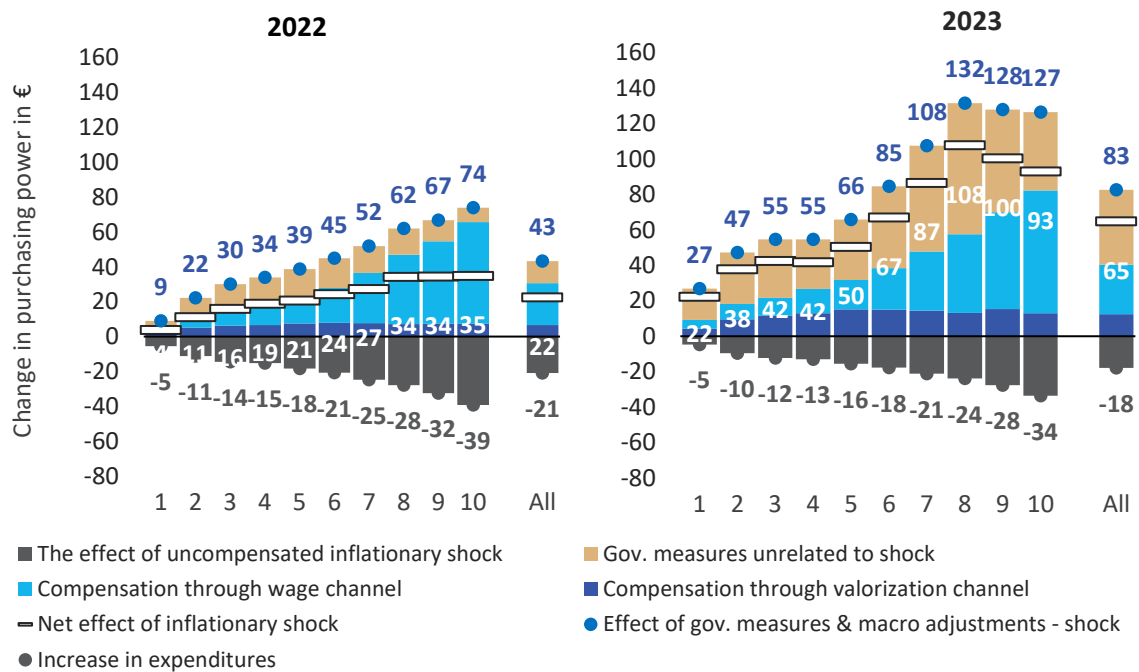
Note: We do not recalibrate the weights of the databases, only updating of monetary variables is changed according to respective forecast. We do not assume changes in the statuses (employed/unemployed/inactive).

Figure A 1: The results by income deciles in euros

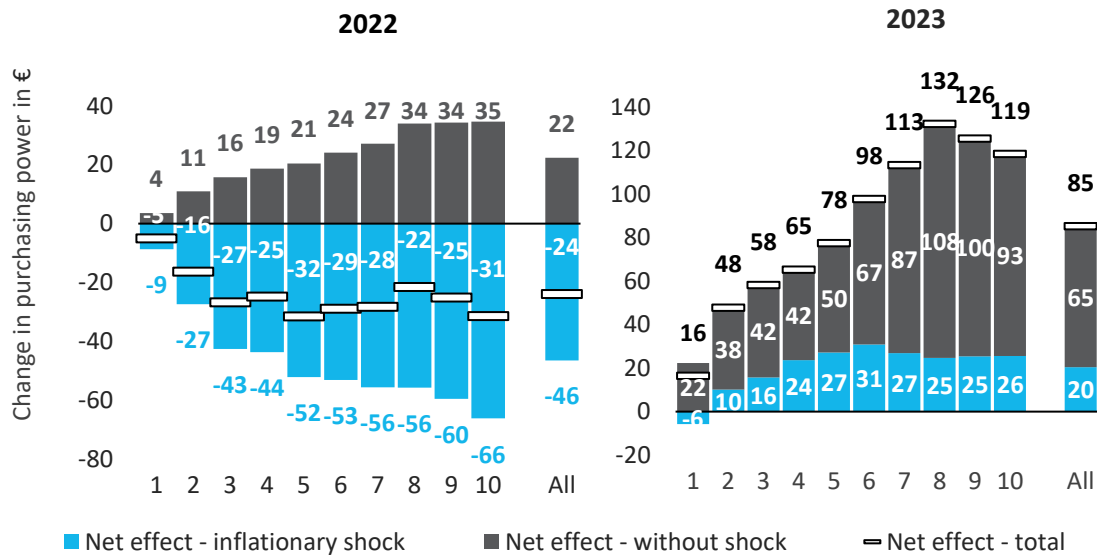
The effect of the inflationary shock



The year-on-year change in purchasing power without the occurrence of the inflationary shock



The year-on-year change in purchasing power by income deciles with the occurrence of the inflationary shock

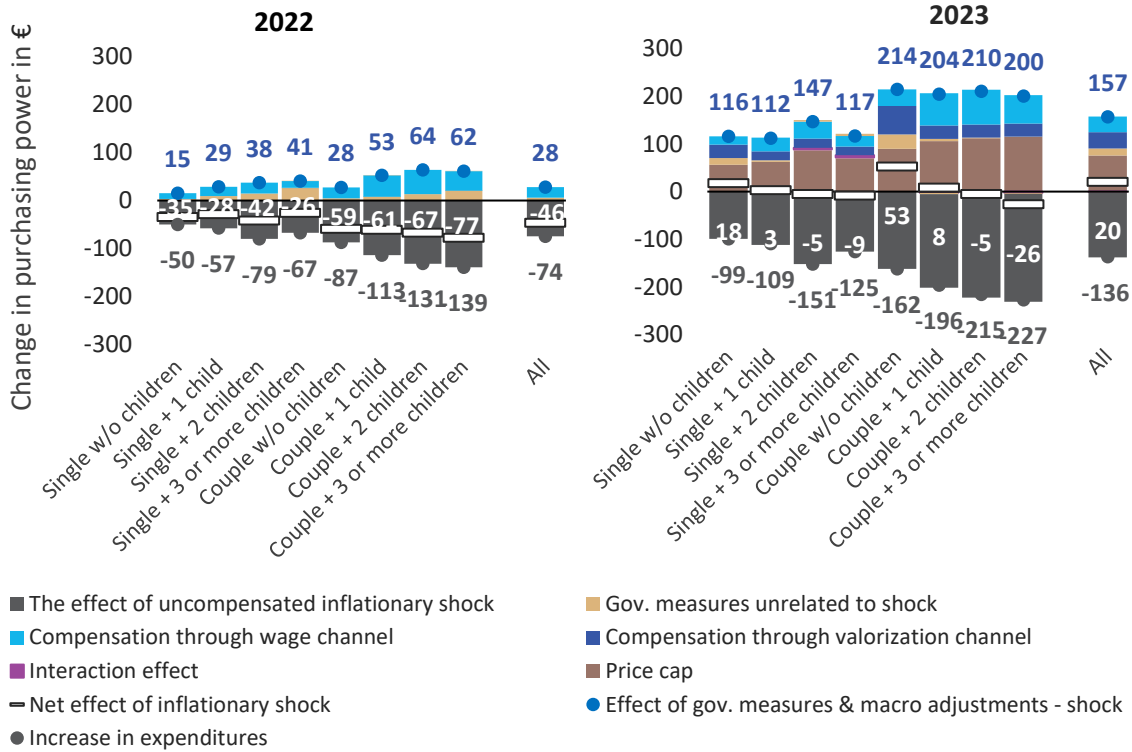


Source: Authors' calculations

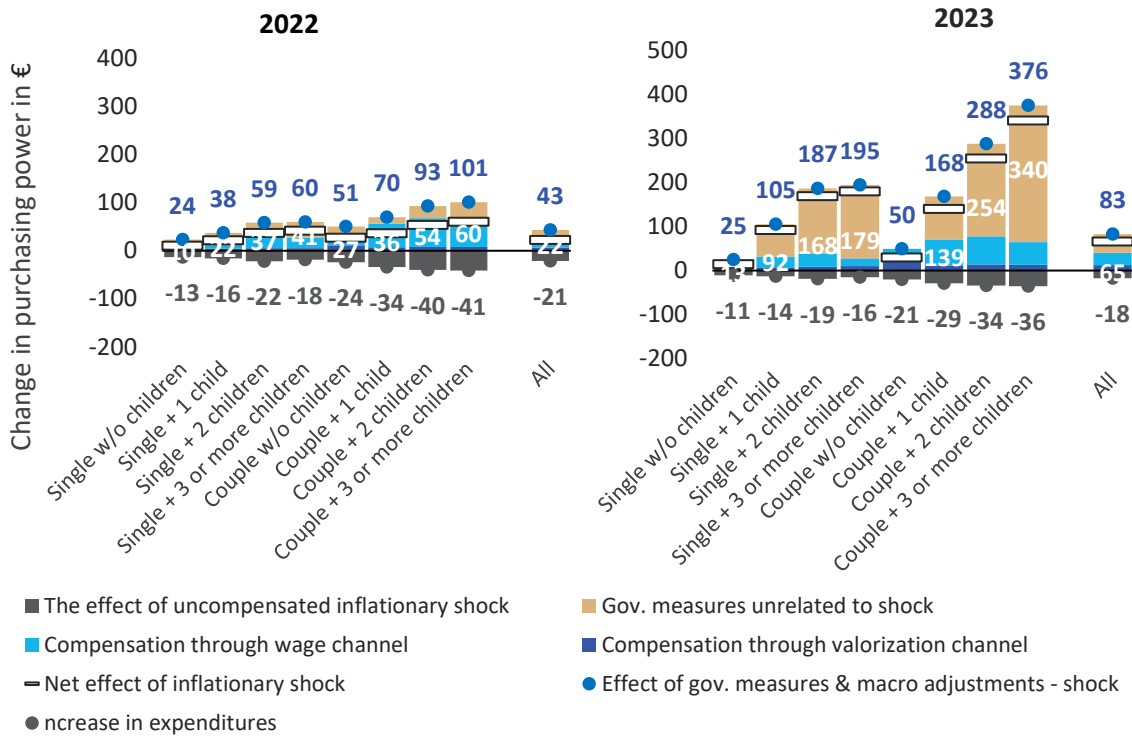
Note: Income deciles are based on equalized monthly family income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the family, of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years). The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Positive net-effect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.

Figure A 2: The results by family types in euros

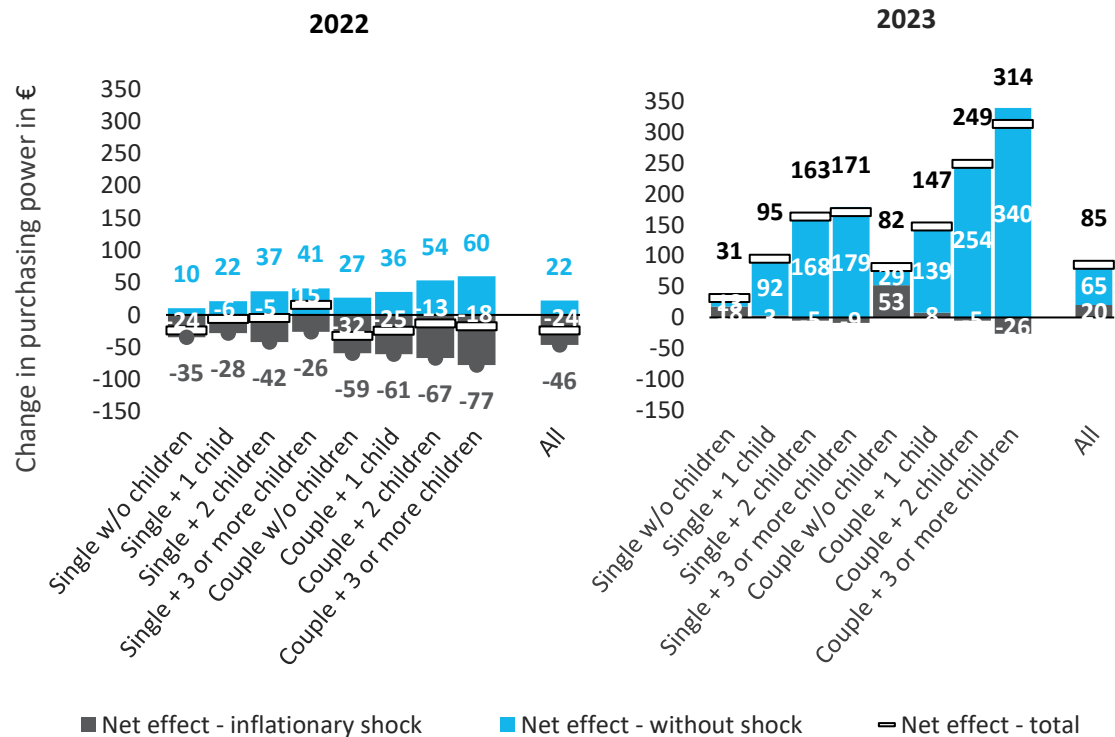
The effect of the inflationary shock



The year-on-year change in purchasing power without the occurrence of the inflationary shock



The year-on-year change in purchasing power by income deciles with the occurrence of the inflationary shock

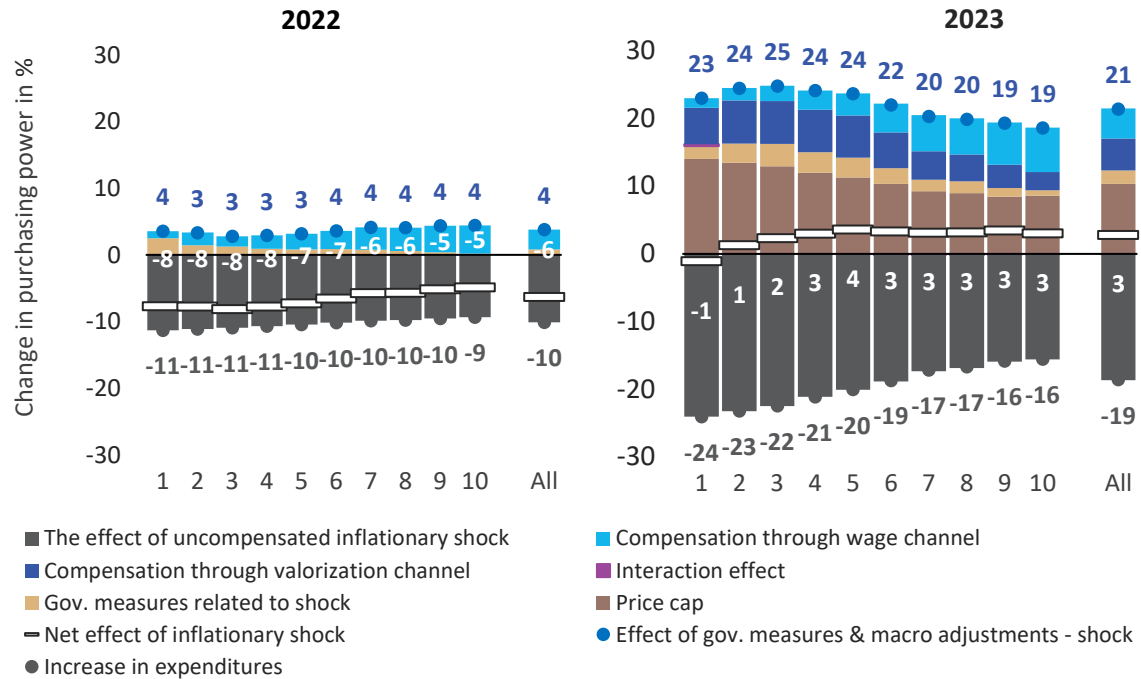


Source: Authors' calculations

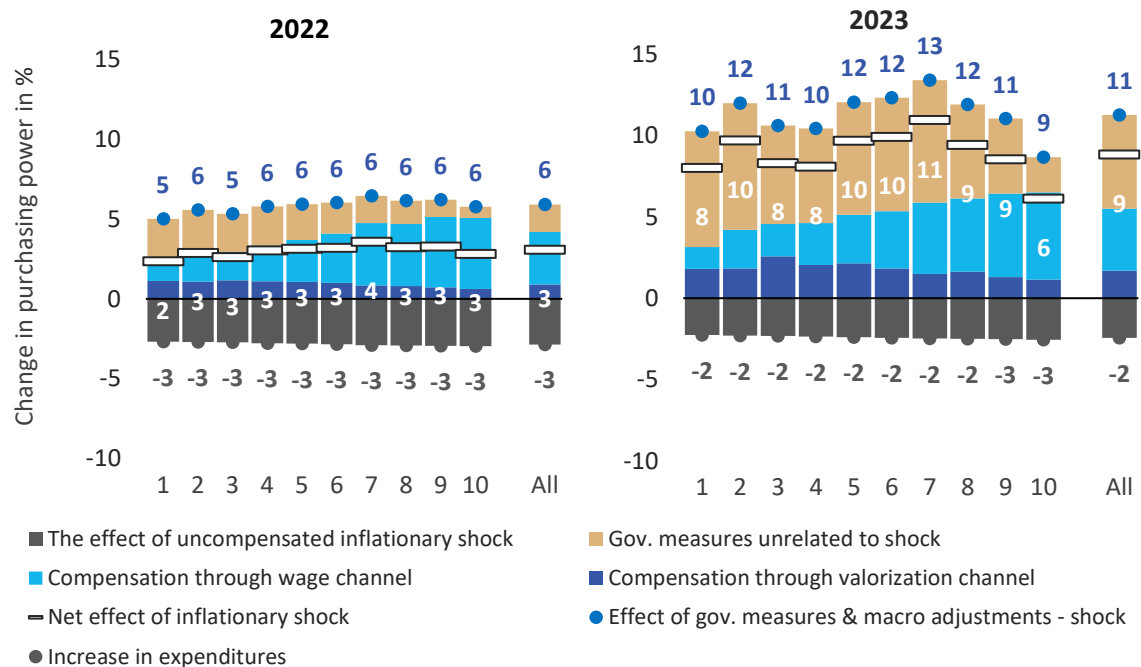
Note: The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Positive neteffect indicates an increase in purchasing power whereas negative net-effect shows a drop in purchasing power.

Figure A 3: The results at household level - by income deciles (% , p.p.)

The effect of the inflationary shock

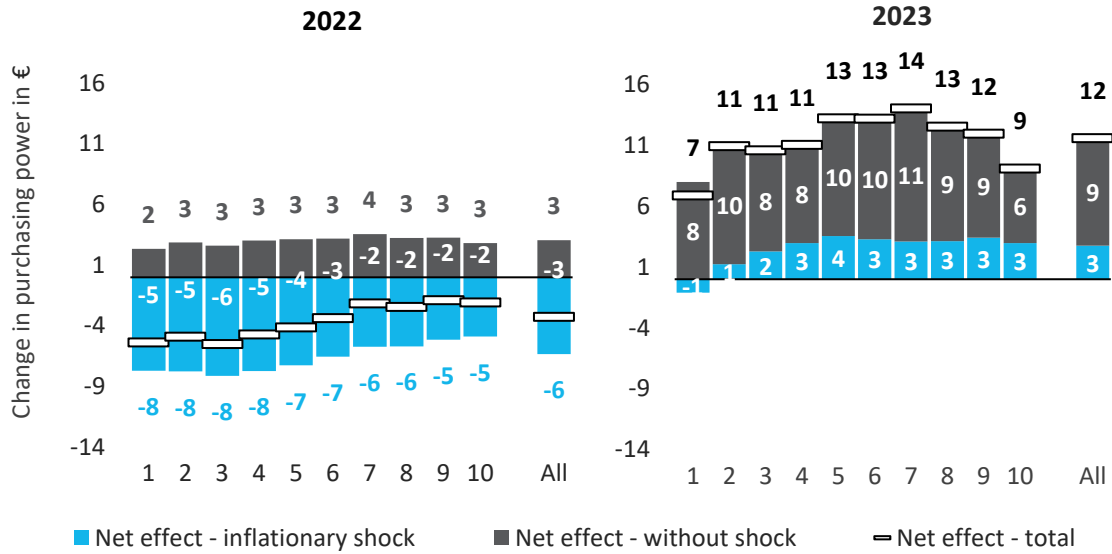


The year-on-year change in purchasing power without the occurrence of the inflationary shock





The year-on-year change in purchasing power by income deciles with the occurrence of the inflationary shock

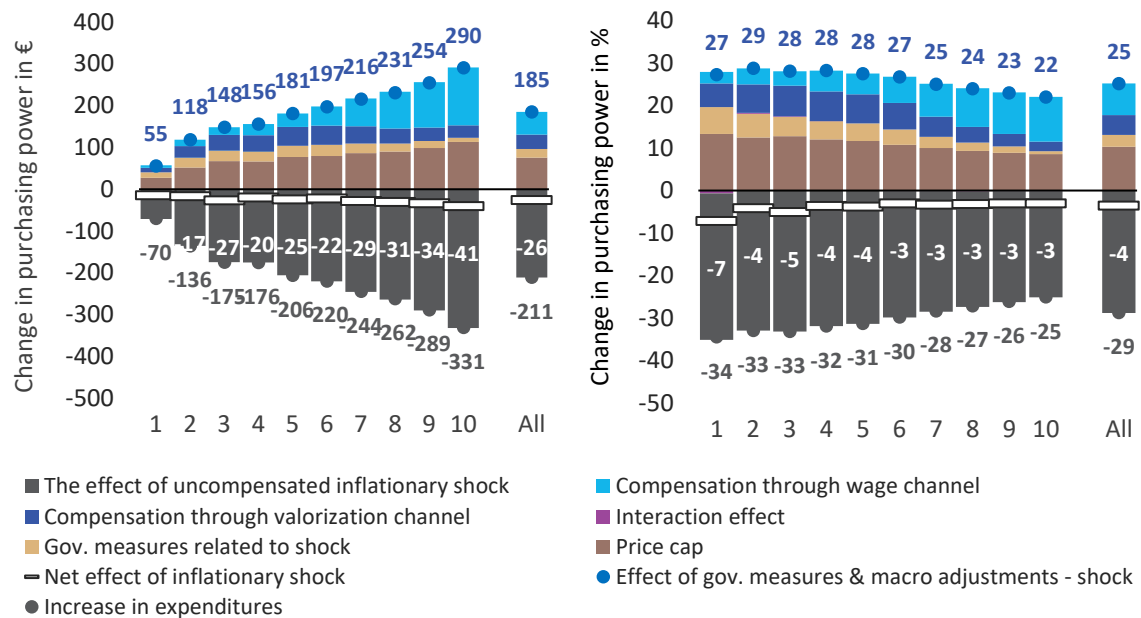


Source: Authors' calculations

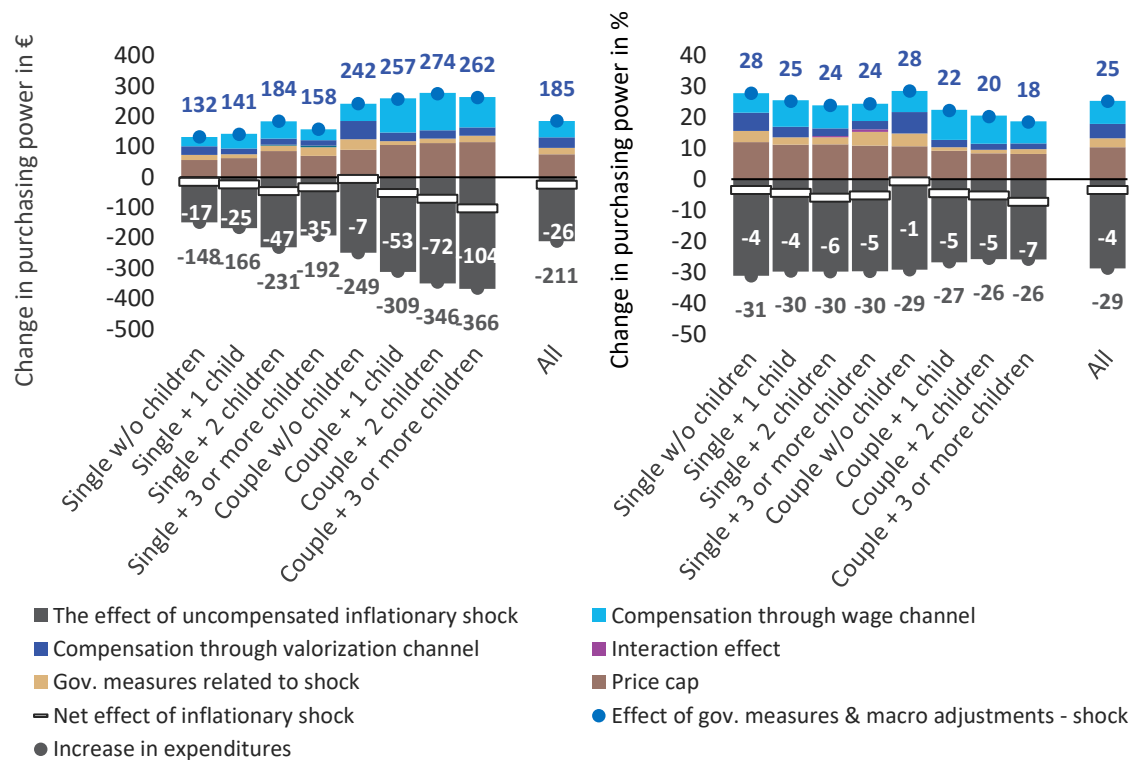
Note: Income deciles are based on equalized monthly household income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the household, of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years). The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative neteffect shows a drop in purchasing power.

Figure A 4: The impact of the inflationary shock at two-year horizon (euros and %, p.p.)

By income deciles



By family types



Source: Authors' calculations

*Note: Income deciles are based on equalized monthly household income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the household, of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years). The net effect on purchasing power equals the difference between the contributions of gov. measures, price cap on energy prices, macroeconomic adjustments and the increase of consumption expenditure. Percentage change with respect to household expenditures. Positive net-effect indicates an increase in purchasing power whereas negative neteffect shows a drop in purchasing power.*

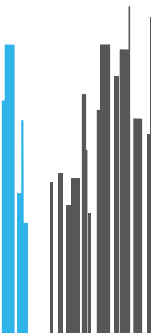
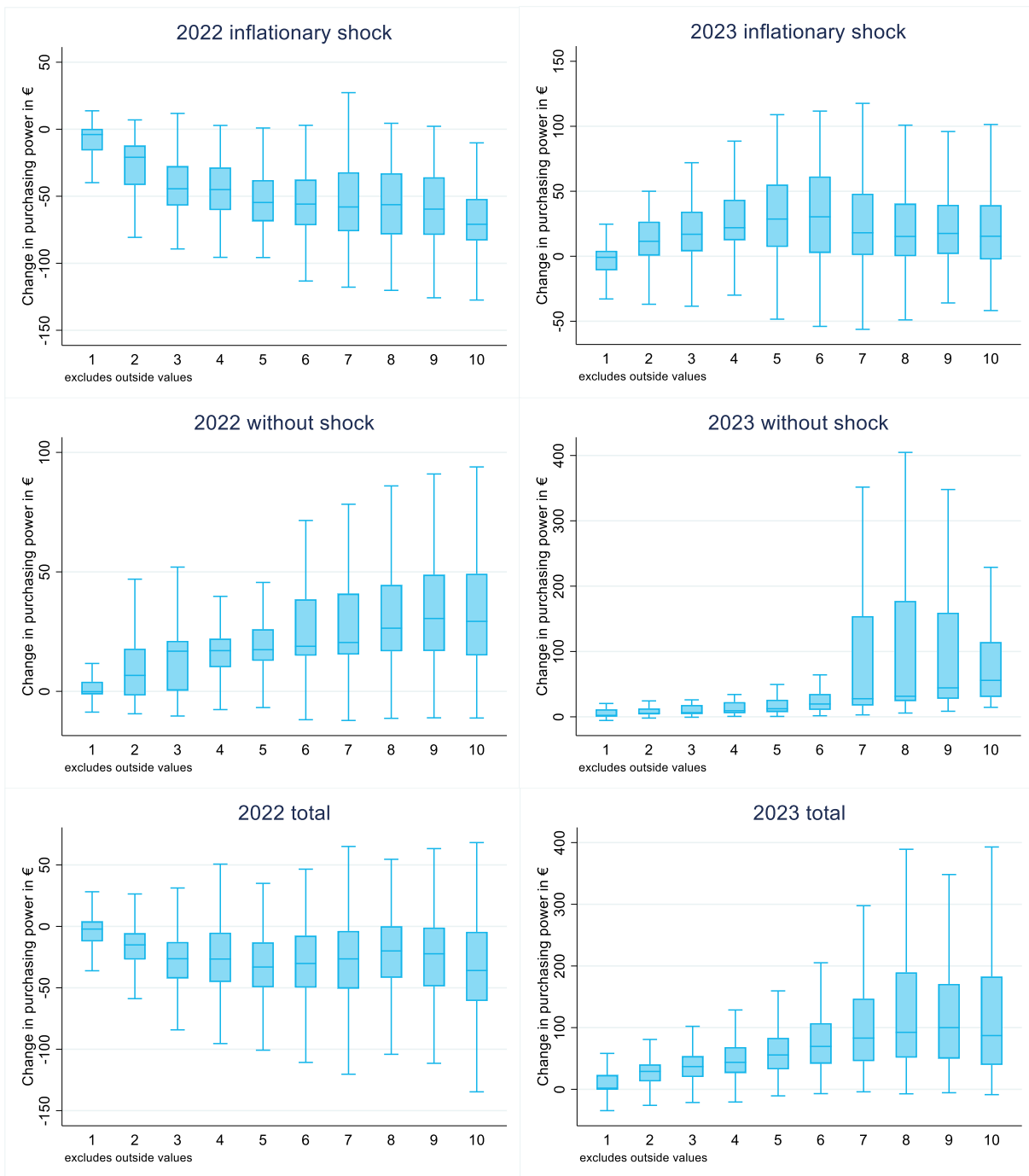


Figure A 5: Net effect on purchasing power presented in box-plots – by income deciles (euros)



Note: Income deciles are based on equivalized monthly family income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the family; of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years).

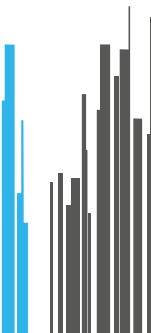


Figure A 6: Net effect on purchasing power presented in box-plots – by family types (euros)

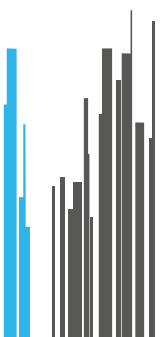
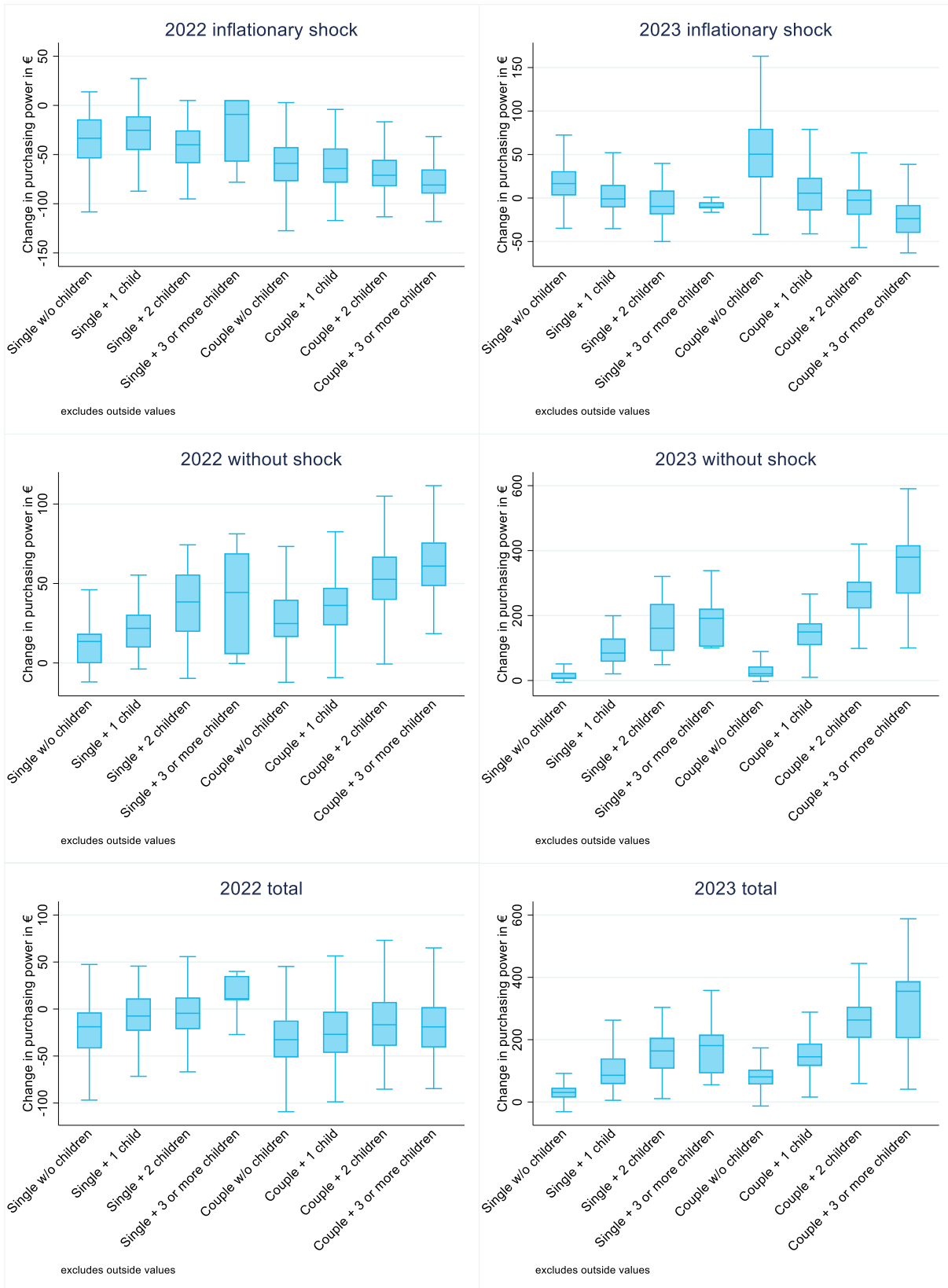
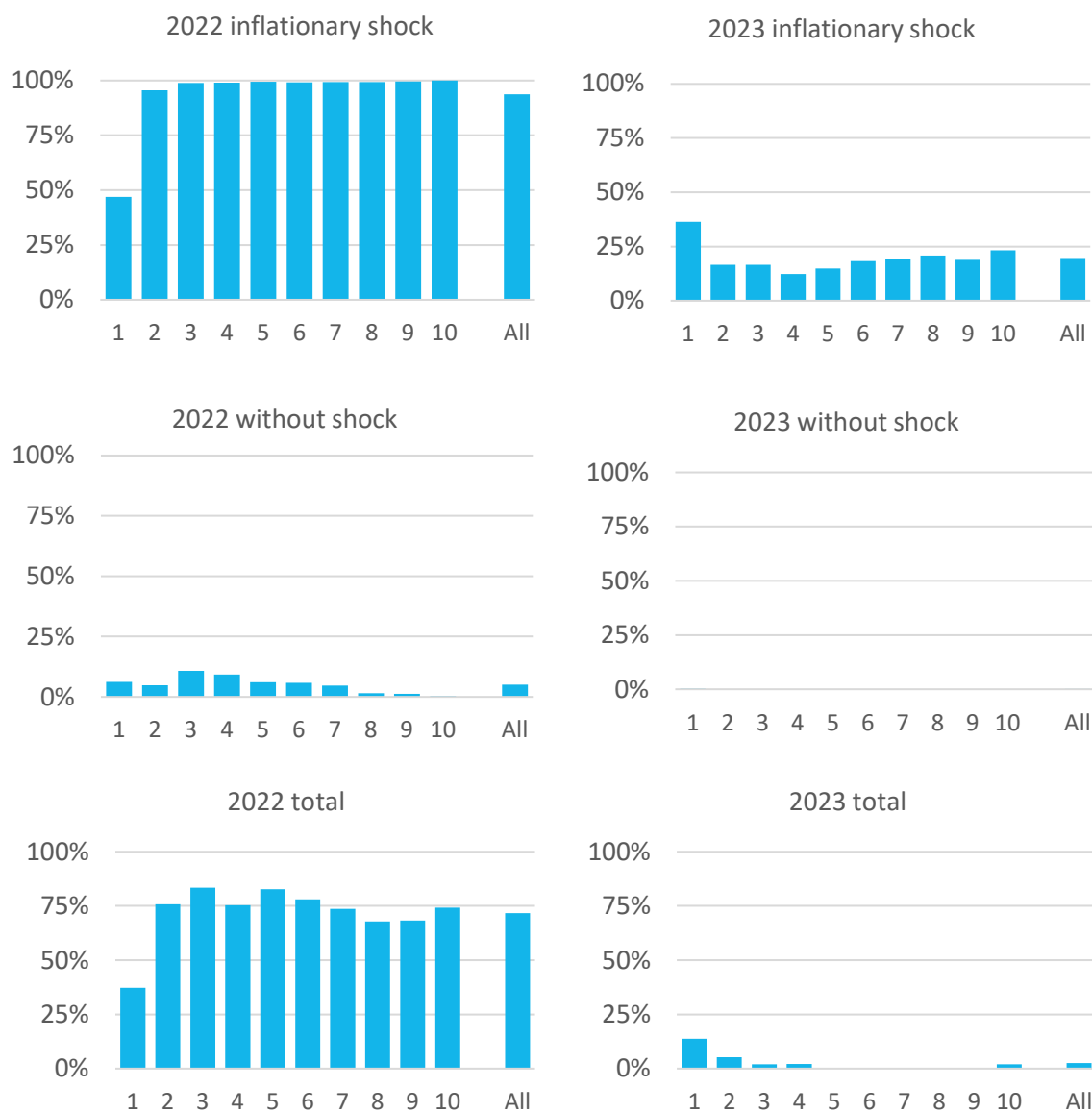


Figure A 7: Share of families with negative net effect on purchasing power – by income deciles (%)



Note: Income deciles are based on equalized monthly family income. OECD-modified equivalence scale is used (assigns a value of 1 to the first adult member of the family, of 0.5 to each additional adult member and of 0.3 to children aged up to 14 years). The graphs show the share of families with negative (lower than -5 €) net effect on purchasing power.

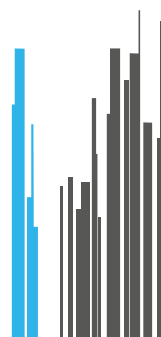


Figure A 8: Share of families with negative net effect on purchasing power – by family types (%)



Note: The graphs show the share of families with negative (lower than -5 €) net effect on purchasing power.



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