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Short- and long-term impacts of the energy crisis in Sweden

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Highlights

- **Lower to middle income groups are most affected by energy price increases in Sweden, with an average welfare impact of –3.8%.**
- **Heating fuel costs are not affected as much as electricity and transport fuel costs due to expanded use of district heating.**
- **Directly supporting the lowest income households instead of maintaining fuel tax reduction schemes could offset a large share of negative welfare impacts from the energy price crisis.**
- **A support mechanism for low to middle income groups (deciles 1 to 5) should target the groups most affected by the price increases (deciles 3 to 5).**

In this brief, we explore the distributional impacts of policy responses to the energy price crisis in the EU, with a particular focus on low-income households and other vulnerable sociodemographic groups in Sweden.

In the past two years, electricity prices in south and middle Sweden have increased by 40% (Energimyndigheten, 2023; SCB, 2023). Fuel taxes on diesel and gasoline were reduced in 2022 and have not been restored since then. Sweden aims for net-zero emissions by 2045, with transport playing an important role in achieving this target.

Little analysis has been done on the impacts on households of the changing energy landscape in the EU and the potential effects of policy measures meant to alleviate negative impacts. Sweden provides a real-world setting for this work, where policy for a social welfare state that promotes equality intersects with spiking energy costs from regional war and other impacts. The findings have implications for the long-term efforts to transition to fossil-fuel free societies and reducing climate-changing emissions.

1. Distributional impacts of the energy crisis

For the analysis, we use outputs from a model originally created to study distributional impacts of EU policy reforms (Alonso-Epelde et al., 2022). The model simulates overnight changes (no price elasticities are assumed) because of energy price changes and compares welfare effects (gains and losses in terms of consumer expenditures). Final price changes for consumers are used, and scenarios can be introduced for simulating measures that EU member states introduced during 2022 to control energy prices.

The analysis is focused on the year 2022; therefore, only the decreased fuel tax levels are included in our scenarios. It is too soon to include electricity support measures introduced in 2023 in the analysis, and these should be the subject of future analysis.

Table 1. Scenario description.

Scenario name	What is included?	Comments
Reference	Distributional impact of energy and fuel price increases in 2022.	Presenting the distributional effects of energy prices in 2022 based on documented average national impacts and including all government measures.
Scenario 1: No policy support	Excluding transport fuel subsidies via tax reductions.	Simulating distributional impacts if a fuel tax reduction was not introduced, thus leading to higher transport fuel costs.
Scenario 2: Direct compensation to lowest income groups	Direct compensation targeted to low-income households below the poverty line.	Fuel tax reductions not considered. The budget that would be used for the fuel tax reduction (EUR 337 million) is instead recycled and used for direct compensation to lower income households.
Scenario 3: Direct compensation to 50% of population	Direct compensation targeted to 50% of the population (first to fifth decile).	

Various sociodemographic variables are included: income decile, population density, household type, income source, age, sex, birth country, study level, work hours, and property type. Data inputs include Eurostat data on energy expenditure as a proportion of overall household expenditure based on household spending surveys for each member state. For Sweden, the latest available household data from Eurostat on these energy expenditure patterns are from 2015. These data are calibrated for 2022 household consumption, and the model analyses the expenditure patterns against data inputs on the recent energy price changes. In general, the model handles average national price impacts and does not include impacts that are specific to a region or sociodemographic group. The scenarios developed for the analysis are presented in Table 1.

2. Results

The model results for Sweden include energy expenditures in relation to total household expenditures. Also included are distributional welfare impacts based on data inputs on the changes in energy prices in 2022 compared to 2021.

Energy price increases in Sweden are close to the EU average for electricity and above the average for transport fuels. Electricity prices increased by 34% year-on-year to December 2022 (compared to the EU average of 35%). For diesel over the same period, the increase was 48%, significantly above the EU average of 37%, while the increase for petrol of 31% was slightly above the EU average of 26%. Natural gas prices increased only slightly in Sweden, well below the EU average of 68%. While gas prices did not increase and direct consumption of gas is very low in Sweden, the effects of the changes across Europe were felt through energy prices via trade with other member states.

2.1 Energy expenditure

Table 2 shows energy expenditures as a share of total household expenditures. Results are reported per income decile, i.e. dividing the adult population into 10 equal-sized groups according to their income. Those in the bottom decile group are the ones who fall in the lowest 10% of the total income distribution.

Energy expenditures are split in four categories: electricity, heating fuels, district heating, and transport fuels; the results are presented per income decile. In Table 2, we compare energy expenditure shares for densely (cities/large urban areas) and sparsely (rural areas) populated regions, using Eurostat definitions for urbanization degree (Eurostat, 2023).

Electricity represents a higher expenditure share for low to middle incomes (first to fifth decile) for all Swedish regions, and particularly for sparsely populated compared to densely populated areas, which have on average a 2.2% difference in spending. In densely populated areas, electricity expenditure share is higher for low-income groups. Heating costs are negligible in general, since most households in cities have access to district heating and the rest of the households mostly use electricity instead of other heating fuels. For example, oil represented only 1% of energy use for heating in 2019 (Energimyndigheten, 2020).

Table 2. Energy expenditure as share of total expenditure (%) for densely and sparsely populated Swedish regions, as well as all Swedish regions, per income decile.

Income decile	Electricity			Heating fuels			District heating			Transport fuels		
	Densely populated	All groups	Sparsely populated	Densely populated	All groups	Sparsely populated	Densely populated	All groups	Sparsely populated	Densely populated	All groups	Sparsely populated
1. 0–10%	3.74%	4.31%	4.80%	0.04%	0.11%	0.16%	0.00%	0.19%	0.20%	1.64%	3.05%	4.05%
2. 11–20%	3.06%	5.15%	6.21%	0.00%	0.17%	0.28%	0.00%	0.25%	0.33%	2.85%	3.64%	4.26%
3. 21–30%	5.24%	5.79%	6.45%	0.00%	0.35%	0.48%	0.94%	0.35%	0.25%	3.27%	5.26%	6.22%
4. 31–40%	2.60%	4.64%	5.84%	0.00%	0.13%	0.24%	0.07%	0.42%	0.40%	3.45%	5.68%	5.75%
5. 41–50%	3.20%	4.92%	5.58%	0.01%	0.25%	0.42%	0.27%	0.47%	0.61%	3.38%	5.01%	5.76%
6. 51–60%	3.30%	4.69%	5.43%	0.00%	0.08%	0.09%	0.19%	0.74%	1.05%	3.56%	4.74%	5.31%
7. 61–70%	3.10%	4.48%	4.61%	0.09%	0.41%	0.19%	0.52%	0.35%	0.39%	4.22%	5.32%	6.27%
8. 71–80%	3.08%	4.02%	4.18%	0.00%	0.21%	0.38%	0.06%	0.23%	0.35%	3.08%	5.08%	6.34%
9. 81–90%	2.61%	3.45%	3.94%	0.18%	0.19%	0.25%	0.10%	0.34%	0.46%	2.74%	4.14%	5.29%
10. 91–100%	2.58%	2.77%	2.99%	0.00%	0.13%	0.23%	0.00%	0.26%	0.30%	2.33%	3.26%	3.90%

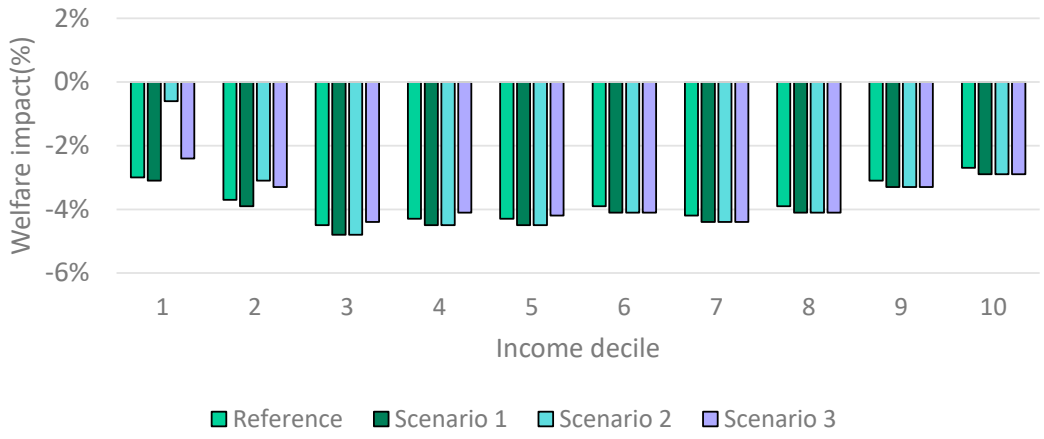
Transport fuel expenditure is higher for middle to high income groups. On average, these groups spend 0.8% more than lower income groups in sparsely populated areas, where car dependency is more prominent, compared to densely populated areas where alternatives such as public transport exist.

2.2 Distributional welfare impacts

The energy expenditure shares previously described are the basis for developing estimations of welfare impacts from the energy prices observed in 2022. Figure 1 shows distributional welfare impacts per income group for the four scenarios. These show the increase in the share of energy expenditure as a proportion of total household expenditure. The reference scenario has an average impact of about –3,8% across all income groups, with income deciles 3, 4, 5 and 7 having the highest impacts (above –4%) and income deciles 1 and 10 having the lowest (equal or below –3%). This shows that low to middle income groups have been mostly affected by the energy price increases, in line with the energy expenditure share analysis presented in Table 2. This welfare impact structure differs from several other member states, for example Italy or Belgium, where effects decrease linearly as income increases.

We also observe that densely populated areas generally have lower welfare impacts compared to sparsely populated ones. The average impact across all income groups in densely populated areas is –2.6% compared to –4.3% for sparsely populated areas – a difference of 1.7 percentage points.

Figure 1. Swedish distributional welfare impacts per income decile and scenario.



Scenario 1 documents the effects of removing fuel tax reductions and has the most negative impact for all income groups (average impact, –4%). Again, we observe that negative impacts are slightly higher for middle income groups. However, the difference between the reference and this scenario is quite small, since the tax reduction itself was marginal.

As expected, welfare benefits to the lowest income deciles are evident in Scenario 2, which includes direct compensation to households below the poverty line, and Scenario 3, with direct compensation to the lower income deciles (50% of the Swedish population). Welfare impacts are only slightly negative (–0.6%) for the first income decile under Scenario 2. In Scenario 3, direct compensation is more broadly dispersed to more households, with more significant dampening of negative impacts for the first and second income deciles, and only slight differences for the remaining deciles in the bottom half of the income distribution.

Both direct compensation scenarios are somewhat successful in dampening negative effects of the energy crisis for the most vulnerable households. However, low to middle income groups (income deciles 3 to 5) benefit only marginally from direct compensation, even though they are the groups affected the most under the reference scenario and the scenario where no policy measures are introduced (Scenario 1).

3. Today's costs, tomorrow's climate

With energy prices increasing, the trend has been to alleviate distributional impacts on households, with global fossil fuel subsidies skyrocketing in 2022, exceeding USD 1 trillion (IEA, 2023). But are the energy price savings a reasonable benefit compared to the long-term cost of not fulfilling emission reduction pledges and not achieving well-founded climate goals? The impact analysis for exceptional short-term measures does not usually include the climate perspective in the long-term. The risk is that reversing attitudes towards emission-saving policies and demand reduction measures, even for shorter periods, could have long-term impacts on consumer behaviours.

Energy demand is linked to price elasticity level. Previous research (before the energy crisis) on a wealthy suburb of Stockholm, for example, showed inelastic price behaviours in response to marginal incentives to decrease energy consumption in the form of demand tariff flexibility (Lanot & Vesterberg, 2021). Higher demand elasticities could be expected for other income groups, with potential impacts to quality of life. A recent analysis showed that consumers in southern Sweden nevertheless are responding to electricity price increases, reducing their demand by around 5% to 7% in 2022 compared to 2021. However, further analysis is needed to determine whether these changes result from demand elasticity or other factors (Wråke et al., 2022).

For transport, Sweden temporarily reduced its gasoline and diesel tax rate for three years by 80 öre per litre (about EUR 0.07) based on the tax rates that would have applied on 1 January 2023. The price of petrol and diesel at the pump was therefore estimated to be reduced by one Swedish krona (about EUR 0.9) per litre including VAT (Regeringskansliet, 2022). Furthermore, the previous and current governments paused the greenhouse gas reduction mandate for transport fuels (Riksdagen, 2022), and an upcoming proposal would decrease the instrument's ambition level announced by the government (Alestig, 2023).

Previous research has shown that only 62% of the tax rate reduction was passed on to fuel consumers (Konjukturinstitutet, 2022). The tax reduction on gasoline in Sweden has some benefits for consumers, but gasoline companies can still earn significant profits. The policy creates losses for consumers in other countries that have not lowered their tax rates and continue to pay the same price, and it favours high-income groups in Sweden, where among the 20% richest households, around 95% show decreased transport fuel expenditures. Additionally, the loss in government revenue – around SEK 6.2 billion in 2022 or around EUR 54 per person – could lead to cuts in welfare expenditures (Andersson & Tippmann, 2022).

The pause and expected reduction of the greenhouse gas mandate goes against what is needed to achieve the Swedish climate targets by 2030 and 2045. The long-term scenarios of the transport authority (Trafikverket) show that the share of biofuel blending in transport needs to increase dramatically compared to today's levels. This required increase is independent of the success of other measures targeting transport emissions, such as electrification or increased transport efficiency (Lindblom & Selin, 2023).

Finally, the fuel price increases in Sweden between 2018 and 2022 have been significantly higher than the EU average, with 17% vs 14% for gasoline and 32% vs 14% for diesel, respectively. Increasing production costs account for about 70% of these price increases. High taxation rates represent a large share of total consumer prices in Sweden, at 60% for gasoline and 45% for diesel, but their relative contribution to the price increase has been much smaller compared to production costs (SCB, 2022).

Despite the drastic increases of fuel prices last year – jumping 70% higher than 2019 – transport fuel volumes mostly remained unchanged in 2022, except for a small decrease in the inner-city cores of two of the biggest cities in Sweden, Stockholm and Gothenburg. This is perhaps not surprising, as individuals who might decide to drive a car in a city could be expected to be more responsive to pricing, given that alternatives such as public transport and cycling exist (Trafikanalys, 2023).

4. Policy recommendations

The recent effects of the energy crisis have been significant for all EU member states, including Sweden. Our investigation here of the welfare impacts of electricity and fuel price increases during 2022 for different income and sociodemographic groups in the country shows an average welfare impact of about –3.8% across all income groups in Sweden, with lower to middle income groups (income deciles 3 to 5) being most negatively affected.

We found significant differences of welfare impacts between sparsely and densely populated areas. This means that support mechanisms should take into account geographical differences.

Targeting just the low-income households below the poverty line with direct compensation would alleviate almost all negative welfare impacts for the lowest income population (the first decile). However, it would not significantly support any other income group. Thus, focusing redistribution only on income groups below the poverty line would not only exclude the most affected income groups, but may also cause unintended consequences by overcompensating the lowest income groups and dampening price signals that can moderate energy consumption levels.

A support mechanism targeting low to middle income groups (deciles 1 to 5) should include the groups most affected by the price increases (deciles 3 to 5). Currently, the budget corresponding to the fuel tax reduction level would be insufficient to cover all households in these income groups.

We recommend further analysis and better communication on the causes of price increases, especially under crisis situations. For the case of Sweden, for example, a large share of fuel price increases is the result of global supply chain developments leading to increased production costs, and not the result of increased taxation. Therefore, policy changes targeting taxation levels do not show the expected results on household fuel expenditures.

A necessary next step is to include in the analysis the impacts of the electricity support mechanism introduced in 2023. Further research is also needed on the indirect impacts to other expenditure categories from increased electricity or fuel prices due to inflationary pressure, e.g. for food expenditures. These linkages should be explored and better understood for designing effective policy instruments targeting distributional effects of the energy crisis.

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The implications of state measures designed to alleviate the effects of the energy crisis on consumers from a climate policy perspective will be tricky to navigate in Sweden. Policy planning should consider the long-term climate perspective in impact assessments of short-term measures that aim to address the distributional effects of the energy crisis. Instruments targeting energy and transport efficiency as well as demand flexibility might be more compatible to long-term climate goals and lead to positive welfare impacts and improved quality of life for the most vulnerable societal groups.

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Correction (10 May 2023): This brief was amended to more accurately represent Sweden's net-zero goal.