ESTIMATING THE EFFECT OF A FUEL PRICE INCREASE ON POVERTY AND INEQUALITY: EVIDENCE FROM A FUEL SUBSIDY REDUCTION IN INDONESIA

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HIGHLIGHTS

- The fuel prices increased by the government in 2022 to reduce the burden on the national budget can lead to an increase in the poverty rate but only a slight reduction in the Gini ratio.

- About 70% of the potential increase in poverty is mitigated by social assistance programs. In addition, social assistance potentially reduces expenditure inequality.

- Overall, reallocation of fuel subsidy into social assistance programs is progressive, as it benefits the poor relatively more than the rich.

INTRODUCTION

Global economic growth projection was revised down in June 2022 for the remaining months in 2022 and year of 2023 (World Bank, 2022; IMF, 2022). Despite the resuming of social economic activities after the COVID-19 pandemic in 2022, there are other underlying reasons for the World Bank and IMF to lower the projection of global economic growth. Most importantly, there are still some uncertainties. Prices of energy sources, especially coal and crude oil, are still high; this is due to supply disruption caused by the war in Ukraine (Kacaribu, 2022). Prices of commodities, such as crude palm oil, wheat, soybean, and corn, have also gone up since April 2020. Although commodity prices started to decrease around April and June 2022, they remain high. Particularly in countries where the international energy and food prices pass through to their domestic consumers, the supply disruption manifests in the form of a rise in inflation. As a response, many countries continue to tighten their monetary policy. For example, since 2022, The Fed rate has increased by 150 basis points and the Bank of England has raised its interest rate by 100 basis points. As a result of the increasing interest rates, the capital flow returns to developed economies and creates uncertainty in terms of exchange rate, which might jeopardize developing countries' inflation management.

Because of the increases in commodity prices, the Government of Indonesia (GoI) can earn higher revenue in 2022 than in 2021. Most of that windfall revenue is directed toward maintaining the purchasing power of consumers in Indonesia for at least the first semester of 2022. This was indicated by a stronger economic growth in the second quarter of 2022 (5.4%, yoy) compared to the last two quarters (5%, yoy for the last quarter of 2021 and first quarter of 2022). The GDP growth is sustained by household consumption and exports (Kacaribu, 2022). It was achieved after the GoI kept the prices of gasoline, electricity, and the 3-kilogram liquid petroleum gas (3 kg LPG) unchanged to protect the consumers' purchasing power, as marked by stronger growth in household consumption. However, the increase in crude oil price during the first semester of 2022 continued to mount pressure on the national budget ability to provide fuel subsidy.

Finally, in September 2022, the GoI increased fuel prices to reduce the fuel subsidy. Other than due to the global inflationary pressure on the national budget, the fuel subsidy in Indonesia disproportionately benefits the rich more than the poor (DJP Kemenkeu, 2022; Dartanto, 2013). The GoI projected that the impact of the fuel subsidy reduction would create higher inflation, which is about 6.3%–6.7%. The poverty rate was expected to increase to 9.9% from 9.5% in September 2022. Economic growth was expected to decrease by 0.1 percentage point from the 2022 baseline (5.3%). To address the potential increase in poverty rate, the government has prepared a social safety net program in the form of Direct Cash Transfer (Bantuan Langsung Tunai/BLT), which aims to reduce the negative impact on the low and lower middle–class households (households in the bottom 40% of well-being distribution).

We expect that, after the fuel price reform, the economic growth will remain inclusive such that, at least, it can retain the poverty rate at one digit and reduce inequality. At the micro level, the fuel subsidy will caused the rise in other items consumed by households, causing higher consumer price inflation. The impact of the fuel price reform on the households is likely to be very diverse; the extent of the rise in inflation will depend on the share of food and fuel in the consumption basket. The loss of purchasing power from higher fuel and food prices is more pronounced for poorer households.

This research note aims to estimate the effect of the fuel price reform on poverty and expenditure inequality in 2022 in Indonesia. In our analysis, we used inflation of commodities as the main channel of welfare change. Besides inflation, we also simulated the disbursement of a large unconditional cash transfer as a follow-up policy from the fuel price reform (reallocating subsidy).

We found that the fuel price increase can lead to an increase in the poverty rate but only slightly reduce inequality. However, the simulations that we conducted also show that social assistance programs have a substantial mitigation role in lessening the adverse effect of the fuel price reform on poverty.

Fuel Prices, Inflation, Poverty, and Inequality in Indonesia

For developing countries, such as Indonesia, which regulate its domestic fuel prices, once the increase in oil price is allowed to pass through, it means fuel subsidy reduction. As a result of the fuel subsidy reduction, the fuel prices increase and create inflationary impact. The effect of a fuel price increase on inflation is significantly positive and longer in developing countries (Kpodar and Liu, 2022).

In Indonesia, a fuel price increase is usually followed by an increase in inflation in the following months. Figure 1 shows the evolution of fuel prices in Indonesia over the period from 2000 to 2022. Prior to the fuel price reform in September 2022, there were at least four periods (2005, 2008, 2013, and 2014) in which the fuel prices substantially changed in the last two decades. Those changes were followed by similar trends in inflation during the periods (Figure 2).

Figure 1. Fuel Price Dynamics 2000–2022
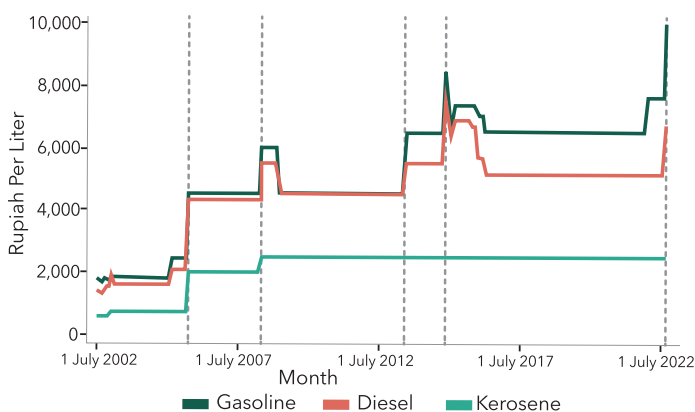
Note: The grey dashed line indicates the period when there was a large increase in the prices of fuel.

Figure 2. Poverty, Gini, and Inflation 2002–2022
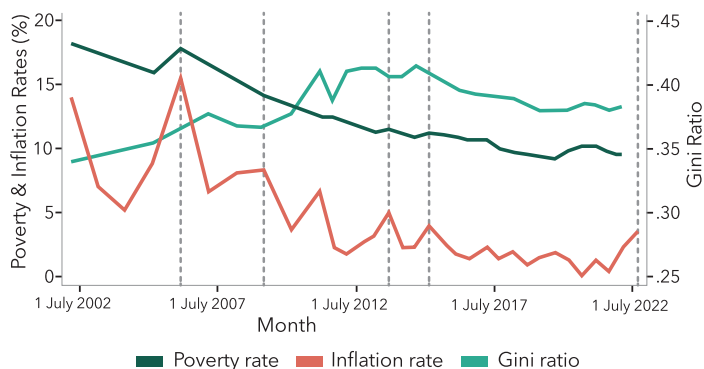
Note: The grey dashed line indicates the period when there was a large increase in the prices of fuel.

Not surprisingly, poverty also increased following the fuel price reform since higher inflation comes with higher poverty rate (Datt and Ravallion, 1998; Agenor 2002). The higher inflation lowers real wages and deteriorates the purchasing power of households (Easterly and Fischer, 2001). Households experienced unequal inflation when they have different consumption bundles. Kpodar and Liu (2022) found that a higher share of household spending on food makes households highly vulnerable to fuel price shocks, as food prices are quite sensitive to changes in fuel prices, mainly due to transport cost. Consequently, higher inflation might worsen the poor rather than the nonpoor. Figure 2 shows that the increase in poverty in 2006 was the largest compared to the other years of fuel price reforms (i.e., 2008, 2013, and 2014). This is because between 2005–2006 the gasoline price rose more than double.

Unlike the poverty trend, Gini ratio of per capita household expenditure shows mixed trends. In the same survey wave in which poverty is measured, the Gini ratio increased in 2006, while it slightly decreased in the next fuel reform years. A higher Gini ratio indicates greater inequality. If the share of fuel expenditure is large in nonpoor households compared to poor households, we would expect that the Gini ratio decreases when fuel prices increase.

However, in 2005–2006, the price of rice also increased in the same period of the fuel price reform. The rice price surge also contributed to the large increase in inflation (especially food price), poverty, and Gini ratio in 2006 (World Bank, 2006). The increase in food price inflation affected the poor households more than the nonpoor households because the poor households have a larger share of food expenditure (i.e., Engel Curve). At the same time, food price inflation pushed up the poverty line. As a result, household expenditure in the bottom 40% decreased more than the decrease of household expenditure at the top of distribution; this in turn leads to the increase in Gini ratio in 2006.

The poverty rate continued to decrease until the COVID-19 pandemic struck in early 2020. The poverty rate increased from 9.2% in September 2019 to 10.2% in September 2020 (BPS, 2021). The rate then decreased to 9.5% in March 2022. The Gini ratio also showed a similar pattern to poverty, as it increased in September 2020 and decreased in March 2022. The inflation rate in Indonesia remained below 3% in the last five years until September 2022. The fuel price reform in early September 2022 triggered inflation in the following weeks of September (Figure 2). There was a spike of inflation in September 2022, a similar pattern which occurs after every fuel price reform.

Since 2006, the poverty rates have shown a downward trend (Figure 2). The establishment of the social safety net policy in Indonesia was a major influence on the decreasing poverty rates, despite the fact that the system of the said policy tends to be fragmented (OECD, 2019). The GoI has acknowledged the need to compensate poor household to prevent increases in poverty following fuel price reforms. Dartanto (2013) carried out a simulation and found that in Indonesia, a partial subsidy removal, accompanied by government spending, transfers, and other subsidies, can more than offset the initial increase in poverty rate associated with the subsidy removal.

No less important than to offset the poverty is the need to ensure that inequality is not increasing. As a result of the 2005–2006 fuel price reform, growth in consumption expenditure tended to be negative for all percentiles because of the inflation hike. Without the cash transfer, the poorest might have experienced a decrease in consumption at a higher rate, while the nonpoor would have had it as well but at a lower rate. Poor households should be cushioned more against the impact of fuel subsidy removal than the average households, let alone the nonpoor.

While the inflation data is available on a monthly basis, there is yet household survey data available to assess the real changes in poverty rate and Gini ratio immediately after the September 2022 fuel subsidy removal. Therefore, we use a microsimulation approach to estimate poverty and inequality in September 2022.

METHODOLOGY AND DATA

This section explains the methodology and data that we used in the analysis. We used two main indicators of welfare, which are poverty and inequality. The poverty rate (or poverty headcount) was calculated by counting the proportion of individuals living below the poverty line measured by their monthly expenditure. We used the provincial poverty lines (for urban and rural separately) determined by Statistics Indonesia (or BPS[1]). Meanwhile, we used the same expenditure data to calculate the inequality measured by the Gini ratio.

We adopted two methods to estimate the impact of the fuel price reform on poverty rate and inequality in September 2022. First, we used the growth incidence curve (GIC) 2014–2015 which represents the last fuel price shock in Indonesia. Second, we used a microsimulation analysis based on an Almost Ideal Demand System (AIDS) estimation (Deaton and Muellbauer, 1980; Poi, 2012). We utilized data from a nationally representative household survey called the National Socioeconomic Survey (Susenas). Using each method, we carried out two simulations to understand what happen with the poverty rate and inequality when there is a cash transfer program and without one.

Method 1: Growth Incidence Curve (GIC) 2014–2015

We used the Susenas datasets of September 2014 and March 2015 just before and after the fuel price reform in November 2014. Our main reason to used the 2014–2015 GIC is that the changes in fuel prices in 2014 are similar to those in 2022, both of which increased by 30%.

We make use of the observed expenditure in Susenas, which is the total expenditure on food and nonfood items. Household expenditure data in Susenas equals a household's private out-of-pocket costs, including any replacement costs. Thus, we are likely to overestimate the purchasing power of low-income households that are likely to receive various kinds of economic assistance. Since Susenas' expenditure contains subsidies, households may appear to have high expenditure, when some parts of their spending actually come from subsidies.

When using GIC, we carried out several steps. First, we calculated the change in per capita expenditure between September 2014 and March 2015, and adjusted it for inflation. Then, as a counterfactual scenario, we subtracted households' per capita expenditure by social assistance program received in 2015 (BLSM[2]). The counterfactual scenario here imagines an alternate outcome or scenario where household beneficiaries did not receive social assistance. Then, we calculated the change in per capita expenditure between 2014 and 2015. This method allows us to calculate changes in per capita expenditure of households based on different welfare groups (percentiles). The GIC 2014–2015 is shown in Figure A1

in the Appendices. Finally, for method 1, we applied the GIC from Figure A1 on the Susenas dataset of March 2021 to simulate the change in expenditure for the September 2022 dataset. A key assumption of this method is that we ignore the household behavioral responses by assuming that the patterns of change in consumption are similar during the 2014–2015 and 2021–2022 periods.

Method 2: Almost Ideal Demand System (AIDS)

We relaxed the assumption used in method 1 by applying the demand system to measure household preferences through price and expenditure (income) elasticities.

For this method, we used two datasets: the main dataset is the Susenas dataset of March 2021 and the additional dataset is the inflation data from Statistics Indonesia. The Susenas dataset of March 2021 has 174 food items and 102 nonfood items. We aggregated all types of expenditure in the survey into eight groups of commodities that are consistent with the commodity classification in the national inflation report. The eight commodities are food, processed food, housing, clothing, health, education and recreation, transportation and communication, and others. We adjusted the poverty line to September 2022 by inflating the March 2021 poverty line with the inflation over that period.

Then we estimated a linear demand system (Deaton and Muellbauer, 1980) using the expenditure share (w) equation for commodity i (k=8 commodities) regressed by each commodity price (p) and total expenditure (m) that was normalized by price index (a(p)):

$$w_i = \alpha_i + \sum_{j=1}^{k} \gamma_{ij} \ln p_j + \beta_i ln\left\{\frac{m}{a(\boldsymbol{p})}\right\}, \quad i = 1, \ldots, k$$

Using the estimated demand system from the previous equation, we then computed the uncompensated price elasticity of good i with respect to change in the price of good j as follows (own price elasticity is when i=j):

$$\epsilon_{ij} = -\delta_{ij} + \frac{1}{w_i}\left(\gamma_{ij} - \beta_i\left(\alpha_j + \sum_l \gamma_{jl} \ln p_l\right)\right)$$

Meanwhile, the expenditure (income) elasticity for good i is:

$$\mu_i = 1 + \frac{1}{w_i}\beta_i$$

The simulation was conducted by simulating the change in consumption because of the change in commodity prices. The change in commodity prices in September 2022 was obtained by estimating the inflation model. We used the historical data (from April 2000 to September 2022) of consumer price index (CPI) for eight commodities at the national level, which was then regressed by the previous fuel prices change. In addition, we also controlled the inflation model by including exchange rate, interest

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[1] BPS, 2022.
[2] An unconditional cash transfer.

rate, and seasonal event (i.e., Eid Al-Fitr). Then, using the inflation model, we predicted the counterfactual inflation (if the reform never happened) by setting the predictor (fuel price change) to zero for September 2022. Therefore, we used the predicted change in commodity prices as a price shock in our demand system (Figure A2). Our purpose is to estimate how the fuel price reform could lead to a change in commodity prices and eventually a change in the allocation of household expenditure in September 2022 (through price and expenditure elasticities).

Simulation

For each method, we conducted two simulations. The first simulation was to estimate the poverty rate and inequality after the fuel price increase without social assistance. The second simulation was to estimate poverty rate and inequality after the fuel price increase with the social assistance.

For the second simulation, we used the coverage of existing social assistance programs (PKH[3] and BPNT[4]) from the Susenas dataset of March 2021 to simulate the distribution of the social assistance program (BLT) in September 2022. We calculated the coverage of PKH and BPNT for each percentile of household welfare (Figure A3 in the Appendices). Then, we set a random number for each household and assigned the BLT recipient status based on the coverage of previous social assistance. The main reason for using the existing social assistance coverage was based on the policy design where the government targeted the same households to deliver the BLT. The amount of BLT benefit that we used in the simulation was Rp300,000 per intended beneficiary, which was the monthly benefit of the social assistance program. We used the BLT as an income shock in the GIC and AIDS methods.

Results and Discussions

Figure A1 in the Appendices shows the proportional change in per capita household expenditure (GIC) from September 2014 to March 2015 after the fuel price reform. GIC trend indicates that the poverty rate increases from 10.96% in September 2014 to 11.22% in March 2015. Meanwhile, the inequality (Gini ratio) slightly decreases from 0.414 to 0.408 in the same period. From Figure A1, there is different responsiveness to changes in fuel prices across welfare groups.

Figure 3 shows the changes in per capita household expenditure after the fuel price reform and disbursement of unconditional cash transfer (BLT) for method 1 (green line) and 2 (orange line). The two methods show similar patterns where fuel price reform and social assistance are progressive. It means that the poor experience the highest increase in per capita household expenditure, while the nonpoor have lower increase in or even negative growth of per capita household expenditure.

Figure 3. Changes in Per Capita Household Expenditure after the Fuel Price Shock (fuel price increase + cash transfer)
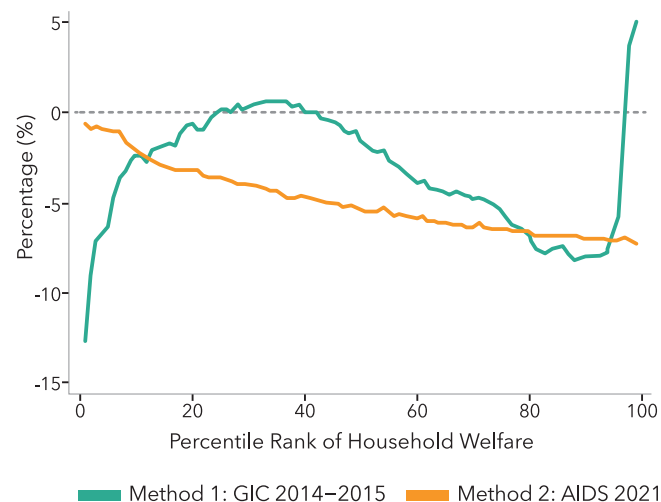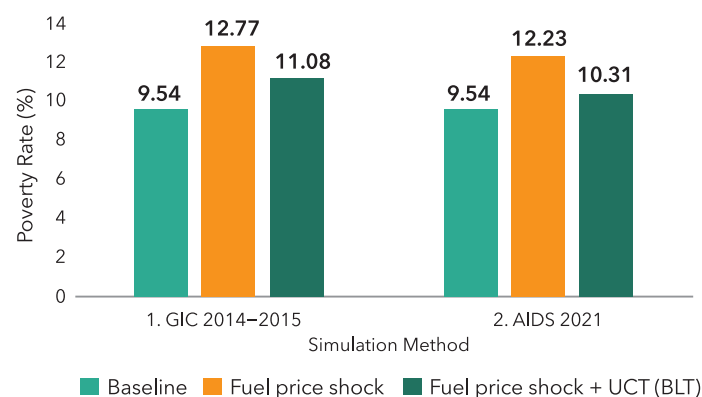

Figure 4 shows the simulation results of the poverty rate for September 2022. From method 1 (GIC), the poverty rate would increase from 9.54% at the baseline period (March 2022) to 12.77% after the fuel price increase. However, the potential increase in the poverty rate can be mitigated by the social assistance program that is implemented during the same period. The poverty rate in September 2022 would increase only to 11.08% after the fuel price shock and unconditional cash transfer disbursement.

From method 2 (AIDS estimation), the poverty would increase to 12.23% after the fuel price increase without social assistance. However, the potential increase in the poverty rate is mitigated by the social assistance program by about two percentage points. From this method, the poverty rate in September 2022 would increase only to 10.31% after the fuel price shock and unconditional cash transfer disbursement.

The simulation results from the two methods are virtually similar; however, method 1 shows a larger impact than method 2 (AIDS) does. This is plausible since in method 1, we assume that there are no behavioral responses. Lastly, on average, from the two methods, we found that the social assistance program can mitigate the potential increase in poverty rate by 50% to 70%.

Figure 4. Change in Per Capita Household Expenditure Aftershock (Fuel Price Increase + Cash Transfer)


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[3] Family of Hope Program.
[4] Non-Cash Food Assistance.

Next, Figure 5 shows the simulation results of the Gini ratio for September 2022. The patterns obtained from the two methods are similar. From the first simulation using the GIC 2014–2015 method, the Gini ratio would increase from 0.384 at the baseline period to 0.392 after the fuel price increase. Meanwhile, the Gini ratio in September 2022 would decrease up to 0.383 after the fuel price shock and unconditional cash transfer disbursement.

From the second simulation using AIDS estimation, the Gini ratio would decrease very slightly after the fuel price increase without social assistance. Ultimately, the Gini ratio in September 2022 would decrease to 0.375 after the fuel price shock and unconditional cash transfer disbursement.

Figure 5. Gini Ratio Simulation for September 2022 (%)
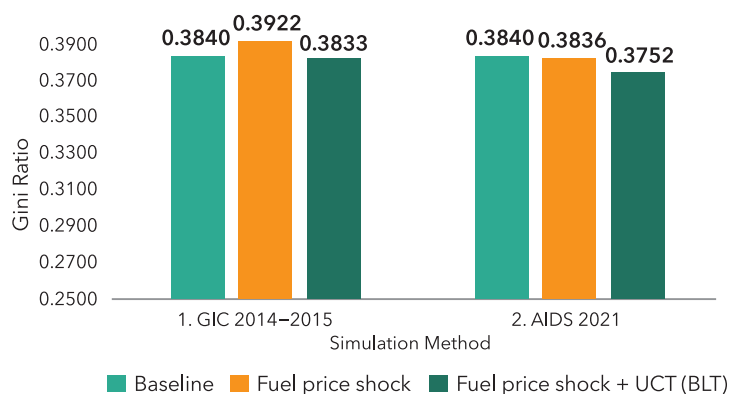
Despite the fuel price reform having a progressive impact on household expenditure distribution, poorer households are still highly vulnerable to the price shock or high inflation. The role of social assistance is a key safety net during such an event.

CONCLUSIONS

Historically, Indonesia has experienced at least four fuel price spikes in the last twenty years. The fuel price spikes are always followed by an increase in inflation (especially food price inflation) and poverty rate. In this note, we attempted to estimate the effect of fuel price increase on poverty and inequality using microsimulations by leveraging information on inflation and household demand. We found that the recent fuel price increase in September 2022 will also lead to an increase in the poverty rate but only slightly reduce expenditure inequality. Furthermore, the simulations that we conducted show that social assistance programs have a substantial mitigation role in lessening the adverse effect of fuel price reform on poverty and inequality. ■

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APPENDICES

Figure A1. GIC September 2014 to March 2015, Proportional Change in Per Capita Household Expenditure after Fuel Price Increase (excluding BLSM benefit)
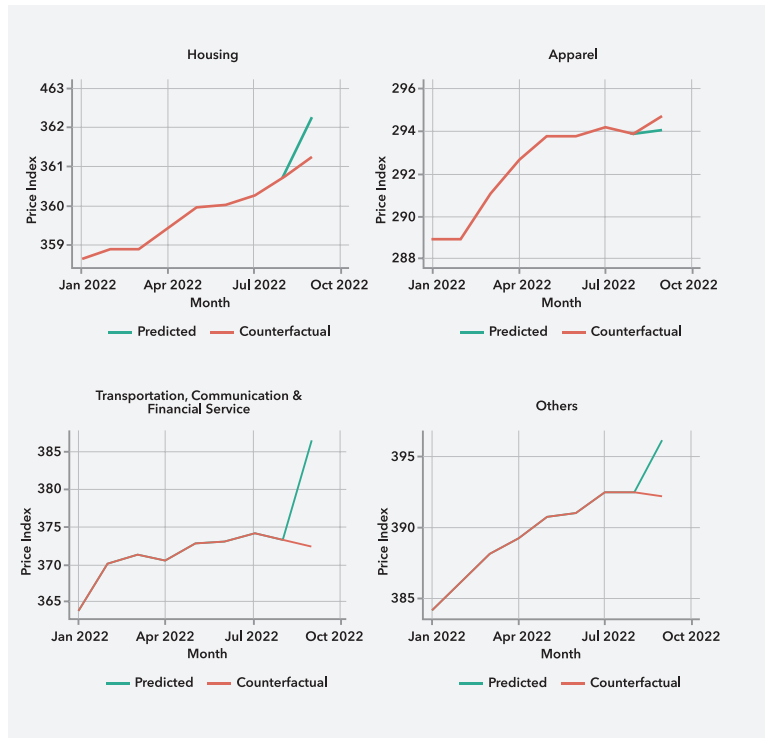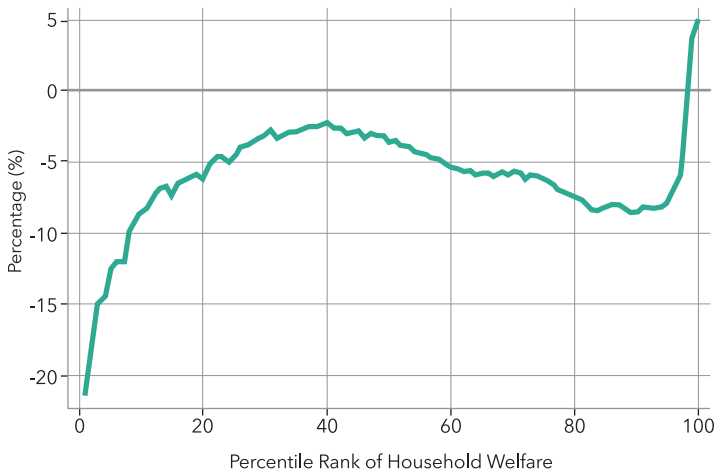

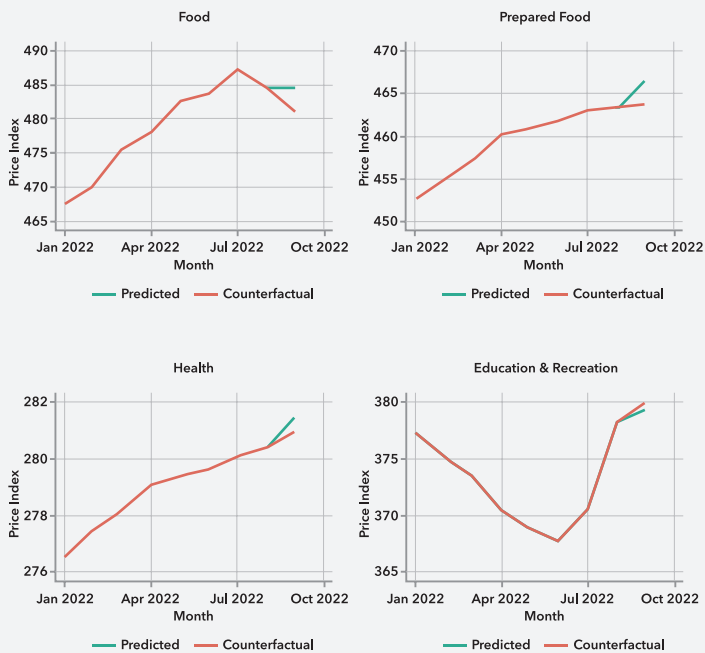Figure A2. Predicted vs Counterfactual Price Index as a Shock for Simulation in AIDS Estimation

Figure A3. Coverage of PKH and BPNT from Susenas Dataset of March 2021 as a Simulated Coverage for BLT 2022