The Impact of COVID-19 Outbreak on Poverty:
An Estimation for Indonesia

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SMERU WORKING PAPER

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The SMERU Research Institute

April 2020

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Cover photo: Mukti Mulyana

ABSTRACT

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The Coronavirus Disease 2019 (COVID-19) is expected to infect millions of people all over the world. The economic impact is expected to be large and can lead to a global recession. Millions of people will be pushed into poverty. In this paper, we estimate the impact of COVID-19 on poverty in Indonesia. One projection puts 1.2 million people in the country would eventually be infected. The economic impact is also expected to be severe. Compared to the baseline projection of 5 percent economic growth in 2020, various studies estimate that COVID-19 would reduce Indonesia's economic growth to between 1 and 4 percent. We find that under the mildest COVID-19 impact on economic growth, the poverty rate will increase from 9.2 percent in September 2019 to 9.7 percent by the end of 2020. This implies that 1.3 million more people will be pushed into poverty. Under the most severe projection, the poverty rate will increase to 12.4 percent, implying 8.5 million more people will become poor. The latter means that Indonesia's progress in reducing poverty over the last decade would be wiped out. The implication of this is that Indonesia needs to expand its social protection programs to assists the new poor in addition to the existing poor.

Keywords: COVID-19, poverty, shock, economic growth, household expenditure

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I. INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) first erupted in China in December 2019. By April 2020, close to 1.5 million people all over the world have been infected (Johns Hopkins University, 2020). While making global projections is challenging (de Walque, 2020), widely cited results from Walker et al. (2020) put estimated global deaths to range from 40 million people under no mitigation scenario to 2 million people under the most successful suppression scenario that reduced interpersonal contact rates by 75 percent.

The economic impact of COVID-19 starts as a negative supply shock (Hausmann, 2020). Two things occur. First, workers get infected, reducing production capacity. Atkeson (2020) states that when 10 percent of the population are infected, key financial and economic infrastructure would face severe staffing shortages. Second, restrictions of activity that is needed as part of disease suppression. As mentioned before, as high as 75 percent reduction in interpersonal contact could be needed to bring COVID-19 under control.

Eventually, these would lead to a demand shock. In countries with incomplete markets and liquidity constrained consumers, the initial supply shock could lead to amplified demand shocks (Guerrieri et al., 2020). Modelling by Eichenbaum, Rebelo, and Trabandt (2020) shows that disease suppression policies would save lives but exacerbate the size of economic recession. Long-term effects could include unemployment hysteresis effects and destruction of supply-side chains.

An economic recession would push millions of people into poverty. A rapid simulation covering 138 developing and 26 high-income economies finds that even in the mildest scenario, COVID-19 could impoverish an additional 85 million people (Sumner, Hoy, and Ortiz-Juarez, 2020).

In this paper, we estimate the impact of COVID-19 on poverty in Indonesia. The country first announced its first two COVID-19 infections in early March 2020. Within one month, the number of infected people has reached close to 3,000, with an 8 percent case fatality rate. Under the most recent projection, 1.2 million people in the country would eventually be infected (Shidiq, 2020). Economic impacts would be severe. Compared to the baseline projection of 5 percent annual growth in 2020, various studies estimate that COVID-19 would reduce Indonesia's economic growth rate to between 1 and 4 percent.

We first estimate the growth elasticity of household expenditure based on long time series data of economic growth and average household expenditure. Then we distribute the aggregate household expenditure shock into shock in each expenditure percentile using the pattern from an episode of poverty-increasing economic-downturn in Indonesia. We use the resulting household expenditure distribution to measure the projected poverty rate. We do the simulations based on various growth impact projections of COVID-19. We find that under the mildest COVID-19 impact on growth, 1.3 million more people will be pushed into poverty. Under the most severe projection, 8.5 million more people will become poor, wiping out the progress in reducing poverty over the last decade.

The rest of this paper proceeds as follows. The next section describes the estimation method in greater detail. Section III presents and discusses the estimation results. Section IV concludes and provides some policy implications.

II. ESTIMATION METHOD AND DATA

Estimating the impact of a shock, including COVID-19, on poverty requires to forecast the impact across the distribution of household income or expenditure. This distributional impact can be assumed, based on theory, borrowed from another context, or applying a historical pattern. In the past two decades, Indonesia experienced two occasions when a shock was large enough to cause the poverty rate to increase. The first was in 1997−1998 due to the Asian financial crisis. The second was in 2005−2006 due a large increase in fuel price, exacerbated by an increase in rice price (World Bank, 2006). This study applies the 2005−2006 pattern to measure the 2019−2020 distributional impact on household expenditure due to COVID-19.

2.1 The Impact of a Shock on Poverty: The 2005−2006 Experience

In the second half of 2005, due to the pressure from continuously increasing international oil price, the Government of Indonesia had no choice but to increase the domestic prices of fuels by an average of 125 percent in October of that year (Sen and Steer, 2005). Back then, fuel prices were fixed by the government, with the gaps with international oil price automatically covered by a government subsidy. When the international oil price increased substantially in 2005, the pressure on government budget became unbearable, forcing the government to increase the domestic fuel prices.

Table 1 summarizes the impact of the shock on Indonesian economy. Annual economic growth was only little impacted, declining from 5.7 percent in 2005 to 5.5 percent in 2007. However, it masked the more significant impact in the economy as shown by the quarterly economic growth, which declined from 6.3 percent in the first quarter of 2005 to 4.6 percent in the first quarter of 2006. Figure 1 on the trend of quarterly economic growth shows this more clearly.

Table 1. Economic Growth, Household Expenditure, and Poverty Rate in 2005 and 2006

	2005	2006	Change
Economic growth (%)	5.7	5.5	*-0.2*
Economic growth Q1 year-on-year (%)	6.3	4.6	*-1.7*
Average per capita household expenditure (Rp)	265,368	249,326	*-16,042 (-6%)*
Poverty rate (%)	15.97	17.75	*1.78*
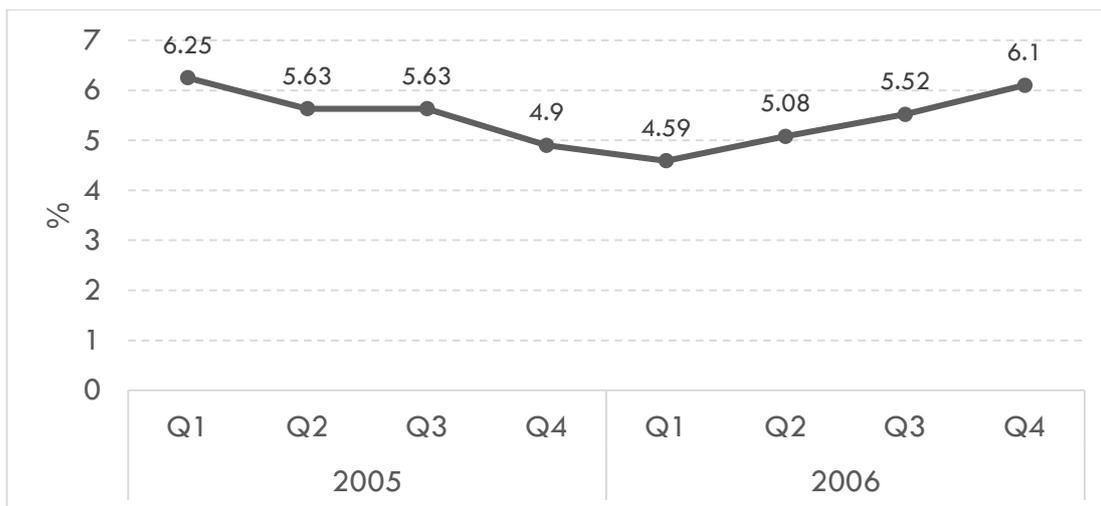
Figure 1. Quarterly economic growth 2005–2006 (year on year)

Because the National Socioeconomic Survey (Susenas), which collects data on household expenditure and is used to measure poverty, is fielded in March every year, the impacts of the shock on household expenditure and poverty were also quite significant. The average per capita household expenditure dropped by about six percent, while the poverty rate increased from 16 percent in 2005 to 17.8 percent in 2006 (BPS, 2007).

Figure 2 shows that the six percent decline in average per capita household expenditure was not evenly distributed across the distribution of per capita household expenditure. The decline was proportionally much higher at the bottom of the distribution compared to the top of the distribution. While the poorest 10 percent population suffered from 10–12 percent decline in their per capita household expenditure, the richest 10 percent population only experienced 0–3 percent decline in their per capita household expenditure. This positively sloped distributional impact of the shock explains the significant increase in poverty rate.
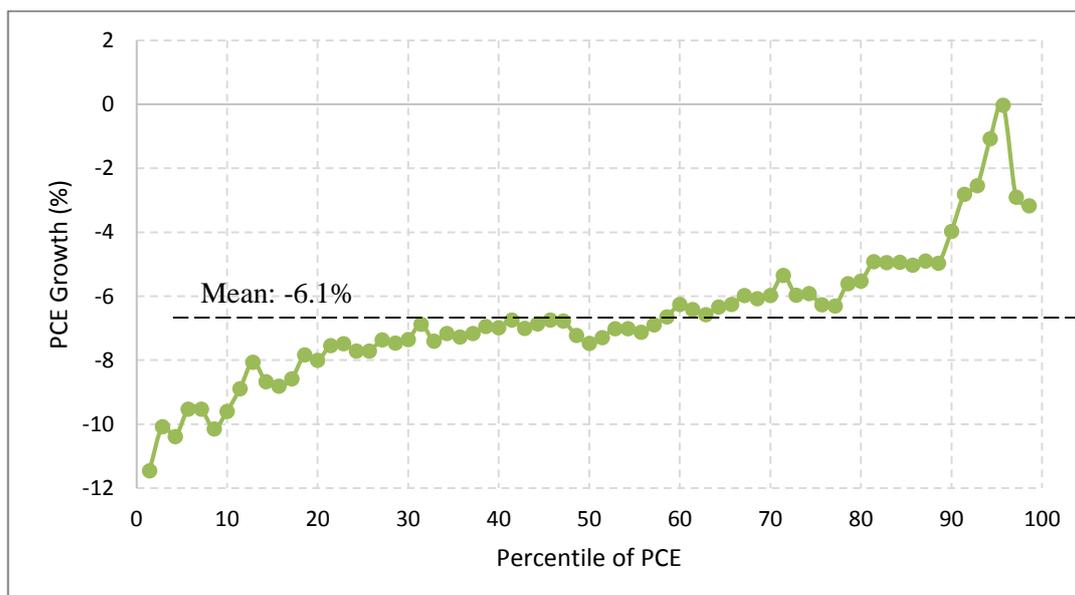
Figure 2. Proportional change of per capita household expenditure (PCE) in 2005−2006 (%)

2.2 Transmission Mechanism

Figure 3 shows the transmission mechanism of how the outbreak of COVID-19 affects the incidence of poverty. First, through a combination of supply and demand shocks, COVID-19 outbreak causes a decline in economic activities, which leads to a decline in economic growth. This macroeconomic shock causes a decline in average per capita expenditure at household level. Then depending on its distributional impact, the decline in per capita household expenditure may lead to an increase in the incidence of poverty.
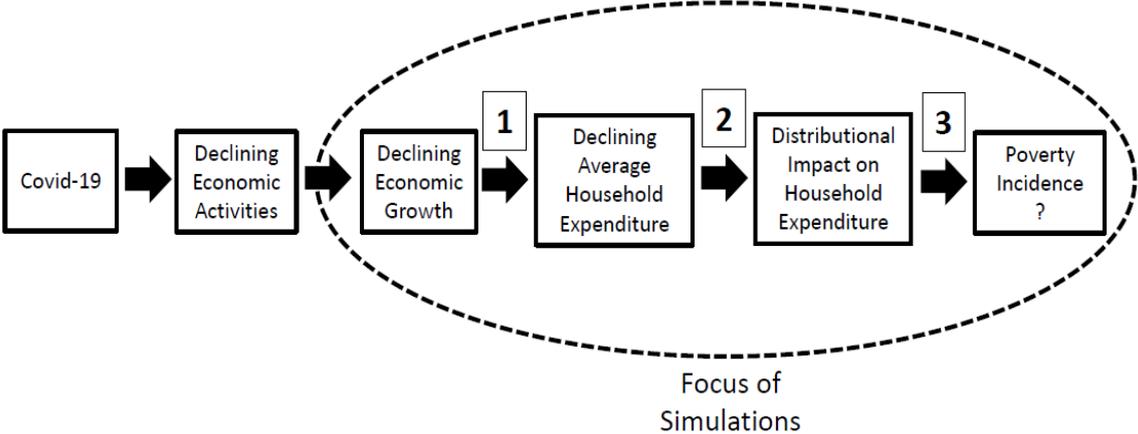

Figure 3. Transmission mechanism from COVID-19 to poverty incidence

The impact of COVID-19 on declining economic growth has already been projected by various institutions (see Section III). Therefore, in this paper we focus on estimating how the decline in economic growth will affect poverty incidence. In the first step, we estimate the growth elasticity of average per capita household expenditure based on long time series data of economic growth and household expenditure. In the second step, we then translate the resulting shock in aggregate household expenditure into shock in each percentile of per capita household expenditure using the pattern from the economic downturn in 2005–2006 in Figure 2. Finally, in the third step, we use the resulting per capita household expenditure distribution to measure the projected poverty rate. We implement these simulations based on various growth impact projections of COVID-19 proposed by various institutions.

2.3 From Growth Shock to Household Expenditure Shock

Poverty in Indonesia is measured based on household expenditure. Therefore, we must first translate the shock in economic growth into the shock in average per capita household expenditure. This can be achieved by estimating the correlation between the change in economic growth and the change in average per capita household expenditure. The correlation can be obtained by estimating the following model:

$$\Delta logPCE_t = \alpha + \beta \Delta gGDP_t + \varepsilon_t \qquad (1)$$

where $\Delta logPCE$ is change in log of average per capita household expenditure and $\Delta gGDP$ is change in the rate of economic growth, while β is the correlation parameter to be estimated. The

model can be estimated using time series data of economic growth and average per capita household expenditure.

Once the correlation has been estimated, the next step is to estimate the decline in average per capita household expenditure between 2019 and 2020. This is obtained by applying the estimated correlation to estimate the decline in average per capita household expenditure between 2019 and 2020 based on the scenarios of decline in economic growth back to the model:

$$\Delta \widehat{logPCE}_{2020} = \hat{\alpha} + \hat{\beta}\Delta gGDP_{2020} = \hat{\alpha} + \hat{\beta}(gGDP_{2020} - gGDP_{2019}) \qquad (2)$$

The result shows how much average per capita household expenditure will decline for each scenario of projected economic growth in 2020.

2.4 The Distributional Impact of Expenditure Shock

Once the decline in average per capita household expenditure has been estimated, the next step is to estimate how this expenditure shock will affect the distribution of per capita household expenditure in 2020. To estimate this, the pattern of distributional impact of the 2005−2006 expenditure shock in Figure 2 will be used and applied to the 2019−2020 expenditure shock. The first step to do this is to calculate the decline in per capita household expenditure by percentile for every one percent decline in average per capita household expenditure. This is obtained by dividing the proportional decline in real per capita household expenditure in Figure 2 by the decline in average per capita household expenditure. The results are shown in Figure 4, which has a negative slope, confirming a larger impact at the lower end of the distribution.
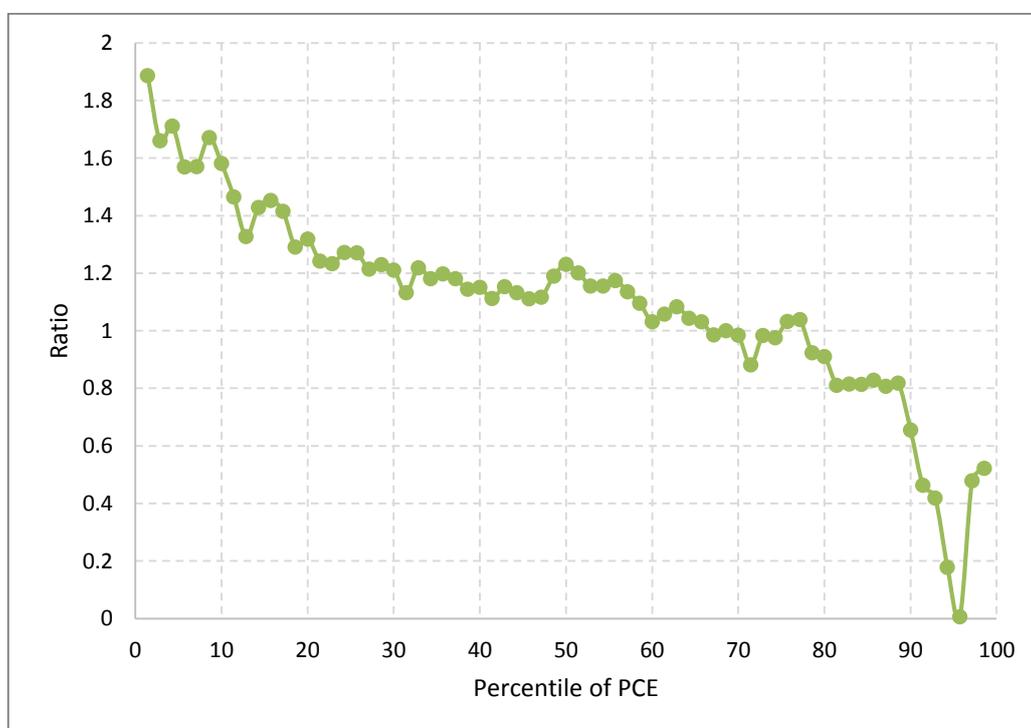

Figure 4. Change of per capita household expenditure (PCE) per one-percent change in average PCE by percentile of PCE, 2005−2006

Assuming this pattern of distributional impact of expenditure shock holds in 2019–2020, it is then applied to the decline in average per capita household expenditure between 2019 and 2020 estimated through Equation (2) to obtain the distribution of per capita household expenditure in 2020 in constant 2019 prices. Since the 2020 expenditure is measured using the 2019 prices, the 2020 poverty lines are the same as the 2019 poverty lines. Using these poverty lines, the poverty rate in 2020 can now be calculated.

2.5 Data

The main data set that is used in this study is the National Socioeconomic Survey (Susenas), collected by Statistics Indonesia (Badan Pusat Statistik, BPS). Susenas collects data related to household welfare indicator, such as household expenditures, as well as basic demographic and other characteristics of households and their members. BPS uses Susenas data to calculate Indonesia's official poverty statistics at national, provincial, and district levels.

First, since we benchmark our simulations to the 2005–2006 shock, we use the longitudinal Susenas Panel 2005 and 2006 data sets to calculate the change in household expenditure distribution. The Susenas Panel 2005 and 2006 data has a sample of 10,500 households and was used to calculate the official national poverty rates for the respected years.

Second, we utilize the Susenas March 2019 data to simulate the household expenditure and calculate the poverty rate for 2020. Susenas March 2019 has a sample of 315,000 households. Third, to estimate the correlation of GDP to household expenditure in Equation (1), we collect the data of average per capita household expenditure, also from Susenas, and GDP data as well as its growth for the period of 1980–2019. This data is also obtained from BPS.

III. ESTIMATION RESULTS

Using the method developed above and available data, we estimate the poverty implications of various economic growth scenarios due to COVID-19 proposed by various institutions. We use the official poverty rate of 9.22 percent in September 2019 as the baseline. This means that the poverty rate scenarios estimated here refer to the period of end of 2020 or early 2021.

3.1 The Correlation of Income and Expenditure Shocks

Table 2 shows the estimation results of Equation (1) on the correlation of change in economic growth and change in average per capita household expenditure using time series data from 1980 to 2019. The coefficient indicates that one percentage point increase in economic growth correlates with 1.4 percent increase in average per capita household expenditure and vice versa. This estimated correlation will be applied to Equation (2) to estimate the change in average per capita household expenditure between 2019 and 2020 based on economic growth projections proposed by various institutions.

Table 2. Correlation of Change in GDP Growth and Change in Average per Capita Household Expenditure (PCE)

	ΔlogPCE
ΔGDP growth	1.424**
	(0.254)
Constant	0.040**
	(0.010)
R^2	0.47
N = time period 1980−2019	38

Note: * $p<0.05$; ** $p<0.01$

3.2 Growth Projections for 2020 and Its Impact on Expenditure

Figure 5 provides the projections of Indonesian economic growth for 2020 to 2023 proposed by various institutions. All institutions predict a slower growth in 2020 compared to 2019. The Economist Intelligence Unit (2020) and Yusuf (2020) predict lower growth than others, of only 1 and 1.2 percent respectively. The World Bank (2020) estimates a moderate growth of 2.1 percent, although it also presents a worst-case scenario of -3.5 percent. Meanwhile, Rogers (2020) and Bank Indonesia (2020) predict the most optimistic growth scenarios at 3 and 4.2 percent respectively. In addition, the Minister of Finance of Indonesia has been quoted to say that the worst estimation of economic growth in 2020 could be as low as -0.4 percent (Finance Detik, 2020).
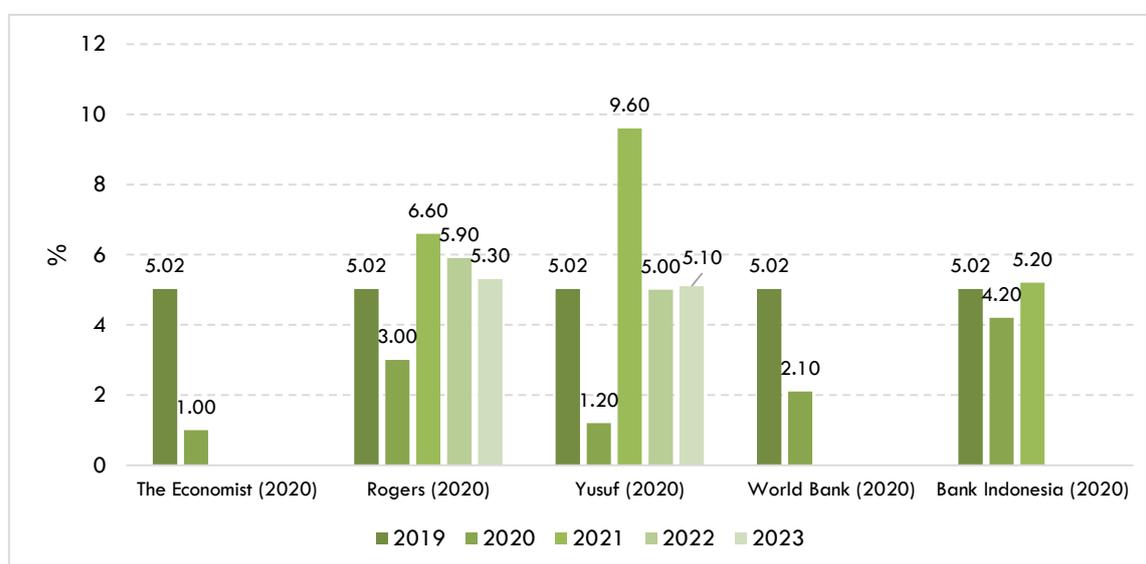
Figure 5. Economic growth projections for 2020−2023 (%) (growth in 2019 is actual growth as the baseline)

Based on those economic growth scenarios and the estimated correlation coefficient in Table 2, we estimate the impact of COVID-19 on the change in average per capita household expenditure between 2019 and 2020. Table 3 shows the estimation results. The average per capita household expenditure is estimated to decrease by -1.17 to -2.88 percent when growth in 2020 is projected at

4.2 and 3 percent, respectively. However, it will decrease much higher by -4.16, -5.44, and -5.72 percent when growth in 2020 is projected much slower at 2.1, 1.2, and 1 percent, respectively.

**Table 3. Estimation Results of the Change in Average
per Capita Household Expenditure in 2020**

Growth 2019	Growth 2020 (Scenario)	Change 2019−2020	Coefficient of correlation	Change in Average PCE
5.02%	4.20%	-0.82%	1.424	-1.17%
5.02%	3.00%	-2.02%	1.424	-2.88%
5.02%	2.10%	-2.92%	1.424	-4.16%
5.02%	1.20%	-3.82%	1.424	-5.44%
5.02%	1.00%	-4.02%	1.424	-5.72%

3.3 The Distribution of Expenditure Shock

To distribute the aggregate household expenditure shock in Table 3 to the whole distribution, this shock is multiplied by the distributional impact by percentile of per capita household expenditure in Figure 4. The results are shown in Figure 6. This figure shows the distributional impact in per capita household expenditure of various growth projections in 2020. Reflecting the method, the pattern of per capita household expenditure change in 2019−2020 mimics the 2005−2006 pattern but with different magnitudes. When economic growth is only 1 percent, the poorest population will experience a decrease in their per capita household expenditure by as much as 10 percent. Meanwhile, when economic growth is projected to only slightly decrease to 4.2 percent, the poorest population's per capita household expenditure will only slightly decrease by 2 percent. Nevertheless, the results of all simulations indicate that the poor is always relatively more affected by the shock compared to those in the higher parts of the distribution.
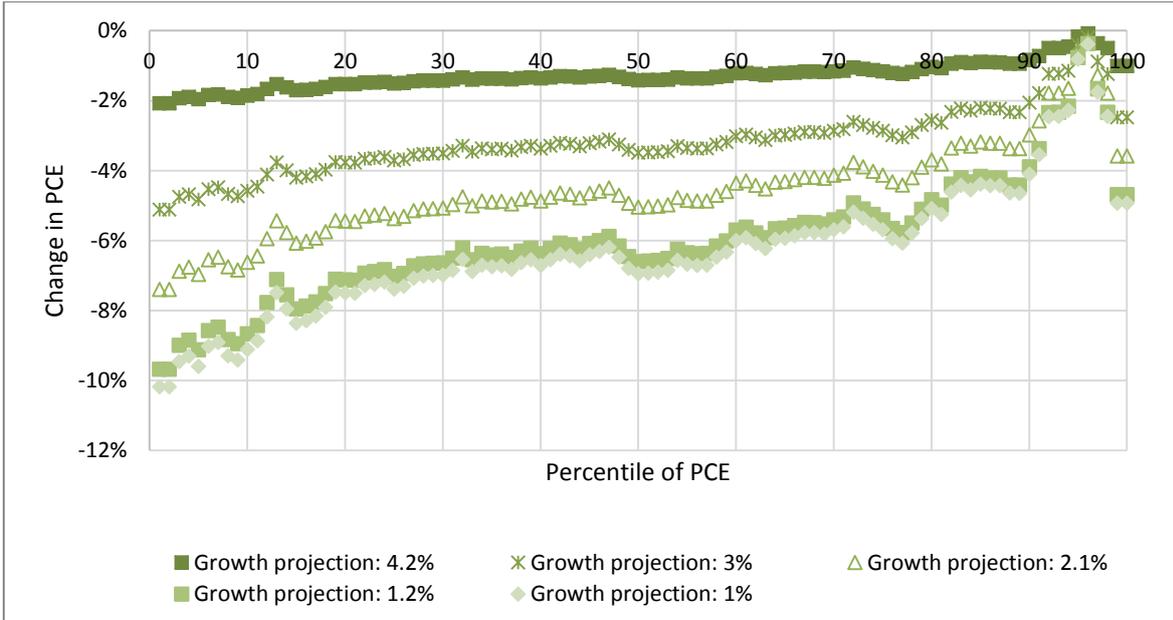

Figure 6. Change in per capita household expenditure (PCE) by percentile of PCE of various scenarios of economic growth in 2020 (%)

3.4 The Poverty Impact

To measure the poverty impact of COVID-19, we need to set a baseline as close as possible to the condition before the outbreak. Currently poverty statistics in Indonesia are calculated twice every year in the month of March and September. The latest poverty rate released by BPS is 9.22 percent for September 2019. The poverty rate is calculated by BPS using separate poverty lines for urban and rural areas in each province, totaling 67 poverty lines. Since September 2019 is quite close to COVID-19 outbreak in December 2019, we will use the September 2019 poverty rate as the baseline.

Unfortunately, the latest Susenas dataset available is only for March 2019. The poverty rate for March 2019 is 9.41 percent. Hence, we need to calibrate the poverty condition in Susenas March 2019 dataset to reflect the September 2019 condition. To do this, we multiply the population weight of Susenas March 2019 dataset by the ratio of poverty rate in September 2019 and poverty rate in March 2019.

Now the per capita household expenditure distribution in Susenas March 2019 dataset with new weight reflects the per capita household expenditure distribution in September 2019 in March 2019 prices. Hence, when the poverty rate is recalculated using Susenas March 2019 dataset with new weight and the original poverty lines, the result is 9.22 percent poverty rate, which is the poverty rate in September 2019.

To calculate the poverty incidence in 2020, first we estimate per capita household expenditure in 2020 by applying the distributional change in Figure 6 to the per capita household expenditure distribution in 2019. Using the 2020 poverty lines, which are the same as the March 2019 poverty lines because the 2020 household expenditure is measured using March 2019 constant prices, we then calculate the poverty rate in 2020.

Figure 7 shows the results on poverty rate projections for various economic growth projections in 2020. The baseline poverty rate before the COVID-19 outbreak in September 2019 is 9.22 percent, which indicates that 24.8 million people live below the poverty line. Figure 7 shows that as economic growth becomes slower, the poverty rate will increase. When growth in 2020 is projected at 4.2 or 3 percent, the poverty rate will increase to 9.7 and 10.7 percent respectively. Meanwhile, when economic growth in 2020 is projected to be as slow as 2.1, 1.2, and 1 percent, the poverty rate will jump to 11.4, 12.2, and 12.4 percent respectively.
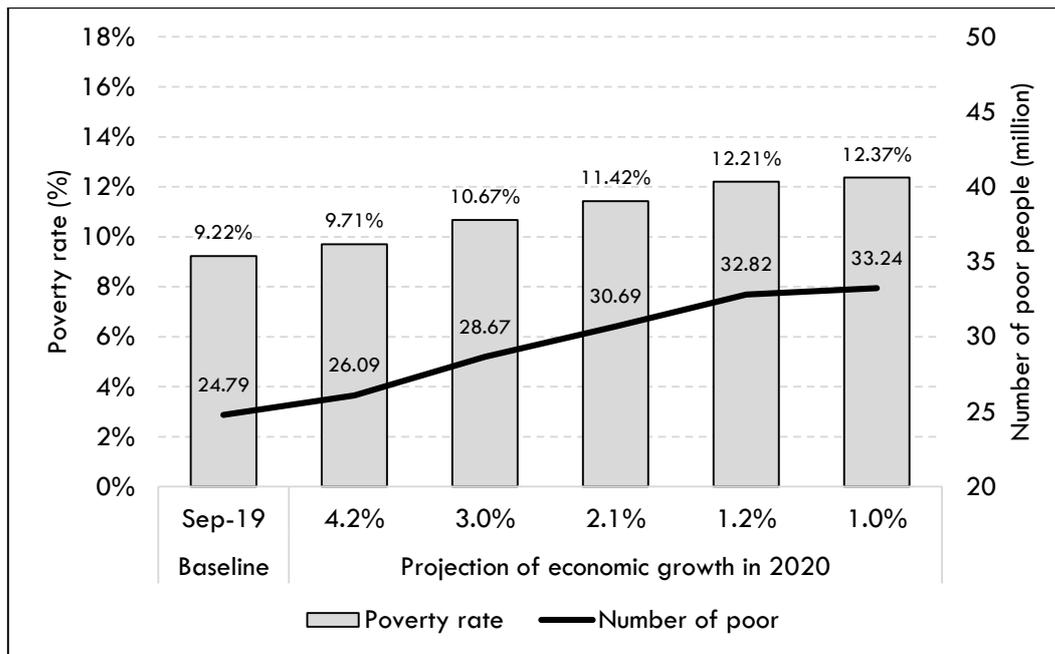
Figure 7. Projected impact of COVID-19 outbreak on poverty rate and number of poor people

Finally, Figure 8 shows the change in poverty rate and number of poor people implied by Figure 7. For the 4.2 and 3 percent of economic growth projections, the poverty rate increases by 0.48 and 1.44 percentage points respectively, implying 1.3 and 3.9 million of additional poor people respectively. Meanwhile, when economic growth in 2020 is projected at 2.1, 1.2, and 1 percent, the poverty rate will increase by 2.2, 3, and 3.1 percentage points respectively, implying 5.9, 8, and 8.5 million more people who become poor.
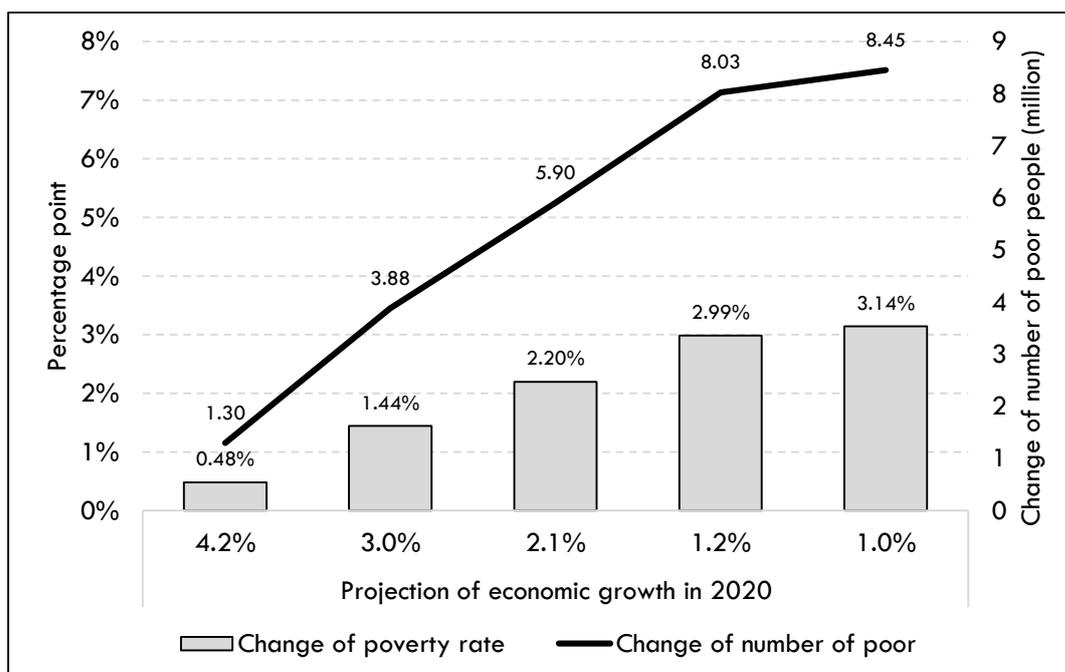

Figure 8. Change in poverty rate and number of poor people

IV. CONCLUSION

COVID-19 has infected around 1.5 million people all over the world by April 2020. The economic impact of this is expected to be large, indicated by a significant decline in projected global economic growth in 2020. Economies are projected to enter a recession. Along with recessions, millions of people will become poor.

In this paper, we estimate the impact of COVID-19 on poverty in Indonesia. One projection puts that 1.2 million people in the country would eventually be infected. The economic impact is also expected to be severe. Compared to the baseline projection of 5 percent economic growth in 2020, various studies estimate that COVID-19 would reduce Indonesia's economic growth rate to between 1 and 4 percent.

To estimate the impact of this on poverty, we conduct simulations based on various economic growth scenarios. We find that under the mildest COVID-19 impact on economic growth, the poverty rate will increase from 9.2 percent in September 2019 to 9.7 percent by the end of 2020. This implies that 1.3 million more people will be pushed into poverty. Under the most severe projection, the poverty rate will increase to 12.4 percent, implying 8.5 million more people will become poor.

The implication of this is that Indonesia needs to put in place social protection programs to assists the new poor in addition to the existing poor. Given the scale of the problem, the resources that will be required to prepare for this will be large. To ensure the effectiveness of these social protection programs, Indonesia needs to learn from the similar programs during the past crises as well as from other countries.

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