Hitting the bullseye: How does aggregate demand shape inflation targeting?

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Abstract

We aim to determine whether components of aggregate demand contribute to regional inflation reaching the threshold level. By using regional-level datasets of Indonesian cities from 2010 to 2023 with Logit and Tobit estimates, we reveal that the pandemic conditions influence the behaviour of aggregate demand components in achieving the inflation targeting level in cities. We show that household spending during the pandemic (in 2020 and afterwards) stimulates cities to reach the inflation targeting level. Likewise, gross fixed capital formation (GFCF) and government spending also increase the probability of the cities reaching inflation targets during the pandemic periods. However, there is no significant effect of exports during the pandemic in helping cities reach the inflation threshold. This finding is corroborated by the estimation of inflation gap reduction, where only household consumption, GFCF, and government spending contribute to the reduction of cities' inflation gap towards the national targeting level. Our finding delivers policy implications, notably on how each city can achieve the national inflation targeting level.

Keywords: regional inflation; Indonesia; aggregate demands

JEL Classification: E31; R11; P44

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1. Introduction

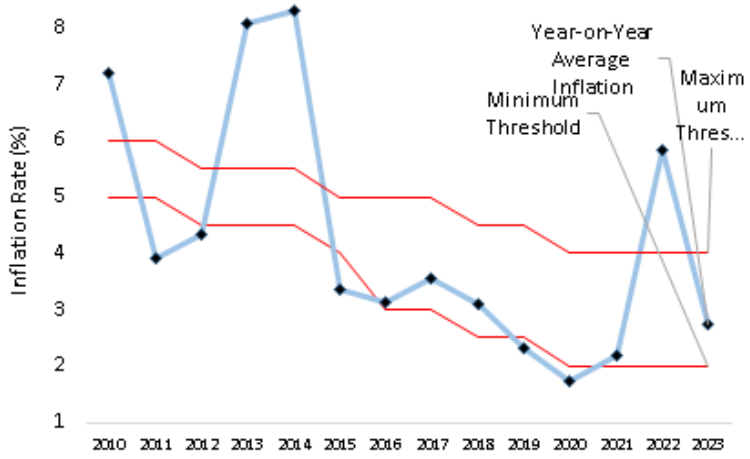
With Inflation dynamics driven by demand-pull stem from excess aggregate demand such as consumption, investment, government spending, and net exports over potential supply, as postulated by Stiglitz & Regmi (2023). Empirical evidence of this nexus has been well discussed in prior studies, such as Zhao et al. (2016), who scrutinized the Chinese economy through oil demand-supply shock to the price stability, and Leduc & Liu (2016), who introduced a model of uncertainty from search friction causing demand drop, which in turn decreases inflation in the United States (US). Other recent studies have devoted attention to the highlight of Covid-19 pandemic amplifying the dynamic of inflation-aggregate demand interrelation (see Armantier et al., 2021; Kantur & Özcan, 2021; Kollmann, 2021). However, amongst abovementioned studies, none have concluded how aggregate demand affects inflation in setting the threshold on or off. In this regard, we aim to fill this gap by examining whether components of aggregate demand namely household consumption, capital formation, government spending as well as net exports encourage regional inflation at the threshold level.

The hypothesis of our study is motivated by the Keynesian theory, as discussed in the seminal paper of Blanchard (1989), which postulates that aggregate demand shocks stimulate outputs and prices in the same direction in the short run. In this notion, an increase in aggregate demand from consumption, investment, government spending, and net export may trigger economic activity, which in turn encourages inflation. Conversely, temporary demand shocks caused by an overall nominal spending downturn lead to output and price deflation (Baqaee & Farhi, 2022). The basic mechanism occurred when workers lose their income due to shock, it causes them to reduce their spending, causing a contraction in demand (Guerrieri et al., 2020). In the empirical evidence, Keynesian theory is pertinent to the current evidence of nexus between inflation and aggregate demand, such as the effect of the Covid-19 pandemic to the stagflation traps and growth rate shock that have been discussed by Castro (2020) and Furnaro & Wolf (2020).

We examine the hypothesis by employing regional level datasets of Indonesia in the years of 2010-2023 to reveal whether aggregate demand components such as household consumption, gross fixed capital formation, government spending, and net export contribute to maintain inflation level on the threshold. The evidence of Indonesia is intriguing and deserves more attention as Indonesia is a country with massive regional diversity, which stimulates the inflation as the main issues in the country. The introduction of Regional Inflation Controlling Team (RICT), also known as *Tim Pengendalian Inflasi Daerah* (TPID), at the regency and provincial levels may cause heterogeneous inflation dynamics due to diverse controlling programs (Purwono et al., 2020). Moreover, in monetary policy framework involving the regulation on the money supply, Indonesian central bank, Bank Indonesia, regulates monetary policy with the main goal of achieving the threshold of inflation rate. During the Covid-19 pandemic in 2020 to 2022, the overall Indonesian inflation rate dropped to 2.18% due to limited community activities causing household consumption decline and leads to the economic circulation decelerate, shown in Figure 1. In this regard, the behaviour of on-off threshold may be well captured in this study.

Our study is important to conclude potential components on regional aggregate demand to set inflation on the optimal inflation targeting (inflation threshold). Kusumatrisna et al. (2022) suggest that inflation-controlling policies should consider regional-specific inflation characteristics and the trade to economic growth. Evidently, Bank Indonesia, Indonesian central bank, has encouraged sustainable economic growth through loose macroprudential policies and the development of a more inclusive payment system.

Figure 1. Average Region (Municipalities and Regency) Inflation Rate and The Threshold



Bank Indonesia has also strengthened policy coordination with the Central Government, Regional Governments, and strategic partners, including the National Food Inflation Control Movement (GNPIP) program in various regions in the Central and Regional Inflation Control Teams (TPIP and TPID), as well as the Acceleration and Expansion of Digitalization of Central and Regional Government Transactions (P2DD).

Bank Indonesia strengthens policy synergy with the Financial System Stability Committee (KSSK) to maintain financial system stability and encourage credit/financing to the business world, especially in priority sectors. Moreover, Bank Indonesia also continues to strengthen and expand international cooperation, including accelerating connectivity of payment systems and transactions using local currencies.

In macroeconomic horizon, demand-supply shocks may cause economic instability, which in turn fluctuates output and prices in the market (International Monetary Fund, 2023). As a decrease of demand (demand shock), such as when people reduce spending or businesses postpone their investment, Bank Indonesia promulgate the policy through lowering interest rate and government bonds purchases (Bernanke & Reinhart, 2004).

This strategy aims to encourage economic activity and prevent a recession. Likewise, expansionary fiscal policy Conversely, if there is a disruption in the supply of goods and services (supply shock), such as increasing government spending, may also complement monetary policy in stimulating economic growth during demand shocks, as in Blanchard & Perotti (2002).

In the empirical findings, the economic shock caused by Covid-19 pandemic has imposed systematic policy changes around the world. For example, China dealt with global demand shock and internal challenges due to the ”zero-covid” policy through lowering the prime lending rate and reducing bank reserve requirements (Han, 2022; Zhou et al., 2022). Moreover, disruptions to global supply chains and rising commodity prices have created additional inflationary pressures which causes the requirement for balancing between promoting economic growth and maintaining price stability (Xu & Xiong, 2022).

In US, the Federal Reserve responded to the drastic decline in economic activity with a very loose monetary policy, namely lowering the benchmark interest rate to near zero percent and carrying out large asset purchases, known as quantitative easing, of $ 120 billion. These steps aim to accelerate liquidity in financial markets and stimulating economic activity.

Our study contributes to the literatures in two main-folds. First, we examine the

probability of cities to be on inflation threshold by disaggregating demand components namely household consumption, investment, government spending, and net exports. Although recent studies on the aggregate demands and inflation nexus have been extensively conducted (Aharon et al., 2023; Barredo-Zuriarrain, 2024; Yang et al., 2023), to the best of our knowledge, not many research pieces devoted attention on how this aggregate demand encourage cities to obtain inflation within the targeting levels. This strategy enables the cities to boost which aggregate demand components that dominantly set inflation within the threshold.

Our second contribution stems from the analysis of pandemic perspective by incorporating the period of pre-Covid19 and post-Covid-19. Likewise, the analysis on how global economy is severely affected by Covid-19 has produced a strand of literatures (Al-Thaqeb et al., 2022; Chowdhury & Dixon, 2024; Lear, 2024), however, these studies did not capture the behaviour of cities in reshaping inflation targeting from aggregate demands. Evidently, during the pandemic, Indonesian aggregate demand dropped significantly due to mobility restriction which thus degrades the value of outputs (Suryahadi et al., 2021). It then drives inflation rate off the threshold. In this regard, whether an increase of aggregate demand in cities during pre-pandemic and pandemic periods performs differently in setting the regional inflation on the threshold across cities is an essential novelty of our study.

The remaining section deliver the data, empirical strategy, and econometric specifications to identify the probability of aggregate demand components in setting inflation on the threshold. Section 3 presents the findings and deliver further discussion. Ultimately, the conclusion and policy suggestion are provided in Section 4.

2. Methodology

2.1. Data and Variables

We employ the Indonesian annual regency/municipalities/cities level dataset spanning from 2010-2023 . The data was collected from BPS-Statistics of Indonesia. There are three empirical reasons for choosing this period. The first reason is that it encompasses the period in which Regional Inflation Controlling Team (RICT/TPID) has been promulgated since 2008 and established significantly in the regency/city/province levels in 2010. The heterogeneous policies across regency/city may cause diverse impact on the inflation targeting goal. The second reason stems from the period in which the year of 2010 has the significant number of TPID, while it may capture more observation to take into account in the analysis. The third reason is the comparison purposes of the Covid-19 pre-pandemic and pandemic circumstances. We infer that inflation behaviour and aggregate demand in the period of pre-pandemic, the year before 2020, may differ from that pandemic era. In this regard, it is essential to consider the year of 2010-2023.

We employ several variables classified into two groups: dependant variable, independent variables. We use two types of dependent variables. The first type is the binary variable to determine whether a city is in the threshold in a year. The threshold is taken from the report of Bank Indonesia capturing national inflation targeting. The utilization of the inflation targeting as the threshold is also used in more advanced approach using stochastic Taylor series as in Conrad and Eife (2012) for the evidence of US inflation dynamics. The second type is to capture the gap between threshold and the actual inflation rate. This strategy is inspired by Chen et al. (2021) and Jalan & Ravallion (1998) discussing inefficiency and poverty traps. The gap between threshold and actual inflation rate is formulated as follows.

$$Gap_{it} = \begin{cases} |Inflation_{it} - ThresMin_i| & \textbf{if } Inflation_{it} < ThresMin_i \\ |Inflation_{it} - ThresMax_i| & \textbf{if } Inflation_{it} > ThresMax_i \\ 0 & \textbf{if } ThresMax_i > Inflation_{it} > ThresMin_i \end{cases} \quad (1)$$

Where Gap_{it} denotes inflation gap of city i in year t. $Inflation_{it}$ is the year-on-year inflation rate of city i in year t. $ThresMin_i$ and $ThresMax_i$ are the minimum and maximum threshold of inflation targeting from Bank Indonesia. The gap is in the absolute value, while those cities who are within the threshold are recognized as 0. In this regard, the further the inflation rate from the targetting level, the larger the gap is.

Moreover, we employ several disaggregation of aggregate demand components as independent variables, namely household consumption, gross fixed capital formation, and government spending, which are all in constant value with 2010 as a base year and transformed into the natural logarithmic form and its deviation from geometric mean.

Table 1. Variable Description

Variable	Proxy	Unit of Measurement
Inflation	Year-on-Year Inflation Rate from regency/city calculated from Consumer Price Index (CPI).	Ratio
Gross Fixed Capital Formation (GFCF)	The addition and reduction of fixed assets in a production unit involve various activities. The addition of capital goods includes acquiring, producing, or purchasing new capital goods domestically, as well as new and used capital goods from abroad. It also encompasses major repairs, the transfer or exchange of capital goods, financial leasing, and the growth of assets related to cultivated biological resources.	Rupiah
Gross Domestic Regional Product (GDRP)	The total value added of goods and services produced by various production units in each province over one year.	Rupiah
Household Consumption	Spending by resident households on goods and services for their final use. A household is characterized as either an individual or a group of individuals who reside together in a home, share some or all of their income and assets, and collectively consume goods and services, with a primary focus on food and housing.	Ratio
Government Spending	The government's expenditure on goods and services for final consumption. The government comprises institutional units in the regency/municipality level responsible for political duties, economic regulation, and the provision of services for both individual and collective consumption.	Ratio
Net Export	The value of export subtracted with import. The proxy is the ratio between net export to the GDRP.	Ratio

Meanwhile, we also include net export, which is the discrepancy between city's export and import. Unlike prior aggregate demand components that are non-negative, net export may possess negative value if import is larger than export. In this regard, we set the ratio proxy between the net export and gross domestic regional product. The summary of variable lists is displayed in Table 1, while Table 2 reports the descriptive statistics of the variable.

Table 2. Descriptive Statistics

Variable	Observation	Unit of Measurement	Mean	STD	Min	Max
Inflation	968	Ratio (%)	4.2	2.4	-0.9	12.3
Household Consumption	968	Billion Rupiah	32438.8	113833.9	734.9	1203918.0
Government Spending	968	Billion Rupiah	5591.7	23021.5	183.4	258562.8
Gross Fixed Capital Formation	968	Billion Rupiah	22280.0	80681.9	411.4	766914.8
Net Export	968	Billion Rupiah	-3493.8	31798.4	-285493.3	57819.7

Note: STD denotes standard deviation.

2.2. Empirical Strategy

We examine the effect the components of aggregate demand, namely household consumption, gross fixed capital formation, government spending, and net export in setting regional inflation on the threshold level and reducing the gap with the targeting level over the period 2010-2023. In this regard, we use two empirical base models, Model 1 and Model 2, as follows.

Model 1:

$$DThreshold_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\delta_i+\varepsilon_{it} \quad (2)$$

Model 2:

$$Gap_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\delta_i+\varepsilon_{it} \quad (3)$$

Where $DThreshold_{it}$ denotes binary variable of on/off threshold, 1 if the inflation of city is within the threshold, 0 if otherwise. Gap_{it} denotes the gap with the threshold as stated in Equation (1). HH_{it} is the household consumptions of city i in year t in the log form. $GFCF_{it}$ is the gross fixed capital formation of city i in year t in the log form. GOV_{it} denotes government spending of city i in year t in the log form. NET_{it} is the ratio of net export to GDRP of city i in year t in the log form.

$Pandemic_i$ is the dummy for pandemic period, 2020-2021. δ_i denotes city dummy-specific effects. ε_{it} denotes error term. The based model is then elaborated to capture the effect of each aggregate demand components during the pandemic condition. The formula is stated as follows.

Model 1A:

$$DThreshold_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\beta_6 (ln\ HH_{it}\times Pandemic_i)+\delta_i+\varepsilon_{it} \quad (4)$$

Model 1B:

$$DThreshold_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\beta_6 (ln\ GFCF_{it}\times Pandemic_i)+\delta_i+\varepsilon_{it} \quad (5)$$

Model 1C:

$$DThreshold_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\beta_6 (ln\ GOV_{it}\times Pandemic_i)+\delta_i+\varepsilon_{it} \quad (6)$$

Model 1D:

$$DThreshold_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\beta_6 (NET_{it}\times Pande$$

$mic_i)+\delta_i+\varepsilon_{it}$ (7)

Model 2A:

$Gap_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\beta_6 (ln\ HH_{it}\times Pandemic_i)+\delta_i+\varepsilon_{it}$ (8)

Model 2B:

$Gap_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\beta_6 (ln\ GFCF_{it}\times Pandemic\_i)+\delta\_i+\varepsilon\_it$ (9)

Model 2C:

$Gap_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta 4\ NET_{it}+\beta_5 Pandemic_i+\beta_6 (ln\ GOV_{it}\times Pandemic_i)+\delta_i+\varepsilon_{it}$ (10)

Model 2D:

$Gap_{it}=\beta_0+\beta_1 ln\ HH_{it}+\beta_2 ln\ GFCF_{it}+\beta_3 ln\ GOV_{it}+\beta_4 NET_{it}+\beta_5 Pandemic_i+\beta_6 (NET_{it}\times Pandemic_i)+\delta_i+\varepsilon_{it}$ (11)

There are two estimation approach used in this study. The first approach is Logistic regression, which is applied for models in Equation (2), (4), (5), (6), and (7). We also employ Probit regression to test robustness from Logistic regression. The standard errors are clustered in the city level. Meanwhile, Tobit regression is used for models in equations (3), (8), (9), (10), and (11). Tobit estimate applies for left-censoring as the value of inflation gap ranges between zero to infinity.

3. Results and Discussion

The first analysis is conducted by looking at the descriptive statistics in Table 1. According to Table 2, the average inflation level of the cities from 2010-2023 is 4.3%, with the smallest level obtains -0.9% and highest level reaches 12.3%. Figure 2 illustrates the average inflation distribution across cities in Indonesia from 2010-2023. According to Figure 2, regency of Banyuwangi has the smallest inflation level on average by about 2.97%, while city of Pontianak shows the largest average inflation by approximately 5.08%.

According to Figure 3, the proportion of cities possessing inflation within the threshold is less than 33% before 2016. However, this proportion increases afterwards into 69% in 2017 while the largest proportion is in 2023 with 84% cities within the national targeted inflation level. This evidence is relevant with Figure 4 where the gap in 2023 is relatively less dispersed in 2023 compared to that in 2013 and 2014.

We then report the results from the regression estimation with the dummy of inflation targeting as the dependent variable, shown in Table 3. The estimation captures probability of cities to obtain the inflation targeting. The estimation consists of the findings from equation (4)-(8). In Table 3, column (1) and (2) report the finding from household interaction (equation 4), with logit and panel logit estimation, respectively.

We also look at the proportion of cities that are off threshold and capture the magnitude of the gap towards the targeted level, shown in Figure 3 and Figure 4.

Column (3) and (4) report the finding from Gross Fixed Capital Formation (GFCF) interaction (equation 5), with logit and panel logit estimation, respectively. Column (5) and (6) report the finding from Government Spending interaction (equation 6), with logit and panel logit estimation, respectively. Meanwhile, column (7) and (8) report the finding from Export interaction (equation 6), with logit and panel logit estimation, respec-

tively. For robustness, we report the estimation using Probit in Table 5 in the Appendix.

Figure 2. Average Year-on-Year Inflation Across Cities in 2010-2023

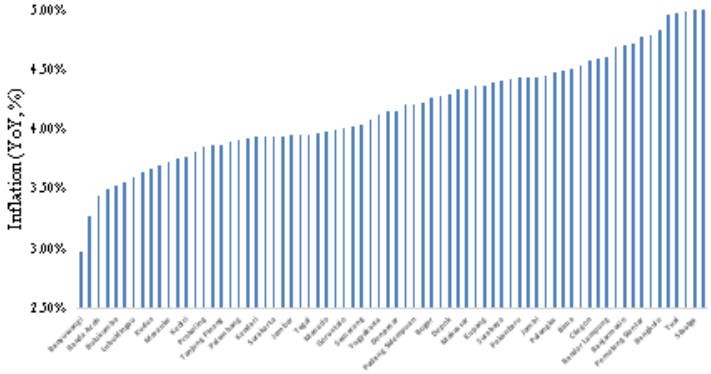
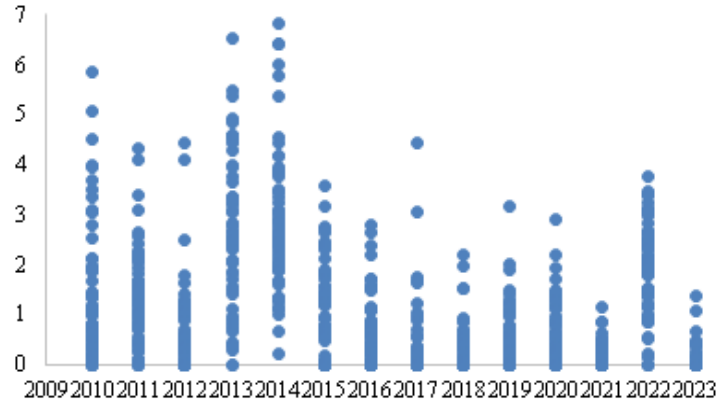


Figure 3. Proportion of Cities with On- and Off-Threshold Inflation from 2010 to 2023

Figure 4. Inflation Gap of Cities towards The Threshold



Geographically, the distribution pattern of provinces in the Sulampua area according to the comparative advantage of fishery products based on the results of the Revealed Comparative Advantage (RCA) calculation can be shown in Figure 3. Based on Figure 3, it can be seen that Maluku Province, South Sulawesi Province, and North Sulawesi Province have comparative advantages in fishery products and are marked in blue during 2018-2022. The three provinces have an RCA value> 1, meaning the area has export product competitiveness above the national average.

Table 3. Regression Results from Inflation Target

	Depvar= Dummy of Inflation Threshold							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Model Household – Logit	Model Household – Panel Logit	Model GFCF – Logit	Model GFCF – Panel Logit	Model Government – Logit	Model Government – Panel Logit	Model Export – Logit	Model Export – Panel Logit
Households	0.352	0.352	0.834	0.834	0.812	0.812	0.673	0.673
	(0.993)	(0.993)	(0.983)	(0.983)	(0.986)	(0.987)	(1.009)	(1.009)
Pandemic	-0.178	-0.178	-0.181	-0.181	-0.163	-0.163	-0.206	-0.206
	(0.219)	(0.219)	(0.220)	(0.220)	(0.223)	(0.223)	(0.220)	(0.221)
Pandemic × Households	0.508***	0.508***						
	(0.188)	(0.188)						
GFCF	-1.141	-1.141	-1.570	-1.570	-1.214	-1.214	-1.071	-1.071
	(1.288)	(1.288)	(1.299)	(1.299)	(1.298)	(1.298)	(1.332)	(1.332)
Government Spending	0.325	0.325	0.321	0.321	-0.111	-0.111	0.283	0.283
	(0.463)	(0.463)	(0.462)	(0.462)	(0.479)	(0.479)	(0.465)	(0.465)
Export	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pandemic × GFCF			0.452***	0.452***				
			(0.164)	(0.164)				
Pandemic × Government					0.603***	0.603***		
					(0.207)	(0.207)		
Pandemic × Export							-0.000	-0.000
							(0.000)	(0.000)
Constant	-1.453	-1.453	-1.473	-1.474	-1.526	-1.526	-1.398	-1.399
	(1.044)	(1.044)	(1.040)	(1.040)	(1.054)	(1.054)	(1.088)	(1.088)
Observation	958	958	958	958	958	958	958	958
Cities Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

According to Table 3, we capture insignificant partial effect of household consumption, GFCF, and government spending for entire specification. Meanwhile, we capture significant positive effect of export-to-GDRP ratio to the probability of cities on the inflation targeting level. This finding implies that an increase of export ratio to the GDRP will enhance the probability of the cities on the inflation targeting level.

An interesting finding is shown in the interaction terms between each GDRP components with the dummy of pandemic condition (years of 2020 and 2021). According to Column (1) and (2), household spending in the pandemic stimulates the cities to obtain inflation targeting level. This finding indicates that household consumption is an essential component in stimulating economy. Evidently, during the Covid-19 pandemic, Indonesian government implemented lockdown policy, causing the economic contraction due to limited mobility which in turn encourages wage cuts and job losses (Ridhwan et al., 2024).

This economic downturn then brings into the off-targeting inflation level from the threshold, shown by the inflation level below national targeting level in 2020 (see Figure 1). However, as the government has disbursed direct cash transfer and unemployment benefits, it may thus stimulate household consumption and brings the inflation back to the on-targeting level.

Although using different strategy through aggregated component, our findings

also support Aharon, Azman Aziz and Kallir (2023) that suggests the significance impact of domestic demand to the inflation.

In terms of Gross Fixed Capital Formation (GFCF) that captures the investment flows in the cities, it will encourage probability of the cities to reach inflation targets in the pandemic periods. This finding implies that it is essential to stimulate economy using capital formation as capital formation may bolster economic resilience by stimulating productive capacity and ensuring that economy continued to operate efficiently. Evidently, the gross fixed capital formation drop in 2020 causes the decrease of potential output by 0.3% and brings Indonesia into a lower trajectory level (Ikhsan et al., 2021). Along with the drop of potential output, it may cause off-targeting level of inflation. In this regard, investment stimulation shown in capital formation may prevent inflation under the national targeting level.

Meanwhile, spending of government interacting with pandemic variable also reveals significant effect in promoting cities to obtain inflation targeting level. This finding is plausible as the government has targeted to program during pandemic to stimulate economy. For instance, the stimulus package chapter 3 was initiated to devote attention on the health program, social safety net, and industrial sector.

This chapter may stimulate inflation back to the targeting level. Our finding is also consistent with Junior et al. (2021) in the case of European economy where government purchases and more expansionary monetary policy are two most effective macroeconomic levers to tackle economic downturn during Covid-19. In our study, it may stimulate economy so that inflation can set back to the national targeting level. This argument also consistent with Yang et al. (2023) postulating the essential role of governments in formulating and implementing multifaceted policies in dealing with the dynamic of inflation.

However, although export is partially significant in promoting cities to obtain inflation target, it shows insignificant when it interacts with pandemic. A plausible reason is that the net export ratio may not be as robust as it was in the pre-pandemic conditions, as many countries needed to deal with their own economies, preventing them from demanding goods from other countries, which in turn discouraged export from Indonesia. For instance, China, as the largest export destination country from the rest of the world, experienced massive downturn due to Covid-19, it discourages Indonesian export ratio to the GDRP (Olivia et al., 2020).

Meanwhile, in the regional level, the economic downturn in East Java and West Java which contribute about 30% of Indonesia's export in the first quarter of 2020 may affect economy significantly along with the mobility restriction implemented in both provinces (Olivia et al., 2020). In this regard, export ratio in the post-pandemic will prevent inflation to reach targeting level.

We also report the marginal effect of each GDRP components to the probability of cities to obtain targeting inflation level, shown in Figure 5. According to Figure 5, an increase of GDRP components in the pandemic periods leads to the larger probability change of cities in the national targeting level, except for the Net Export variable. As mentioned previously, government spending becomes the most consistent components of GDRP in setting up the inflation on the targeting level.

The following analysis is to report the finding from the GDRP components in reducing the gap with the targeting inflation level, reported in Table 4. The estimation is conducted using Tobit estimation. If we look at Table 4, the variable of Pandemic shows significant positive effect to the inflation gap, implying that the inflation gaps from Indonesian cities is enlarged in the pandemic condition. An interesting finding is shown by the interaction between pandemic and the components of GDRP.

Figure 5. Average Marginal Effects of Pandemic Periods

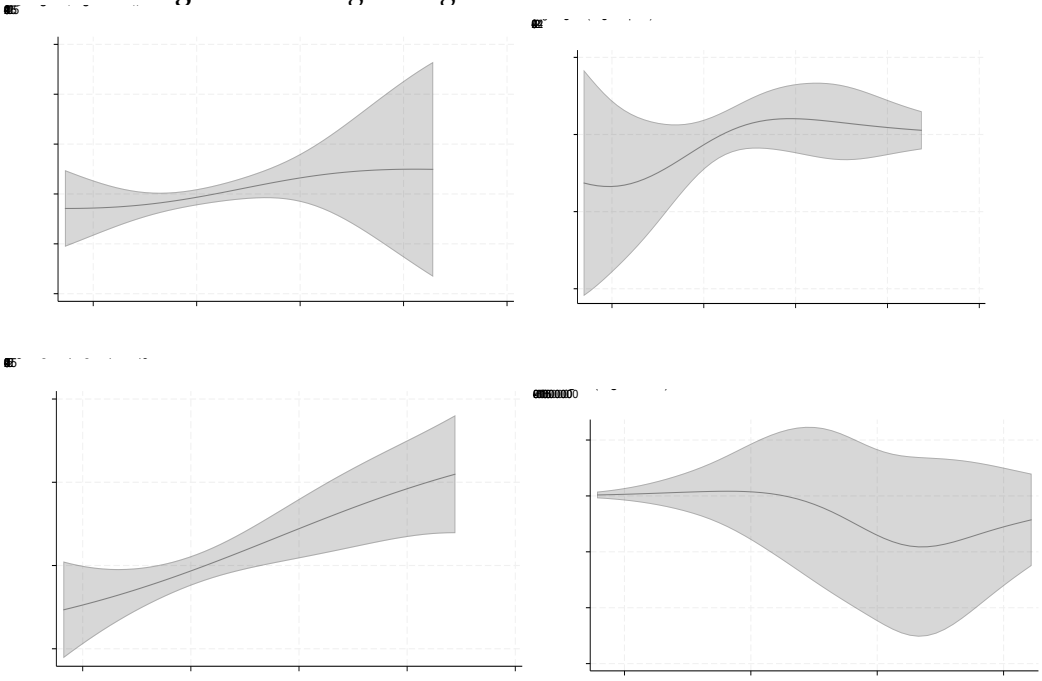


Table 4. Regression Results from Inflation Gap

VARIABLES	(1) Model Household - Tobit	(2) Model GFCF - Tobit	(3) Model Government - Tobit	(4) Model Export - Tobit
Households	0.004	-0.192	-0.192	-0.128
	(0.627)	(0.633)	(0.628)	(0.646)
Pandemic	0.857***	0.860***	0.856***	0.863***
	(0.125)	(0.127)	(0.126)	(0.126)
Pandemic × Households	-0.205**			
	(0.091)			
GFCF	0.199	0.398	0.242	0.164
	(0.726)	(0.735)	(0.728)	(0.742)
Government	-0.063	-0.063	0.154	-0.037
	(0.436)	(0.434)	(0.434)	(0.439)
Export	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Pandemic×GFCF		-0.211**		
		(0.083)		
Pandemic × Government			-0.304***	
			(0.090)	
Pandemic × Export				0.000
				(0.000)
Constant	0.300	0.304	0.343	0.273
	(0.640)	(0.637)	(0.643)	(0.662)
Observation	963	963	963	963

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The results show that the interaction between household consumption, gross fixed capital formation, as well as government spending and the pandemic affect negatively to the inflation gaps, implying that these three components will alleviate cities' inflation gaps with the national levels during the pandemic. Meanwhile, the interaction between pandemic and export is not significant in changing the inflation gap.

This finding corroborates the finding from Table 3 where only household consumption, gross fixed capital formation, and government spending that matter the most in encouraging cities back to the inflation targeting level, while export does not reveal significant during the pandemic periods.

4. Conclusion

We have demonstrated the impact of GDRP components namely household consumption, gross fixed capital formation, government spending, and net export in encouraging inflation on the targeting level or threshold. We capture the condition where pandemic influences the behaviour of GDRP components in setting up cities on the targeting level. First, we reveal that household spending in the pandemic (in 2020 and 2021) stimulates the cities to obtain inflation targeting level.

Likewise, gross fixed capital formation (GFCF) and government spending also encourage probability of the cities to reach inflation targets in the pandemic periods. However, no significant effect of export interacting with pandemic stimulate cities to obtain inflation threshold. This finding is confirmed by the estimation of inflation gap reduction where only household consumption, GFCF, and government spending that contribute to the cities' inflation gap towards national targeting level.

Our findings deliver into two policy implication. First, it is essential to maintain inflation based on the regional characteristics. Although inflation targeting is referred to the national level, each region must possess adjustment in obtaining optimum level of inflation. For instance, the improvement of logistic distribution and infrastructure support may encourage price stability as it provides better accessibility in obtaining goods and services.

However, it is worth noting that although unique characteristics of a city may cause irrelevant policy to be implemented in other cities. In this regard, how regional-specific policies are arranged in stimulating aggregate demands to set up optimum inflation rate is important.

Our second policy implication stems from the finding where the government support affects significantly in bringing up regional inflation on the targeting level. Although this result work on the short run during pandemic, the fiscal planning in the long run is required to maintain inflation rate on the targeting level. Hence, regional development does not thoroughly rely on the government spending to stimulate economy.

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