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Estimating the Potential Gross Regional Domestic Product (GRDP) of Banten Province Using the Optimal Hodrick–Prescott Filter

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Abstract
Gross Regional Domestic Product (GRDP) serves as a fundamental metric for assessing economic activity within a specific region, encapsulating the total value added by all sectors of the economy over a defined period. Although GRDP is widely utilized to evaluate regional economic performance, it predominantly reflects realized output under prevailing conditions, thereby failing to fully capture the region's optimal productive potential. As such, estimating potential GRDP is imperative for discerning the maximum sustainable level of economic output achievable through the efficient and effective allocation of resources. Potential GRDP is conceptualized as the highest level of output that can be sustained without generating upward pressure on inflation. This study focused on Banten Province—one of Indonesia's principal economic hubs—and underscored the critical role of potential GRDP estimation in informing long-term development strategies, managing output gaps, and evaluating the trajectory of post-shock economic recovery. The empirical investigation revealed that potential GRDP can be reliably estimated through the application of a smoothing parameter optimized by minimizing the Generalized Cross-Validation (GCV) criterion. The trajectories of both nominal and real potential GRDP exhibited strong coherence with their respective actual GRDP values, thereby validated the robustness of the estimation technique. Moreover, the derived output gap—calculated as the deviation betwee n actual and potential GRDP—served as a diagnostic tool for identifying cyclical dynamics within the regional economy. Findings indicated that Banten's economy more frequently experienced positive output gaps, indicative of overheating episodes wherein aggregate demand exceeded existing productive capacity. These results highlighted the necessity for macroeconomic policy interventions aimed at mitigating demand-side pressures while addressing structural supply-side limitations. In conclusion, the estimation of potential GRDP and the associated output gap provides a vital analytical framework for the formulation of adaptive, evidence-based, and sustainable economic policies at the regional level.

Keywords: *Gross Regional Domestic Product (GRDP), Hodrick-Prescott Filter, Output Gap, Regional Economy*

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1. INTRODUCTION

Gross Regional Domestic Product (GRDP) is a central macroeconomic indicator commonly used to evaluate the level of economic activity within a defined subnational jurisdiction. GRDP captures the aggregate value added by all productive sectors over a specific time horizon. While widely adopted as a metric for regional economic performance, GRDP reflects only the realized output under current economic conditions—regardless of whether those conditions reflect optimal utilization of resources. In reality, the actual level of production may deviate substantially from a region's potential output, thus necessitating the estimation of potential GRDP to accurately assess the economy's maximum sustainable productive capacity.

Potential GRDP is defined as the highest level of output that can be sustained over the long term when all production factors are utilized efficiently, without generating inflationary pressures. Estimating potential GRDP is particularly salient in the context of regional development planning and macroeconomic policy for several reasons. First, it enables the identification of output gaps—defined as the divergence between actual and potential output. A positive output gap may signal overheating and heightened inflationary risks, whereas a negative gap reflects economic slack and the underutilization of resources **[1], [2], [3]**. Second, for subnational policymakers, potential GRDP serves as a critical benchmark for designing sustainable and realistic development agendas. It supports evidence-based strategic planning, sectoral investment prioritization, and the optimal allocation of limited resources. Third, potential GRDP allows for more robust evaluation of policy effectiveness by providing a normative baseline against which actual performance can be assessed, thereby enhancing the appraisal of interventions such as public spending, tax incentives, and labour market reforms. Finally, a sound understanding of potential GRDP strengthens a region's ability to respond to both exogenous and endogenous economic shocks. In this context, output gap estimations—derived from potential GRDP—act as essential diagnostic tools for assessing the long-term consequences of crises and for shaping effective recovery strategies **[4]**. Given the persistent divergence between actual and potential economic performance, accurate estimation of potential GRDP plays a strategic role in informed policymaking and macroeconomic forecasting.

This study applies the Hodrick-Prescott (HP) filter to estimate potential GRDP. The HP filter is a widely used econometric tool designed to decompose time series data into long-term trend and short-term cyclical components. The trend component is interpreted as potential output. The HP filter offers several advantages: (1) It effectively isolates long-term trends from short-run fluctuations induced by business cycles or exogenous disturbances **[5], [6]**; (2) It is compatible with datasets of varying periodicities (e.g., annual, quarterly, monthly); (3) It is broadly applied in empirical economic research and policy monitoring; and (4) It allows for the adjustment of the smoothing parameter (λ), offering flexibility in calibrating the sensitivity of trend estimation.

Banten Province, one of Indonesia's most dynamic economic regions, presents a compelling case for the application of this methodology. Despite considerable potential, the province continues to face structural bottlenecks and cyclical constraints that warrant rigorous analytical attention. By estimating Banten's potential GRDP using the HP filter, this study aims to: (1) Quantify the region's long-term productive ceiling to inform development planning; (2) Assist in designing targeted macroeconomic policies to close output gaps and enhance resource efficiency; and (3) Contribute to the evaluation of post-crisis economic recovery strategies at the subnational level. Additionally, the commonly used rule-of-thumb smoothing parameter (λ) value of 1,600 in the HP filter may not be appropriate for regional economic conditions. Therefore, applying the HP filter with an objectively determined smoothing parameter is essential for accurately estimating potential GRDP and the output gap.

2. RESEARCH METHODOLOGY

2.1 Data and Sources

This study utilized quarterly time series data on the Gross Regional Domestic Product (GRDP) of Banten Province, presented in both current prices (nominal GRDP) and constant prices (real GRDP), with values denominated in millions of Rupiah. The dataset covered the period from the first quarter of 2008 to the first quarter of 2024 and was obtained from the Banten Provincial Statistics Office (Badan Pusat Statistik Provinsi Banten). This comprehensive dataset provided a robust empirical foundation for analysed the temporal dynamics of regional economic performance. GRDP serves as a fundamental macroeconomic indicator for quantifying the level of economic activity within a specific subnational jurisdiction—such as a province, regency, or municipality—over a defined time horizon. It measures the aggregate gross value added by all productive sectors within the regional economy, encompassing both goods and services. As such, GRDP functions as a critical tool for evaluating regional economic performance, examining sectoral contributions, and assessing the effectiveness of regional development policies. Conceptually, GRDP is analogous to the national-level Gross Domestic Product (GDP), but with a narrower geographic focus tailored to regional analysis. From the perspective of valuation methodology, GRDP is classified into two principal forms:

1. GRDP at Current Prices (Nominal GRDP): This measure is calculated based on prevailing market prices during the reporting period. It captures the nominal monetary value of output and reflects price level fluctuations, including inflationary effects.
2. GRDP at Constant Prices (Real GRDP): This measure is derived using fixed prices from a designated base year, allowing for the elimination of price distortions. It isolates real changes in output and facilitates a more accurate assessment of economic growth over time by controlling for inflation.

2.2 Hodrick-Prescott (HP) Filter

The HP filter is a widely utilized mathematical technique in macroeconomic analysis, particularly in the study of business cycles, for decomposing a time series into its trend and cyclical components. This approach enables the extraction of the long-term trend by smoothing short-term fluctuations, thereby facilitating the identification of underlying economic patterns.

Let y_t represent the observed time series at period t (e.g., the Gross Regional Domestic Product—GRDP). The HP filter assumes that y_t consists of two unobservable components: the trend component τ_t which captures long-term structural movements, and the cyclical component x_t, which represents short-term deviations from the trend:

$$y_t = \tau_t + x_t \, .$$

The objective of the HP filter is to estimate the smooth trend τ_t by solving the following optimization problem [6]:

$$\min_{\tau}\left(\sum_{t=1}^{T}(y_t-\tau_t)^2+\lambda\sum_{t=2}^{T-1}((\tau_{t+1}-\tau_t)-(\tau_t-\tau_{t-1}))^2\right), \tag{1}$$

The first term minimizes the deviation of the observed series from the estimated trend, ensuring fidelity to the original data, while the second term penalizes variations in the trend's second difference, thereby enforcing smoothness. The parameter λ is a smoothing constant that governs the trade-off between goodness of fit and smoothness of the trend; higher values of λ yield smoother trends.

To solve **Equation (1)**, the objective function is reformulated into a matrix expression, as follows:

$$\min_{\tau}((\boldsymbol{y}-\boldsymbol{\tau})'(\boldsymbol{y}-\boldsymbol{\tau})+\lambda\,\boldsymbol{\tau}'\boldsymbol{K}'\boldsymbol{K}\boldsymbol{\tau}\,)\,.$$

Let the loss function $\mathcal{L}$ be defined as:

$$\mathcal{L}=(\boldsymbol{y}-\boldsymbol{\tau})'(\boldsymbol{y}-\boldsymbol{\tau})+\lambda\,\boldsymbol{\tau}'\boldsymbol{K}'\boldsymbol{K}\boldsymbol{\tau} \tag{2}$$

Expanding **Equation (2)** to become:

$$\mathcal{L}=\boldsymbol{y}'\boldsymbol{y}-2\boldsymbol{\tau}'\boldsymbol{y}+\boldsymbol{\tau}'\boldsymbol{\tau}+\lambda\,\boldsymbol{\tau}'\boldsymbol{K}'\boldsymbol{K}\boldsymbol{\tau}\,,$$

where $\boldsymbol{y}$ is $T\times 1$ vector of observed values (e.g., GRDP), $\boldsymbol{\tau}$ is $T\times 1$ vector of the estimated trend component, λ is the smoothing parameter, and $\boldsymbol{K}$ is a differencing matrix of dimension $(T-2)\times T$, with elements k_{ij} define as:

$$k_{ij}=\begin{cases}1, & \text{for } j=i \text{ and } j=i+2\\ -2, & \text{for } j=i+1\\ 0, & \text{otherwise}\,.\end{cases}$$

To derive the first-order condition with respect to $\boldsymbol{\tau}$, we compute the gradient of $\mathcal{L}$:

$$\frac{\partial\mathcal{L}}{\partial\boldsymbol{\tau}}=0$$

$$\frac{\partial\mathcal{L}}{\partial\boldsymbol{\tau}}=-2\boldsymbol{y}+2\boldsymbol{\tau}+2\lambda\boldsymbol{\tau}\boldsymbol{K}'\boldsymbol{K}\,.$$

Rearranging the terms, the normal equation for estimating the trend becomes:

$$-2\boldsymbol{y}+2\boldsymbol{\tau}+2\lambda\boldsymbol{\tau}\boldsymbol{K}'\boldsymbol{K}=0$$

Solving for $\boldsymbol{\tau}$, we obtain the normal equation:

$$\hat{\boldsymbol{\tau}}=(\mathbf{I}+\lambda\boldsymbol{K}'\boldsymbol{K})^{-1}\boldsymbol{y}\,, \tag{3}$$

where $\mathbf{I}$ is identity matrix $(T\times T)$.

Equation (3) provides a closed-form solution for estimating the smooth trend component $\hat{\boldsymbol{\tau}}$, thereby isolating the long-term trajectory of the original time series. This formulation is particularly useful for economic analysis as it enables a rigorous decomposition of observed economic data into interpretable structural and cyclical elements.

2.3 Estimation Procedure for Potential GRDP

The estimation of Potential GRDP, both in nominal and real terms, was conducted using the HP filter methodology, following a structured computational procedure as outlined below:

1. Application of the HP Filter. The Nominal and Real GRDP series were independent subjected to **Equation (3)**, represented the HP filter, used a range of smoothing parameter values λ between 200 and 5,000. These values were incremented systematically in steps of 0.01 to identify optimal trend smoothness.
2. Generalized Cross-Validation (GCV) Calculation. For each value of λ, the GCV criterion was computed to evaluate the quality of the trend extraction. The GCV function is formulated as follows:

$$\text{GCV}(\lambda) = \left(1 + \frac{2T}{\lambda}\right) \sum_{t=1}^{T} \left(y_t - \hat{\tau}_t(\lambda)\right)^2 \Big/ T \,, \tag{4}$$

   where $\hat{\tau}_t(\lambda)$ denotes the estimated trend component at time t for a given λ, and T is the total number of observations.
3. Selection of optimal λ. The optimal value of the smoothing parameter λ was selected based on the minimum GCV value obtained in Step 2, thereby ensuring the best balance between goodness of fit and smoothness of the estimated trend.
4. Estimation of Potential GRDP. The optimal λ identified in the previous step is substituted into Equation (3) to re-estimate the smoothed trend component $\hat{\tau}_t$, which was interpreted as the Potential GRDP. This was conducted for both Nominal and Real GRDP series.

The outcome of this procedure was a robust estimate of Potential GRDP, reflected the maximum sustainable output level of the regional economy under efficient utilization of available resources, and served as a foundational input for subsequent economic analysis and policy formulation.

3. RESULTS AND DISCUSSION

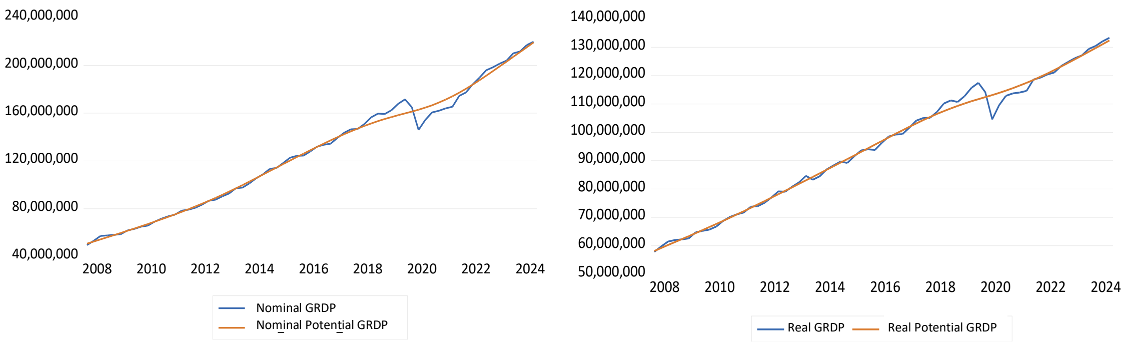
The estimation results of the smoothing parameter (λ) that minimizes the Generalized Cross-Validation (GCV) criterion were summarized in **Table 1**. The optimal λ values for nominal and real Gross Regional Domestic Product (GRDP) were 471.79 and 656.21, respectively. These values indicated that the trend components extracted using the HP filter effectively capture the long-term trajectory of the observed data in a statistically robust and objective manner. Moreover, the estimated smoothing parameters differed from the commonly used rule-of-thumb value of λ = 1600, which was typically applied in the use of the HP filter in economic research. This implied that the rule-of-thumb approach may not be entirely appropriated for quarterly data. Therefore, determining the λ value through the minimization of the GCV criterion was a more accurate, objective, and data-driven approach that better accommodated the intrinsic characteristics of the time series. The extracted trend components, represented potential GRDP (see **Appendix 1**), were obtained using the HP filter calibrated with the optimal λ values. Potential GRDP is further disaggregated into nominal and real measures, both of which were depicted in **Figure 1**.

The figure demonstrated that nominal and real potential GRDP exhibit coherent, directionally consistent movements relative to their respective actual GRDP series. The economic shock associated with the COVID-19 pandemic was visibly reflected in the structural breaks observed in the trajectories of both nominal and real GRDP during the second quarter of 2020 and the fourth quarter of 2021. These disruptions also influenced the dynamics of potential GRDP over the corresponding periods.

Table 1. Estimated λ and GCV Values for Nominal and Real Gross Regional Domestic Product (GRDP), Banten Province, Q1 2008 – Q3 2024

Indicators	Nominal GRDP	Real GRDP
λ	471.79	656.21
GCV	8.55×10^{-4}	3.19×10^{-4}

source: Author's own calculations



(a) (b)

Figure 1: (a). Dynamics of Nominal GRDP and Estimated Potential Nominal GRDP in Banten Province, Q1 2008 – Q3 2024, (b). Dynamics of Real GRDP and Estimated Potential Real GRDP in Banten Province, Q1 2008 – Q3 2024

Despite signs of gradual recovery, the trajectories of actual and potential GRDP between the second quarter of 2020 and the third quarter of 2024 had not yet fully returned to their pre-pandemic growth paths. This persistent divergence suggested that the regional economy remains in a state of partial recovery. Potential GRDP, represent the maximum sustainable level of output achievable without triggering inflationary pressure, served as a critical benchmark for assessing macroeconomic stability [2], [3], [7], [8], [9], [10]. Accordingly, the output gap—here defined as the GRDP gap—was computed as the deviation of actual GRDP from its potential level in both nominal and real terms.

The trajectories of nominal and real GRDP gaps fluctuated around the zero baseline throughout the study period. A sharp negative deviation was recorded in the second quarter of 2020, coincided with the initial outbreak of COVID-19, during which nominal and real GRDP gaps dropped to -10.43% and -7.60%, respectively (see Figure 2 and Appendix 2). In the same quarter, the GRDP deflator contracted by 2.40%, while the unemployment rate rose to 10.64%, a notable increase from 8.11% in 2019. Observations with positive GRDP gaps—indicated actual GRDP exceeding its potential level—lie above the zero line, whereas negative GRDP gaps—where actual GRDP fell below potential—lie below it. Over the entire period, 37 observations reflected a positive gap and 30 observations reflected a negative gap, suggested that Banten's economy had more frequently operated in a state of overheating. This condition indicated that economic expansion had often outpaced the economy's optimal productive capacity.

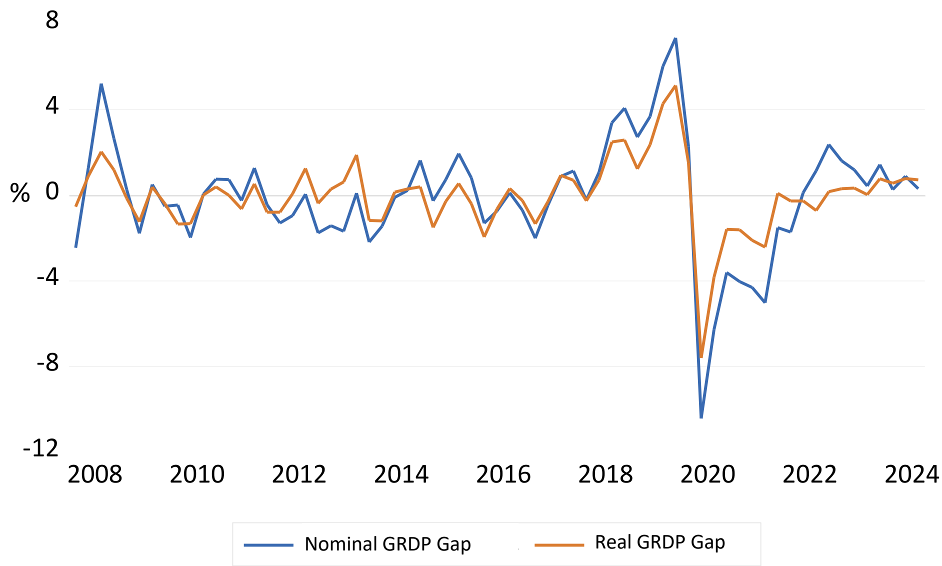


Figure 2: Dynamics of the Nominal and Real GRDP Gaps in Banten Province, Q2 2008 – Q3 2024

A positive GRDP gap implied that actual output exceeds potential output, which may indicated the following: (1) aggregate demand (encompassing consumption, investment, and exports) exceeded the region's productive capacity demand [11]; (2) firms were operating at or beyond capacity limits; and (3) excess demand exerts upward pressure on prices, fuelled inflation [1], [12], [13], [14].

Conversely, a negative GRDP gap signified economic underperformance, characterized by: (1) underutilization of productive resources; (2) rising unemployment resulted from weak aggregate demand [1], [9], [11]; and (3) heightened risk of deflation, wherein declining prices increased the real burden of debt and potentially deepen economic stagnation [1], [12], [13], [14].

A sustained positive GRDP gap denoted an overheating economy, which might result in elevated inflation, sectoral distortions, and pressures on productive capacity. To mitigate these risks, the following policy recommendations are proposed:

1. Curtailing public expenditure on consumption-driven sectors to temper aggregate demand pressures, as suggested by Blanchard and Leigh [11], who advocate fiscal restraint during overheating episodes to promote stability;
2. Imposing higher taxes on luxury goods and region-specific levies to moderate excessive consumption without deterring productive investment;
3. Enhancing logistical systems to ensure the smooth distribution of essential goods, thereby reducing opportunities for speculative price manipulation Orphanides and Van Norden[13].
4. Redirecting investments toward productive sectors to increase long-term supply-side capacity and enhance economic resilience.

In contrast, a negative GRDP gap signalled an economic downturn, commonly observed during recessions. In such contexts, the following countercyclical measures are recommended:

1. Increasing public investment in infrastructure and essential services to stimulate aggregate demand [15];
2. Providing targeted tax incentives for SMEs to foster investment, productivity, and employment growth;

3. Expanding access to affordable financing for SMEs, as a means to invigorate local economic activity [11];
4. Delivering technical assistance and capital support to informal sector enterprises, in line with best practices across Southeast Asia [16];
5. Implementing conditional cash transfer programs and public works initiatives to bolster consumption and safeguard vulnerable populations during the recovery phase [17].

4. CONCLUSION

The estimation of potential Gross Regional Domestic Product (GRDP) through the application of the HP filter yields important insights into the sustainable output level that Banten Province can achieve without exerting upward pressure on prices. The empirical evidence suggests that the region has more frequently experienced a positive output gap—indicative of demand-driven overheating—than a negative gap, which reflects underutilized productive capacity. This observed pattern underscores the necessity of formulating policies that align aggregate demand with supply-side fundamentals, thereby mitigating the risk of macroeconomic imbalances and promoting long-term economic stability.

The estimation of potential GRDP not only enhances capacity-oriented economic planning but also supports the formulation of responsive and adaptive macroeconomic strategies. In scenarios of a positive output gap, demand-management policies become essential to mitigate inflationary risks and preserve macroeconomic stability. Conversely, negative output gaps necessitate countercyclical, expansionary measures aimed at revitalizing economic activity and optimizing resource utilization. As such, the estimation of potential GRDP constitutes a fundamental analytical tool for promoting sustainable, inclusive, and evidence-based policymaking at the regional level.

Future research may extend this analysis by utilizing output gap estimates to empirically assess the applicability of Okun's Law within the context of Banten Province. Okun's Law posits a negative correlation between the output gap and the unemployment rate, suggesting that deviations of actual output below potential output are associated with rising unemployment, whereas output levels exceeding potential are associated with declining unemployment. This relationship encapsulates the intricate linkages between macroeconomic performance and labour market dynamics, providing a valuable framework for evaluating regional employment conditions [2], [10].

Appendix 1. Estimation of Potential GRDP

Period	Potential Nominal GRDP (in millions of Rupiah)	Potential Real GRDP (in millions of Rupiah)
2008Q1	50,732,133.29	58,151,195.42
2008Q2	52,528,201.02	59,194,151.71
2008Q3	54,321,630.95	60,236,633.41
2008Q4	56,111,209.64	61,278,965.46
2009Q1	57,901,734.66	62,323,344.67
2009Q2	59,701,162.28	63,373,076.39
2009Q3	61,517,781.46	64,431,337.89
2009Q4	63,357,634.56	65,500,113.61
2010Q1	65,227,424.96	66,581,769.92
2010Q2	67,133,163.37	67,678,275.17
2010Q3	69,080,237.43	68,790,233.38
2010Q4	71,071,230.05	69,916,887.24
2011Q1	73,108,794.71	71,057,489.54
2011Q2	75,196,723.41	72,211,719.93
2011Q3	77,339,944.35	73,379,259.09
2011Q4	79,542,991.65	74,559,086.27
2012Q1	81,812,497.23	75,750,773.82
2012Q2	84,154,342.65	76,952,992.97
2012Q3	86,572,166.05	78,163,501.03
2012Q4	89,067,922.34	79,380,139.39
2013Q1	91,643,652.67	80,602,244.60
2013Q2	94,298,070.16	81, 828,698.49
2013Q3	97,027,133.47	83,058,733.52
2013Q4	99,823,455.48	84,292,365.65
2014Q1	102,679,863.28	85,531,995.82
2014Q2	105,584,564.85	86,778,512.94
2014Q3	108,522,627.59	88,031,246.30
2014Q4	111,478,891.61	89,289,716.06
2015Q1	114,438,720.58	90,553,844.48
2015Q2	117,391,327.42	91,824,093.42
2015Q3	120,325,309.98	93,098,855.44
2015Q4	123,231,100.10	94,376,117.62
2016Q1	126,104,089.41	95,654,654.40
2016Q2	128,941,786.84	96,932,678.80
2016Q3	131,738,225.16	98,205,564.56
2016Q4	134,485,408.97	99,467,723.18
2017Q1	137,175,690.29	100,714,038.23
2017Q2	139,799,432.56	101,939,026.45
2017Q3	142,341,164.40	103,135,163.56

Period	Potential Nominal GRDP (in millions of Rupiah)	Potential Real GRDP (in millions of Rupiah)
2017Q4	144,784,046.82	104,294,472.49
2018Q1	147,113,887.23	105,410,431.65
2018Q2	149,319,983.72	106,477,640.53
2018Q3	151,390,929.40	107,490,285.34
2018Q4	153,318,723.25	108,443,701.51
2019Q1	155,106,258.52	109,337,310.20
2019Q2	156,769,669.14	110,174,794.37
2019Q3	158,334,012.96	110,961,901.64
2019Q4	159,836,566.98	111,708,348.65
2020Q1	161,334,840.64	112,431,081.68
2020Q2	162,911,257.59	113,155,785.28
2020Q3	164,656,088.21	113,910,759.29
2020Q4	166,623,604.31	114,711,206.20
2021Q1	168,846,174.67	115,565,688.28
2021Q2	171,343,418.74	116,479,987.54
2021Q3	174,120,535.52	117,457,053.14
2021Q4	177,167,063.37	118,496,108.11
2022Q1	180,454,021.48	119,592,042.94
2022Q2	183,946,753.27	120,739,902.12
2022Q3	187,604,046.91	121,934,237.15
2022Q4	191,385,186.27	123,169,112.62
2023Q1	195,254,026.34	124,437,270.52
2023Q2	199,184,036.13	125,731,768.07
2023Q3	203,155,372.64	127,046,248.71
2023Q4	207,153,220.15	128,375,005.40
2024Q1	211,164,632.44	129,712,388.05
2024Q2	215,182,955.35	131,054,253.21
2024Q3	219,202,713.02	132,397,577.11

Appendix 2. Output Gap (GRDP Gap)

Period	Nominal GRDP Gap (%)	Real GRDP Gap (%)
2008Q1	-2.45	-0.54
2008Q2	1.28	0.89
2008Q3	5.22	2.04
2008Q4	2.66	1.19
2009Q1	0.27	-0.13
2009Q2	-1.78	-1.24
2009Q3	0.51	0.39
2009Q4	-0.52	-0.40
2010Q1	-0.45	-1.34
2010Q2	-1.97	-1.32
2010Q3	0.05	0.01
2010Q4	0.76	0.40
2011Q1	0.73	0.00
2011Q2	-0.25	-0.64
2011Q3	1.28	0.53
2011Q4	-0.45	-0.79
2012Q1	-1.29	-0.79
2012Q2	-0.94	0.07
2012Q3	0.05	1.26
2012Q4	-1.76	-0.38
2013Q1	-1.42	0.29
2013Q2	-1.67	0.63
2013Q3	0.10	1.88
2013Q4	-2.18	-1.18
2014Q1	-1.44	-1.20
2014Q2	-0.10	0.14
2014Q3	0.23	0.30
2014Q4	1.63	0.40
2015Q1	-0.25	-1.50
2015Q2	0.74	-0.29
2015Q3	1.94	0.55
2015Q4	0.81	-0.39
2016Q1	-1.30	-1.95
2016Q2	-0.74	-0.65
2016Q3	0.12	0.32
2016Q4	-0.70	-0.24
2017Q1	-2.01	-1.33
2017Q2	-0.46	-0.29
2017Q3	0.88	0.93
2017Q4	1.14	0.71
2018Q1	-0.23	-0.26
2018Q2	1.08	0.71
2018Q3	3.40	2.49
2018Q4	4.07	2.58
2019Q1	2.71	1.24
2019Q2	3.68	2.36
2019Q3	6.03	4.28
2019Q4	7.35	5.13
2020Q1	2.29	1.53
2020Q2	-10.43	-7.60
2020Q3	-6.28	-3.83
2020Q4	-3.61	-1.59
2021Q1	-4.03	-1.61
2021Q2	-4.31	-2.10
2021Q3	-5.02	-2.42
2021Q4	-1.51	0.09
2022Q1	-1.71	-0.27
2022Q2	0.13	-0.26
2022Q3	1.15	-0.71
2022Q4	2.37	0.17
2023Q1	1.62	0.31
2023Q2	1.19	0.34
2023Q3	0.43	0.03
2023Q4	1.43	0.77
2024Q1	0.26	0.57
2024Q2	0.89	0.78
2024Q3	0.31	0.72

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