Capacity Utilization in Indonesia: Time to Invest

Yoichiro Ishihara
Daan Marks

Abstract

The capacity utilization rate is an important economic policy variable. Low capacity utilization implies the economy has idle capacity, and increases in demand would lead to higher production. In contrast, high capacity utilization implies that the economy needs additional investment to increase production, and increases in demand would lead to more imports and inflation. Existing survey-based data on Indonesia’s capacity utilization is weak, and does not necessarily reflect the underlying true capacity utilization. This paper estimates Indonesia’s capacity utilization based on the output-capital ratio. The results suggest that the present capacity utilization rate is far above the historical average. Moreover, low levels of investment have pushed up the average age of installed capital, which raises concerns about the quality and productivity of installed capital. The current levels of capacity utilization should cause investment to pick up. However, this is not the case for Indonesia, where low investment is at levels not seen since the early 1970s, suggesting that the country’s weak investment climate is holding back investment.

Keywords: Capacity Utilization, Indonesia, Investment
JEL Classification: D24, E22
1. INTRODUCTION

The capacity utilization rate is an important economic policy variable. It is, besides unemployment and the output gap, an important measure of economic slack. Low capacity utilization implies the economy has idle capacity, and increases in demand would lead to higher production. In contrast, high capacity utilization implies that the economy needs additional investment to increase production, and increases in demand would lead to more imports and inflation.

In most developed countries good and reliable capacity utilization data are available. The data are calculated using both surveys and time series. In Asia the reliability of the data has generally been quite weak. In Indonesia for example the Indonesian Chamber of Commerce and Industry (Kadin) declared that the country’s industrial sector needs an additional investment of Rp 150 trillion (US$ 17.7 billion) per year to optimize capacity utilization. Then-Kadin President Aburizal Bakrie said in December 2003 that “the country’s industries are now operating at 40-60 percent of their installed capacity because of old and inefficient machines.” At the same time the official data published by BPS in 2003 show capital utilization rates of around 70 percent. These contradictions raises the question what the true capacity utilization in Indonesia is.

So despite its importance, existing survey-based data on Indonesia’s capacity utilization is weak, and does not necessarily reflect the underlying true capacity utilization. We therefore suggest a new method to estimate Indonesia’s capacity utilization based on the output-capital ratio.

The results suggest that the present capacity utilization rate is far above the historical average. Moreover, low levels of investment since the crisis have pushed up the average age of installed capital, which raises concerns about the quality and productivity of installed capital. The current levels of capacity utilization should cause investment to pick up. However, this is not the case for Indonesia, where low investment is at levels not seen since the early 1970s, suggesting that the country’s weak investment climate is holding back investment.

2. PAST INVESTMENT TRENDS

Indonesia’s 2004 GDP has returned to the pre-crisis levels. However, the recovery was mostly consumption driven, though investment started to pick up in the second half of 2004. The share of investment in GDP was
19 percent, 10 percentage points below the pre-crisis level, and the lowest rate since the early 1970s. Investment growth rates were negative in 1998-1999 (Figure 1). In addition, the composition of investment has changed. The share of property investment increased from around 70 percent in the early 1990s to 83 percent in 2003 (Figure 2). The increase in the share of the property investment is reflected in the decline in other items. For example, the share of foreign capital goods imports declined from 22 percent in 1997 to 11 percent in 2003, which is consistent with weak performance of foreign direct investment (FDI). Property investment and non-property investment equally contribute to GDP, but property investments such as shopping malls and apartments do not have a direct impact on expanding manufacturing production capacity.

**Figure 1**
*Investment is on the decline*

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*Source: CEIC, BPS, authors calculation*
Past investment trends have important implications on production capacity and hence capacity utilization. The combination of low investment and the increase in the share of property investment suggest that capacity utilization is on the rise, though depending on the output level. If capacity utilization is proved to be high, the economy would face supply constraints to higher growth rates. In other words, further increase in demand would not lead to higher growth rates, but instead lead to higher inflation.

3. UNIVERSAL CONCEPT OF THE CAPACITY UTILIZATION RATE

The capacity utilization rate is defined as the ratio between actual output and potential output (Equation 1).

\[
\text{Capacity utilization rate} = \frac{\text{Actual output}}{\text{Potential output}} \quad (1)
\]

The concept of potential output is controversial, while that of actual output is straightforward. Theoretically, ‘potential output reflects sustainable practical capacity defined as the greatest level of output each plant in a given industry can maintain within the framework of a realistic work schedule taking into account normal downtime and assuming
sufficient availability of inputs to operate machinery and equipment in place' (Corrado and Mattey, 1997, p.152).

In practice, two concepts of potential output are used interchangeably: A technology-based concept and an economic-based concept. The economic-based concept refers to economically optimal output, in other words, the output level achieving maximum profits. This concept is consistent with the above statement by Corrado and Mattey (1997). The technology-based concept refers to the maximum output regardless of profitability. The measured capacity utilization rate is likely to differ significantly depending on which concept is adopted. Nelson (1989) finds, for the United States between 1961 and 1983, that the capacity utilization rate measured with the economic-based concept is 20 percentage points higher than with the technology-based concept.

4. EXISTING DATA ON INDONESIA'S CAPACITY UTILIZATION RATE

Despite the importance of the capacity utilization rate as a key economic policy variable, the data is weak in Indonesia. The central statistics office (BPS) and the Ministry of Industry and Trade (MOIT) officially publish the data on capacity utilization. However, data is inconsistent between the two institutions and even among BPS data across periods. Moreover, timely data is not available, as the latest data is still as of 2001.

There is a considerable difference between BPS and MOIT data (Table 1). As MOIT does not publish an aggregate number for manufacturing, the cement industry is used for the comparison as an example. Although the capacity utilization rates are close in 1998-1999, figures in two institutions deviate in 2000-2001. While BPS data shows the capacity utilization in the cement industry is 79.7 percent, MOIT data shows it is 65.1 percent in 2001. The policy implication from the BPS data is that the cement industry immediately needs investment to further increase production, while that from the MOIT data does not suggest it.

The BPS data are subject to significant revisions each year. In its 2001 publication, the 1999 capacity utilization is 38.6 percent, which suggests Indonesia had considerable idle capacity in manufacturing. However the 1999 capacity utilization rate is revised up in the 2002 publication and further changed to 68.3 percent in the latest publication in 2003. These frequent revisions send mixed signals.
Table 1
Capacity Utilization Rate in Manufacturing from Different Sources

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<td>70.6</td>
<td>68.3</td>
<td>74.0</td>
<td>66.4</td>
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<td>BPS (2002)</td>
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<td>82.1</td>
<td>81.2</td>
<td>76.6</td>
<td>77.0</td>
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<tr>
<td>Average</td>
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<td>76.1</td>
<td>71.3</td>
<td>65.7</td>
<td>38.6</td>
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<td>BPS (2001a)</td>
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<td>76.1</td>
<td>71.3</td>
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<td>Average</td>
<td>58.0</td>
<td>69.4</td>
<td>71.0</td>
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Source: Ministry of Trade and Industry website, BPS

5. ESTIMATING INDONESIA'S CAPACITY UTILIZATION (CONCEPT)

The existing capacity utilization data is inconsistent, and complicates making accurate economic analysis. In light of this, an alternative method to estimate Indonesia’s capacity utilization is required. In the new method, the output-capital ratio is used as a proxy indicator which is calculated as the ratio between actual output measured by GDP and capital outstanding (Equation 2).

\[
\text{Output capital ratio} = \frac{\text{GDP}}{\text{Capital outstanding}} \quad (2)
\]

Further, capital outstanding of period (t) is computed as capital outstanding of the previous period (t-1) minus depreciation plus new investment of period (t) (Equation 3).

\[
\text{Capital outstanding (t)} = (1-d) \times \text{Capital outstanding (t-1)} + \text{Investment (t)} \quad (3)
\]

Where \(d\) is the depreciation rate of existing capital. Investment is derived from gross fixed capital formation in the national account. Equation 3 shows that the higher the depreciation rate becomes, the smaller capital outstanding is.
Intuitively this proxy indicator makes sense, as GDP is the total output and capital outstanding can be considered the potential output. However, the output-capital ratio cannot be used directly as a proxy indicator for the capacity utilization rate. The prime difference between the output-capital ratio and the capacity utilization rate is that the former has a downward trend. As the economy develops and capital accumulates the output-capital ratio tends to decline due to the law of diminishing marginal output. Therefore, the deviation from the trend is a better proxy for the capacity utilization rate. If the output-capital ratio of a certain period is above the trend, the capacity utilization rate of the period is higher than the historical average capacity utilization rate, and vice versa. However, data on the historical average of the capacity utilization rate is unavailable in Indonesia. The output-capital ratio on the trend is considered to be the average capacity utilization rate. As such, we use the deviation from the trend line to determine whether capacity utilization is historically high or low (Equation 4).

\[
\text{Deviation from the Average Capacity Utilization (t) =}
\]
\[
\text{Actual OCR (t)} - \text{Trend OCR (t)} - 1 \quad \text{............... (4)}
\]

Where, OCR (t) is the output-capital ratio of period t. If the actual OCR equals the trend OCR, the deviation from the average capacity utilization is zero.

6. ESTIMATING INDONESIA'S CAPACITY UTILIZATION (EXERCISE)

Data. The Penn database provides historical data of Indonesia's GDP and investment (i.e. gross fixed capital formation) between 1960 and 2000 on a constant basis. The national account data from BPS are used to supplement the Penn database in 2001-2004. In addition, a special survey on gross fixed capital formation in 1980-2001 (BPS, 2002) is used to distinguish between property investment and non-property investment.

Capital outstanding. Determining the depreciation rate (d in Equation 3) is the key first step for computing capital outstanding. The higher the depreciation rate is, the smaller the capital outstanding becomes. In the national account, the five percent depreciation rate is used to calculate the national income. The five percent depreciation rate
means it takes 20 years for a capital value to become zero. However, in light of Indonesia’s accounting standard (Table 2), the five percent depreciation rate seems too low. Further, given the change in the share of property investment over the sample period of 1980-2004 (Figure 2), applying for a single depreciation rate for the whole period does not seem reasonable. Therefore, this exercise applies the five percent depreciation rate for property investment, and the ten percent depreciation rate for non-property investment.

### Table 2

*Depreciation Rate in Indonesia’s Accounting Standard*

<table>
<thead>
<tr>
<th>Category</th>
<th>Depreciation rate</th>
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<tbody>
<tr>
<td>Up to 4 years useful life</td>
<td>50%</td>
</tr>
<tr>
<td>4 to 8 years useful life</td>
<td>25%</td>
</tr>
<tr>
<td>8 to 16 years useful life</td>
<td>12.5%</td>
</tr>
<tr>
<td>16+ years useful life</td>
<td>10%</td>
</tr>
<tr>
<td>Building / immovable property</td>
<td>5%</td>
</tr>
<tr>
<td>Non-permanent building</td>
<td>10%</td>
</tr>
</tbody>
</table>

*Source: Doing Business in Indonesia*

**Results.** The output-capital ratio has a downward trend between 1980-2004 (Figure 3). The trend line is set using the Hodrick-Prescott Filter*. The output-capital ratio started to increase in 1999 and exceeded the trend line in 2001. Figure 4 further illustrates GDP as output and capital outstanding. The figure shows that capital outstanding kept declining since 1999, while GDP started to resume in 2000. The combination of these trends made the output-capital ratio start to increase in 1999. The decline in capital outstanding means investment is less than the depreciation of the past capital outstanding.
Figure 3
The Output-Capital Ratio 1980-2004

Source: Authors calculation

Figure 4
GDP and Capital Outstanding
1980-2004

Source: BPS, Authors calculation
The gap between the actual output-capital ratio and the trend can be translated into the deviation from the historical average capital utilization rate using Equation 4. The deviation had sharply increased since 1999 and reached nine percent in 2004, the highest rate in 1980-2004 (Figure 5). The comparison between the capacity utilization and investment growth gives an instructive picture regarding high correlations between two (Figure 6). The positive relationship suggests the high capacity utilization rate is accompanied with high investment growth. Although conducting a sophisticated statistical analysis is not reasonable due to small sample numbers, the cross-correlation analysis in 1980-2003 suggests the deviation from the historical average capacity utilization rate tends to coincide with investment growth (Table 3).

**Figure 5**
Deviations from the Average Capacity Utilization Rate 1980-2004

*Source: Authors calculation*
However, the positive relationship no longer holds after the crisis, where the gap between the capacity utilization rate and investment growth widened. Based on the past trends, current levels of the capacity utilization rate should trigger higher investment levels. Historical data suggests that with the deviation from the historical average capacity utilization rate at nine percent, investment growth would be above 20 percent (Figure 7). The lack of the high investment growth rates suggests that investors still consider Indonesia’s investment climate as unattractive. However, at the same time, this suggests that the improvement in the investment climate would have a direct impact on additional investment.
Figure 7
Deviation from Average Capacity Utilization and Investment Growth

\[ y = 1.7977x + 0.0532 \]
\[ R^2 = 0.4299 \]

Source: Authors calculation

Figure 8
Average Age of Capital

Source: Authors calculation
Quality of capital deteriorates. The combination of the lack of investment and the increase in the share of property investment has led to aging of capital outstanding (Figure 8). Assuming that new capitals are more efficient than old ones, aging of capital outstanding suggests that Indonesia's capital is becoming less productive and hence less competitive.

7. CONCLUDING REMARKS

Using the output-capital ratio as a proxy for capacity utilization showed that Indonesia faces two challenges regarding capacity. First, the estimated capacity utilization rate is much higher than historical averages. Second, the average age of capital has increased sharply in recent years, serving as a proxy for a deterioration of the quality of capital. Current high capacity utilization results from low investment for 8 years and a moderate increase in growth recently. The historical relationship between capacity utilization, investment and growth suggests that high current capacity utilization rates should be generating investment growth rates around 20 percent. The current rate, while picking up, is well below this, suggesting that investors still consider Indonesia's investment climate unattractive. However, it also suggests that continued growth and improvements in the investment climate could have a large, direct impact on additional investment.

8. REFERENCES


Heston, Alan, Robert Summers and Bettina Aten, 2002, Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP).

The views expressed in this paper are those of authors and not necessarily those of the World Bank, its member countries, or executive directors. Comments from Bert Hofman, Lead economist, World Bank Office Beijing on an earlier version of the paper are gratefully acknowledged.


In May 2004, BPS revised the base year of the national account from 1993 to 2000. Due to data availability, this paper uses the 1993 base series for analysis. Note, however, the investment to GDP ratio (nominal) in 2003 is 17.8 percent in the 2000 base compared to 19.7 percent in the 1993 base.

The investment to GDP ratio before 1983 is derived from constant series due to data availability.

Gross fixed capital formation in the national account comprises of (i) construction, (ii) domestic machinery and appliance, (iii) foreign machinery and appliance, (iv) domestic transportation equipment, (v) foreign transportation equipment, (vi) other domestic and (vii) other foreign.

Data from the Center of International Comparisons at the University of Pennsylvania

The national account data from BPS is only available since 1983. The national account data are subject to revision in every 10 years, and therefore consistency in historical data is in question.

http://www.centrin.net.id/hwncogi/business.htm

The Hodrie-Prescott Filter is a smoothing method to estimate the long-term trend of time-series data