The concept of growth at risk and the linkage to Thailand’s financial stability

Growth at Risk (GaR) is a tool used to measure risks to economic growth in the future. It applies the concept of Value at Risk, an estimate of financial risks, to the evaluation of downside risks to economic growth. The objective of this article is to explain the measurement of GaR for Thailand as well as the empirical relationship between GaR and a financial cycle (FC), both of which are crucial elements for the conduct of monetary policy that systematically incorporates financial stability (FS) into considerations.

1. Measuring GaR

The forward-looking assessment of the economy necessarily take into consideration both downside and upside risks that may deviate economic growth from baseline projection. GaR is one particular tool that can measure such risks by forecasting one-year-ahead quarterly GDP growth at different percentiles, where GDP growth at X percentile (GaR X%) implies the probability of X percent that the GDP growth will fall below GaR X%. In general, GaR 5% is chosen to reflect extreme downside risks or crisis events which infrequently occur. Moreover, GaR can be useful in assessing upside risks through the estimate of GaR 95%.

Based on the historical distribution of Thailand’s quarterly GDP growth during 1993-2018 (Chart 1a), GaR 5% registers at -4 percent (red vertical line). That is, there is a 5-percent chance that the Thai economy going forward will contract by more than 4 percent. Past observations featuring GDP growth below GaR 5% were mostly in the periods of 1997 Asian Financial Crisis (AFC), whereas GaR 95% stands at around 9 percent. However, since 2000 (Chart 1b), it can be observed that the historical distribution of GDP growth has narrowed. While GaR 95% remains close to the previous level at 8 percent, GaR 5% is at -2 percent. The episodes where the Thai economy contracted by over 2 percent correspond to the periods when Thailand was hit by the Global Financial Crisis (GFC) during 2008-2009 and the Great Flood in 2011.

Chart 1 GaR 5%, GaR 95%, and distribution of Thailand’s GDP growth

Distribution of Thailand’s GDP growth in the past

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<th>a) Data during 1993 - 2018</th>
<th>b) Data during 2000 - 2018</th>
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Source: Office of the National Economic and Social Development Council (NESDB), calculations by Bank of Thailand

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1 Mathematically, GaR X% is the threshold that satisfies \( \text{Prob}(Y_{t+h} \leq GaR_{t+h} X\%) = X\% \), where \( Y_{t+h} \) denotes GDP growth h-quarter ahead. Normally, it is assumed that h=4, which amounts to measuring economic growth in the same quarter one-year ahead.

2 Extreme events that drag economic growth below GaR 5% have a 5-percent chance of occurrence. In other words, they take place on average every 20 year.
The above examples suggest that, although the estimate of GaR 5% may alter by periods of assessment, the observations that are below GaR 5% well reflect severe recession events. Such events include financial crises, which are systemic risks to FS that do not frequently occur but can have large negative impact on the economy once they occur. Given the fact that the probability of systemic risks to FS can be signaled by the FC indicator21/, this naturally leads to the hypothesis that GaR is negatively correlated with FC. That is, an increase (decrease) in FC reflects heightened (lowered) systemic risks, prompting GaR 5% in future periods to deteriorate (improve).

2. The relationship between GaR and FC

The empirical relation between GaR and FC can be studied through a quantile regression analysis, where the current level of FC is used to predict GaR 5% in the future22/, consistent with the forward-looking risk assessment. However, the estimation of Thailand’s GaR absolutely depends on FC, i.e. excluding macroeconomic and external factors, and hence can only reflect risks emanated from the financial system.

The empirical findings suggest that GaR 5% for Thailand, an indicator of downside risks, is negatively and significantly correlated with FC, consistent with the hypothesis. Periods under which GDP growth outturn is lower than the predicted value of GaR 5% coincide with AFC, GFC and the great flood of 2011 (Chart 2). Meanwhile, GaR 95%, which portrays upside risks, is relatively constant and does not correlate with FC. It can, hence, be concluded that systemic risks to FS have a connection with downside risks to future economic growth. Therefore, mitigating FS risks is crucial in reducing downside risks to economic growth and the severity of financial crisis that could occur in the future, thereby providing more chances of achieving sustainable economic growth.

Chart 2 Changes in GaR 5% as explained by Thailand’s financial cycle

Source: Office of the National Economic and Social Development Council (NESDB), calculations by Bank of Thailand

21/ Additional details can be found in the box “Financial cycle and its policy implications (Monetary Policy Report, the third quarter of 2019)

22/ The baseline equation used in the study is \( GaR_{t+4}X\% = \beta_0 X\% + \beta_1 FC_t + \epsilon_{t+4} \). The current value of FC is to predict GaR 5% four-quarter ahead. Other factors can also be taken into considerations in this equation, including the upcycle and downcycle of FC, and the non-linear relationship between FC and GaR. It is estimated by a cross-country panel-quantile regression, using the dataset of 9 countries. The estimation for only Thai data finds a negative \( \beta_1 \) coefficient.
3. Policy implications

The linkage between the GaR framework and the level of FC, which is an indicator of systemic risks to FS, is an important element for the systematic assessment of FS risks in monetary policy decision processes. In practice, the assessment of economic outlook should be performed in parallel with evaluating downside GAR, in order to enhance the comprehensiveness of the information set in support of the deliberation processes. Nevertheless, the conduct of monetary policy could face intertemporal trade-offs in some occasions. It would be beneficial to set the policy rate at a level that is not overly-expansionary, preventing the FC from rising too high and inducing risks to FS (the action referred to as “lean against the wind”). In turn, such level of policy rate would help reduce downside risks to future economic growth. Such policy decision, nevertheless, could affect economic growth in the short-term. On the contrary, monetary policy expansion, while being conducive to short-term economic growth, could have adverse consequences on economic and financial stability over the longer term. The appropriate conduct of monetary policy should, therefore, aim at striking the balance between both short-term and long-term economic stability.