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Real-time estimation of the output gap in Japan and its usefulness for inflation forecasting and policymaking

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Abstract

This paper examines the methods used by the Bank of Japan (BOJ) for estimation of the output gap. Great emphasis is put on the real-time estimation problems. After reviewing the evolution of output-gap estimation at the Bank, I discuss advantages and disadvantages of the various output-gap measures. First, I examine the usefulness of the output gap for inflation forecasting and show that the real-time output gap sometimes includes too much noise. Second, I investigate the implications of the real-time estimation problems for policy evaluation. Third, I exploit the TANKAN to enhance the usefulness of the real-time output gap.

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1. Introduction

The measurement of the output gap is clouded in uncertainty. In particular, uncertainty in the real-time estimate of the output gap stems from two sources: the revision of source data and the arrival of new data. It is especially important to recognize that the extent of

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this uncertainty depends on the method used for estimating the output gap. In this paper, I review the history of output-gap estimation at the Bank of Japan (BOJ) and offer a brief explanation of the construction of the six output-gap measures developed by the BOJ to aid in preparing its economic outlook and in the formation of monetary policy. I compare these measures with one another and discuss their advantages and disadvantages from the viewpoint of vulnerability to data revision and data arrival.

This paper quantifies the seriousness of the effects of output-gap uncertainty on inflation forecasting as well as on monetary policymaking in Japan. The standard tool for forecasting future inflation is the Phillips curve, but the resulting forecasts are often far from satisfactory for a real policymaking purpose due to their large errors. The paper estimates a forecast function with each BOJ measure of the output gap as an explanatory variable and quantifies to what extent forecast uncertainty exists. I show that the output gap tends to exacerbate the degree of disturbance in inflation forecasting and it is often better to get rid of the output-gap measures from the forecast functions altogether.

Regarding monetary policy, I compare the original Taylor rule with the actual movement of the Japanese overnight call rate. The paper shows that BOJ policy from the late 1980s to the early 1990s was basically consistent with the Taylor-rule prescription. Remembering the experience in the “lost decade” since the early 1990s, however, this result suggests that the Taylor rule requires some modifications. The paper shows, with the benefit of hindsight, that tightening in the late 1980s and easing in the early 1990s would be stronger and prompter, if the BOJ had controlled the call rate more quickly and responded to the output gaps more strongly.

This paper also devotes space to examining the usefulness of representative business-cycle indicators for reducing the uncertainty in the output-gap estimates. Among the various business-cycle indicators published in Japan, there are some indicators that are free from data revision (e.g., the *Short-term Economic Survey of Enterprises in Japan: TANKAN*). The paper discusses how to make use of this additional information for the purpose of eliminating or at least reducing the amount of uncertainty in output-gap estimates.

The remainder of this paper is constructed as follows. Section 2 reviews the history of development of output-gap measures at the BOJ and provides a brief introduction to their estimation methodologies. Section 3 presents six measures of the output gap with four stages of data revision, as defined in [Orphanides and van Norden \(2002\)](#), and shows how seriously the output gap measures are distorted by the real-time estimation problems. Section 4 evaluates the usefulness of output-gap measures in inflation forecasting. Section 5 evaluates BOJ policy from the late 1980s to the early 1990s via Taylor rules and discusses modifications to improve them as a policy reference. Section 6 introduces a remedy to improve the real-time measures of the output gap based on TANKAN information and discusses its implications for inflation forecasting and policymaking. Section 7 summarizes the main results of this paper.

2. History of output-gap measures at the Bank of Japan

In this section, I review the evolution of output-gap measures at the BOJ briefly. To my knowledge, however, the BOJ has quite a short history with regard to the development of

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