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# Comparing the New Keynesian Phillips Curve with time series models to forecast inflation☆

Fabio Rumler[a,b,*], Maria Teresa Valderrama[a]

[a] Oesterreichische Nationalbank, Economic Analysis Division, Otto Wagner Platz 3, A-1090 Vienna, Austria
[b] Bank of Canada, Canadian Economic Analysis Department, 234 Wellington Street, Ottawa K1A 0G9, Canada

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ABSTRACT

The New Keynesian Phillips Curve, as a structural model of inflation dynamics, has mostly been used to explain past inflation developments, but has hardly been used for forecasting purposes. We propose a method of forecasting inflation based on the present-value formulation of the hybrid New Keynesian Phillips Curve. To evaluate the forecasting performance of this model we compare it with forecasts generated from a traditional Phillips Curve and time series models at different forecast horizons. As state-of-the-art time series models used in forecasting we employ a Bayesian VAR, a conventional VAR and a simple autoregressive model. We find that the New Keynesian Phillips Curve delivers relatively more accurate forecasts of inflation in Austria compared to the other models for longer forecast horizons (more than 3 months) while they are outperformed by the time series models only for the very short forecast horizon. This is consistent with the finding in the literature that structural models are able to outperform time series models only for longer horizons.



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* Corresponding author at: Oesterreichische Nationalbank, Economic Analysis Division, Otto Wagner Platz 3, A-1090 Vienna, Austria. Tel.: +43 1 40420 7444; fax: +43 1 40420 7499.
*E-mail addresses:* fabio.rumler@oenb.at, frumler@bankofcanada.ca (F. Rumler), maria.valderrama@oenb.at (M.T. Valderrama).

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## 1. Introduction

Forecasting inflation is an important task for a central bank since the rate of inflation is commonly regarded as the most important indicator of monetary policy. Some central banks, in particular those pursuing direct inflation targeting, even attribute the inflation forecast a crucial role in their monetary policy strategy. The literature on inflation forecasting has been growing rapidly in recent years as more and more forecasting methods have been developed and applied to forecast inflation. These are mostly time series models (e.g. factor models, autoregressive models, transfer function models) as well as more structural models (such as structural VARs or traditional Phillips Curve equations). This paper attempts to employ a widely used theoretical model of inflation dynamics, the New Keynesian Phillips Curve, for forecasting purposes and compares its forecasting performance with those of state-of-the-art time series models.

The New Keynesian Phillips Curve (NKPC) is currently the most widely accepted theory of inflation dynamics in modern macroeconomics. It is derived from a New Keynesian model characterized by monopolistic competition and short-run price rigidity and represents (in its reduced-form formulation) inflation as a function of expected inflation and the firm's real marginal cost. The baseline NKPC was developed in the late 1990s by Galí and Gertler (1999) and others (e.g. Sbordone, 2002).[1] Depending on the specification and the use of an appropriate empirical proxy for real marginal cost, it was generally found to be successful in tracking inflation dynamics in a number of large industrial economies over the last 20–30 years (see Galí & Gertler, 1999, for the US, Galí, Gertler, & López-Salido, 2001; McAdam & Willman, 2003, for the euro area, and Jondeau & Le Bihan, 2005, for the UK and major euro area countries). Despite its empirical success to explain past inflation, it has until now never been used for forecasting purposes in a single equation approach.[2] As a core ingredient of the New Keynesian Sticky Price Model, however, it is sometimes used as a forecasting equation in the context of DSGE models; see e.g. Adolfson et al. (2005) and Kilponen and Ripatti (2006). Nevertheless, we prefer the single equation approach because it allows us to better isolate the performance of the specific structure of the NKPC for forecasting. This is to say that in a general equilibrium setting the performance of one equation will depend on all the assumptions and specifications in the whole system. Thus, the single equation approach is more robust to misspecification in other parts of the system.

In this paper we develop a method of forecasting inflation that is based on the present-value formulation of the NKPC inspired by Galí and Gertler (1999) and Galí et al. (2001). Starting from their concept of fundamental inflation we extend this methodology by expressing current fundamental inflation only with lagged variables. Iteratively we construct a series of multi-step forecasts of fundamental inflation which we interpret as the inflation forecasts implied by the NKPC. We chose to do our analysis for Austria being a fairly open economy, because we want to assess and compare the forecasting performance of the open economy version of the NKPC developed in Rumler (2007). Forecasts are generated from three different specifications of the NKPC, which differ by the degree to which the open economy aspects are incorporated.

The forecasts stemming from the NKPC are compared to the forecasts of a traditional backward-looking Phillips Curve, a Bayesian Vector Autoregressive model (BVAR), a conventional Vector Autoregressive model (VAR) and a univariate autoregressive (AR) model. To systematically evaluate the forecasting performance of the different models, we generate multi-step out-of-sample forecasts in a recursive procedure from which the root mean square errors (RMSE) are computed. Additionally, to test for significant differences in predictive accuracy we use the Diebold–Mariano test and perform a bootstrap to determine the significance of the results.

We find that the AR model delivers the lowest RMSE for the 1-quarter-ahead forecast horizon and the NKPC delivers the lowest RMSE for the 4-quarters and 8-quarters-ahead horizons. Although

[1] A survey of the literature on the New Keynesian Phillips Curve can be found in Ólafsson (2006).

[2] Canova (2007) evaluates the forecasting performance of a number of Phillips Curve models for inflation, among them also a forecast generated from a NKPC. However, this forecast turns out to be based on a bivariate model of real marginal cost and inflation rather than on the specific structural form of the NKPC.