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Forecasting industry-level CPI and PPI inflation: Does exchange rate pass-through matter?

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Abstract

We show that incorporating the effects of exchange rate pass-through into a model can help in obtaining superior forecasts of domestic, industry-level inflation. Our analysis is based on a multivariate system of domestic inflation, import prices and exchange rates that incorporates restrictions from economic theory. These are restrictions on the transmission channels of the exchange rate pass-through to domestic prices, and are presented as testable hypotheses that lead to model reduction. We provide the results of various tests, including causality and prior restrictions, which support the underlying economic arguments and the model we use. The forecasting results for our model suggest that it has a superior performance overall, jointly producing more accurate forecasts of domestic inflation.

Keywords: Causality; Direction of change; Econometric model; Exchange rates; Forecasting; Inflation; Model reduction; Pass-through; VAR model; VARMA model

1. Introduction

We examine whether industry-level inflation forecasts of domestic consumer and producer prices can be improved when we incorporate additional information about potential exchange rate pass-through. Our analysis is performed in a multivariate setting, and we compare standard forecasting models, such as linear multivariate ARMA and VARMA models, with a "structural" system that incorporates information about the transmission of exchange rate effects to domestic prices. We cover several different industries in three major economies, Japan, the United Kingdom and the United States.

The exchange rate pass-through effect is defined as the percent change in local currency import prices resulting from a 1% change in the exchange rate between the exporting and importing countries. Theoretically, this effect can be either full

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or zero,[2] i.e., a one percent change in the exchange rate can either lead to an exact and proportionate (1%) change in local currency import prices, or there may not be any effect (0%) on the local currency import prices.[3] Thus, domestic prices may either be affected significantly or remain unchanged due to an exchange rate fluctuation. Obstfeld (2001, 2002), however, proposes another form of pass-through effect, arguing that the exchange rate pass-through can be two-dimensional, affecting both import prices (in local currency terms) and domestic prices. With this two-dimensional approach, the net effect on domestic inflation can be either significant or insignificant, and thus becomes an issue for empirical investigation. Following Obstfeld's (2002) arguments, we build a "structural" system that separates the exchange rate pass-through effects on local currency import prices and domestic prices of imported goods in the short-run. We use this system to empirically test for the presence and extent of the pass-through effect, and to see whether we can provide better forecasts of industry-level inflation.

Our analysis adds to the related literature in a number of ways. First, it links domestic inflation forecasts with the exchange rate channel in a novel way for three major OECD countries, using monthly industry-level prices. Second, we augment our forecasting evaluation with a number of tests of the causality of the exchange rate. The results of these tests are important in their own right (for checking the validity of the underlying economic arguments) and are also used later to determine the extent of the ability of the pass-through effect to make inflation predictions. Taylor (2000) argues that the low level of inflation in the nineties in the US can be one potential explanation of a lower pass-through effect or lower pricing power of the firms. He therefore takes the exchange rate as being endogenous in determining the optimal price level. We, on the other hand, actually provide formal tests, which do not necessarily corroborate Taylor's view. Third, our study relies on a system that is built around *testable implications* of economic theory. We then extensively compare the results from this system with those from a number of "atheoretic" forecasting methods. The main novelty and contribution of our proposed system lies in the way we treat and test for the presence of the exchange rate pass-through effect. The two-dimensional approach of Obstfeld (2002) is modeled via a "triangular" specification of a reduced-form VAR model, which is tested and reduced in turn, before generating inflation forecasts. Spanos (1989), Clements and Mizon (1991), and Hendry and Mizon (1993) show that, in this kind of a VAR setup, tests for competing "structural" hypotheses are possible.

To preview our results, we find significant evidence in favor of the economic arguments that guide our approach for most of the industries examined. Specifically, we find evidence in favor of non-causality from domestic prices to exchange rates, and causality from exchange rates to domestic prices. These findings clearly corroborate both the underlying economic argument and our use of a model where the exchange rate is used as an explanatory variable rather than being modeled jointly with domestic prices. After incorporating the above tested restrictions into our system, we compute 1, 2 and 3 month ahead forecasts for domestic inflation variables (consumer and producer inflation), and compare them with forecasts computed from "atheoretic" multivariate time series models, which includes the parsimonious class of VARMA models. We find that, overall, our model has a superior forecasting performance when evaluated against standard forecast evaluation criteria. In particular, our model is either best or second best (based on the root mean-squared or mean absolute error of the forecasts) for about 80% of the cases examined, and is always the best model in correctly predicting the direction of future domestic inflation.[4] The ability of the proposed model to produce accurate forecasts shows that it has higher informational content than its competitors, and thus should be more useful to forecasting practitioners engaged in industry-

[2] A full effect arises due to a producer currency pricing (PCP) type assumption, where the imported goods are priced in terms of the sellers', exporters' or producers' currency (see, in particular, Obstfeld & Rogoff, 2000; Obstfeld, 2002, and references therein). On the other hand, a zero effect arises because of the local currency pricing (LCP, see Devereux, 1997; Engel, 2002) or pricing to market (PTM; see Krugman, 1987)-type assumptions, where pricing is done in terms of the buyers', consumers' or importers' currency.

[3] Empirical studies (see, for example, Goldberg & Knetter, 1997; Campa & Goldberg, 2005), however, show that the pass-through effect is partial, i.e., hovering around 50% in the long-run for manufacturing traded goods in OECD countries.

[4] The results on the directional performance of the generated forecasts are not reported here but are available to the interested reader from the corresponding author upon request.