

Can the new open economy macroeconomic model explain exchange rate fluctuations? [☆]

Yongseung Jung ^{*}

Department of Economics, Kyung Hee University, Hoegi-Dong 1, Dongdaemun Gu, Seoul, South Korea

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Abstract

This paper explores the successes and failures of the new open economy macroeconomics more critically by addressing the performance of the model at all frequencies along the line of Watson's [Watson, M.W., 1993. Measures of Fit for Calibrated Models, *Journal of Political Economy* 101, 1011-1041] measures of fit. This paper shows that the NOEM model with either PCP or PTM is not successful in generating the spectral density of the selected variables calculated from the data. In particular, the model cannot generate mass spectra of the exchange rates at low frequencies as in the data. It shows that the NOEM model with either separable preference or incomplete asset market cannot generate the typical hump-shaped spectra of exchange rates.

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1. Introduction

In recent years, a proliferation of new monetary models that incorporate imperfect competition and nominal rigidities into a dynamic stochastic general equilibrium have surfaced in

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^{*} Tel.: +82 2 961 0962; fax: +82 2 961 0622.

E-mail address: jungys@khu.ac.kr.

macroeconomics.¹ This kind of research program is closely linked to the recent theoretical development of international finance, which has become known as the new open economy macroeconomics. New open economy macroeconomics, embedding imperfect competition and nominal rigidities in a dynamic general equilibrium open economy attempts to explore empirical issues, such as the excessive exchange rate movements and liquidity effects which had been unaccounted for previously.

In the theoretical development of international finance, [Obstfeld and Rogoff \(2000\)](#) argue that the assumption of sticky prices in the producer's currency is important for matching the behavior of the terms of trade. Their Redux model assumes no international market segmentation, favoring the producer–currency–pricing (hereafter PCP) approach in the exchange rate fluctuations. However, there is a large body of evidence against the law of one price. In particular, [Engel \(1999\)](#) and [Chari, Kehoe, and McGrattan \(2000\)](#) hereafter [Chari et al. \(2000\)](#) have documented that the international deviations in tradable prices are responsible for the violation of the law of one price. In line with this empirical evidence, many authors, presuming that international markets for manufacturing goods are sufficiently segmented, have introduced the so-called 'pricing-to-market (hereafter PTM)' approach into the new open economy macroeconomic (hereafter NOEM) model. PTM with local-currency sticky prices breaks the link between home and foreign price levels and allows the real exchange rates to fluctuate.² In particular, [Betts and Devereux \(1999, 2000\)](#) set up a full-fledged PTM model and show that the model outperforms the PCP model in tracking the real exchange rate movements.

Notwithstanding these theoretical developments in international finance, relatively little empirical or quantitative studies have been done. Some studies have attempted to evaluate the quantitative importance of the mechanisms emphasized in the NOEM model either via calibration exercises or VAR econometric models. In important quantitative applications of the NOEM model in dynamic general equilibrium settings, [Betts and Devereux \(1999\)](#), [Chari et al. \(2000\)](#), and [Kollman \(1997\)](#) show the potential of the model to replicate international business cycle regularities including the variability of real and nominal exchange rates. In calibration exercises, [Chari et al. \(2000\)](#), and [Kollman \(1997\)](#) have evaluated the NOEM model with PTM by comparing the unconditional moments generated by the model with the unconditional moments observed in the data. In the econometric investigation, [Betts and Devereux \(1999\)](#) have shown that the NOEM model with PTM performs well in matching the stylized facts of the international monetary transmission mechanism as documented by VAR results.

In frequency domain, [King and Watson \(1996\)](#), [Stock and Watson \(1999\)](#), and [Watson \(1993\)](#) document interesting stylized facts over business cycles. The selected real macroeconomic variables have common, hump-shaped growth rate spectra. That is, the spectra are relatively low at low frequencies, rise at middle frequencies, and then decline at high frequencies. However, no one in international finance has explored whether the current NOEM models can generate the dynamics of the selected variables at low and high frequencies in addition to business cycle frequencies. Because the height of the spectral density of the selected variable at each frequency indicates the extent of that frequency's contribution to the variance of the corresponding variable, the variance of the corresponding variable occurring between any two frequencies is given by the areas under the spectrum between those two frequencies. Therefore, one cannot argue that the NOEM model performs well in matching the volatile exchange rate movements by comparing

¹ See [Goodfriend and King \(1997\)](#) for detailed discussions.

² [Betts and Devereux \(1999, 2000\)](#) refer to this pricing convention for exports as local currency pricing (LCP). See also [Krugman \(1987\)](#) [Lane \(2001\)](#). In this paper, PTM is used to mean PTM cum LCP.

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