

---

<b>Report No.</b>	HIAS-E-64
<b>Title</b>	Radial Basis Functions Neural Networks for Nonlinear Time Series Analysis and Time-Varying Effects of Supply Shocks
<b>Author(s)</b>	Nobuyuki Kanazawa <sup>(a)</sup>
<b>Affiliation</b>	(a) Hitotsubashi Institute for Advanced Study, Hitotsubashi University
<b>Issued Date</b>	March 2018
<b>Abstract</b>	<p>I propose a flexible nonlinear method for studying the time series properties of macroeconomic variables. In particular, I focus on a class of Artificial Neural Networks (ANN) called the Radial Basis Functions (RBF). To assess the validity of the RBF approach in the macroeconomic time series analysis, I conduct a Monte Carlo experiment using the data generated from a nonlinear New Keynesian (NK) model. I find that the RBF estimator can uncover the structure of the nonlinear NK model from the simulated data whose length is as small as 300 periods. Finally, I apply the RBF estimator to the quarterly US data and show that the response of the macroeconomic variables to a positive supply shock exhibits a substantial time variation. In particular, the positive supply shocks are found to have significantly weaker expansionary effects during the zero lower bound periods as well as periods between 2003 and 2004. The finding is consistent with a basic NK model, which predicts that the higher real interest rate due to the monetary policy inaction weakens the effects of supply shocks.</p>
<b>Keywords</b>	neural networks, radial basis functions, zero lower bound, supply shocks
<b>JEL</b>	C45, E31

---