



**WP/18/230**

# IMF Working Paper

---

## An Algorithmic Crystal Ball: Forecasts-based on Machine Learning

by Jin-Kyu Jung, Manasa Patnam, and Anna Ter-Martirosyan

***IMF Working Papers* describe research in progress by the author(s) and are published to elicit comments and to encourage debate.** The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

I N T E R N A T I O N A L M O N E T A R Y F U N D

## IMF Working Paper

Strategy, Policy and Review Department

### **An Algorithmic Crystal Ball: Forecasts-based on Machine Learning<sup>1</sup>**

**Prepared by Jin-Kyu Jung, Manasa Patnam, and Anna Ter-Martirosyan**

Authorized for distribution by Vikram Haksar

November 2018

**IMF Working Papers describe research in progress by the author(s) and are published to elicit comments and to encourage debate.** The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

### **Abstract**

Forecasting macroeconomic variables is key to developing a view on a country's economic outlook. Most traditional forecasting models rely on fitting data to a pre-specified relationship between input and output variables, thereby assuming a specific functional and stochastic process underlying that process. We pursue a new approach to forecasting by employing a number of machine learning algorithms, a method that is data driven, and imposing limited restrictions on the nature of the true relationship between input and output variables. We apply the Elastic Net, SuperLearner, and Recurring Neural Network algorithms on macro data of seven, broadly representative, advanced and emerging economies and find that these algorithms can outperform traditional statistical models, thereby offering a relevant addition to the field of economic forecasting.

JEL Classification Numbers: C53, C45.

Keywords: Machine learning, forecasts, forecast errors.

Author's E-Mail Addresses: jin-kyu.jung@whu.edu; mpatnam@imf.org; atermartirosyan@imf.org

---

<sup>1</sup> The authors would like to thank Tamim Bayoumi, Aquiles Farias, Vikram Haksar, Federico Kalan, Jungjin Lee, Sanjaya Panth, Helene Poirson Ward, Murtaza Husain Syed, Andrew Tiffin, and participants of the IMF research seminar for suggestions. All errors and omissions are our own.