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The Total Factor Productivity of National Innovation Systems in the European Union

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Innovation is important for economic growth. In this research, we analyze the productivity and efficiency of the National Innovation Systems (NIS) of the European Union 28 (EU-28) Member States, in the period 2006–2012. The data come from the Innovation Union Scoreboard 2014 report and Eurostat. Based on the Battese and Coelli (1995) time-varying inefficiency model, a Cobb– Douglas stochastic frontier is estimated as well as the effects of macroeconomic environmental variables on inefficiency. Innovation growth is decomposed into total factor productivity (TFP) changes, accumulation of inputs, and an unexplained residual component. Using an extension of the Kumbhakar and Lovell (2000) decomposition, TFP changes are computed as the sum of technological changes, changes in technical efficiency, and scale effects. Results show decreasing returns to scale in innovation production. Concerning the effects of macroeconomic environmental variables, technical inefficiency decreases with higher standards of living, the rate of economic growth, the reduction of economic inequality, and the control of inflation and unemployment. Excessive financial liquidity and political decentralization increase technical inefficiency. Growth in the innovation production of the EU- 28 Member States is due to TFP changes, to the accumulation of inputs, and to a residual non-explained component. Positive TFP changes resulted exclusively from the improvement in technical efficiency.