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## **Efficiency in banking: does the choice of inputs and outputs matter?**

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**Abstract:** This paper examines banking efficiency using recent data from PIGS countries (i.e., Portugal, Italy, Greece and Spain), which suffer from debt problems. We employ a two-stage approach based on the effect of several items of balance sheets on cash flows and data envelopment analysis (DEA). More specifically, we extend previous studies by giving attention to the deposit dilemma. The reported results show that the choice of inputs and outputs does matter in the case of European banking efficiency. Although the role of deposits is controversial, we find that deposits may be an output variable, owing to liquidity issues that play a major role in the efficiency of PIGS' banking sector. We also report that the DEA model with deposits as an output variable generates efficiency scores that fall between periods. These results are helpful to bank managers and financial analysts dealing with efficiency modelling.

**Keywords:** PIGS; banking sector; efficiency; deposits dilemma; two-stage approach; cash flows; DEA; data envelopment analysis; regression.

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**Biographical notes:** Christos Floros is a Professor of Finance at the TEI of Crete. His main research interests include behavioural finance, financial derivatives, financial economics/econometrics and empirical banking. He is the Editor-in-Chief of *International Journal of Financial Markets and Derivatives* (IJFMD) and has published in a number of academic journals, including *Journal of Empirical Finance*, *Journal of International Financial Markets Institutions and Money*, *International Review of Financial Analysis*, *Economic Modelling*, *Manchester School*, *Review of Accounting and Finance* and *Global Finance Journal*. He is a co-author of *Modelling and Forecasting High Frequency Financial Data* (Palgrave, 2015) and *The Greek Debt Crisis* (Palgrave Macmillan, 2017).

Constantin Zopounidis is a Professor of Financial Management and Operations Research at the Department of Production Engineering and Management, Technical University of Crete, Greece. His research interests include multiple criteria decision-making, financial engineering and financial risk management. He has published over 300 papers in premier international journals as *Decision Sciences*, *European Journal of Operational Research*, *Decision Support Systems*, *Journal of the Operational Research Society* and *Expert Systems with*