DRIVERS OF PRODUCTIVITY IN THE SPANISH BANKING SECTOR: RECENT EVIDENCE

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We analyse the drivers of total factor productivity of Spanish banks from early 2000, including the last financial crisis and the post-crisis period. This allows us to study changes in productivity following a major restructuring process in the banking sector such as the one experienced in Spain. Overall, we find that following a period of continued growth, productivity declined after the height of the crisis, though large banks were less affected. We also find that risk, capital levels, competition and input prices were important drivers of the differences in productivity change between banks. Finally, our results suggest that, by the end of our sample period, there was still some room for potential improvements in productivity via exploiting scale economies and enhancing cost efficiency. These opportunities appear to be generally greater for the smaller banks in our sample.

Following the crisis, the Spanish banking sector underwent a thorough restructuring process. Further to the reduction of their balance sheets and excess debt, banks also had to search for more diversified income sources, review their business models and reduce overcapacity and operating costs. With this process still under way, a key question for the sector is how to sustain its productivity and, as a corollary, whether there may still be room for further consolidation.

To help answer this question, we perform a total factor productivity (TFP) decomposition analysis to study the effects of changes in productivity in different types of Spanish banks in 2000-2015, and gain empirical insights into whether there may still be room to achieve further gains in scale economies and cost efficiency by the end of the period.

We consider the bank as a multiproduct firm that combines three types of activities: intermediation services, financial investments and fee-based services, following the intermediation approach (Sealey and Lindley, 1977) under which banks are assumed to use deposits and other inputs in order to produce loans and other outputs.

For the empirical methodology, we follow a variable cost frontier approach to decompose TFP (Berger and Humphrey, 1991) in the Spanish banking sector into cost efficiency, scale economies, technical change, equity capital, risk, input prices and mark-up components. This approach takes into account an inefficiency component in the estimation which does not allow banks to operate at minimum feasible costs thereby affecting their productivity (Berger and Mester, 1997). Under this framework, inefficiency is related to the excessive use of inputs and their inadequate allocation given the input prices and the output produced. Previous studies have evidenced the importance of properly identifying economic efficiency and have identified that it widely dominates scale effects in banking (Berger and Humphrey, 1991; Grifell-Tatjéb and Lovell, 1997; Lozano-vivas, 1998). Finally, to measure risk-taking, we propose a composite ex-ante risk metric which is able to capture different sources of risks such as credit risk, liquidity, solvency, profitability and macroeconomic conditions.

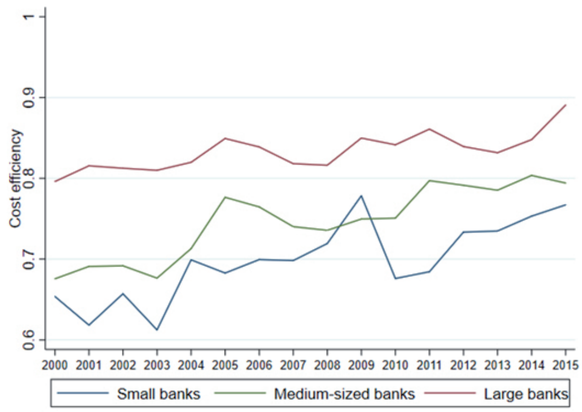
The database we use includes Spanish commercial and saving banks over the period 2000-2015 thus enabling the highly expansive period prior to the crisis and also the crisis and post-crisis years to be taken into consideration. Our sample represents 90% of the total assets of banks and savings banks as a whole. When two banks merge, we consider that a new institution is created. The result of this process is an unbalanced panel composed of 50 entities over 16 years.

Focusing on our preferred empirical specification, we find that TFP increased remarkably during the years of credit expansion before the crisis. Main drivers during this period were technical change and cost efficiency improvements, which in turn were related to the innovation in financial instruments (Martin-Oliver *et al.*, 2013) and increasing competition in the sector (Casu and Girardone, 2006). This trend reversed during the crisis period, when the imbalances accumulated in previous years started to manifest in rapid increases of non-performing loans and deterioration of liquidity, solvency and profitability indicators. Afterwards, during the post-crisis period, productivity gradually started to recover, mainly due to the reduction of risk and improvements in efficiency.

We also find significant heterogeneity among banks of different sizes, not only in TFP growth but also in terms of its drivers. Large banks have taken advantage of scale economies and benefited more from technical change during the pre-crisis period, which allowed them to have higher TFP growth rates than small institutions. Once the crisis hit, productivity change

SCALE ECONOMIES BY SIZE OF BANKS FIGURE 1

COST EFFICIENCY BY SIZE OF BANKS FIGURE 2



in large banks was more sensitive to variations in risk, but the net effect of the crisis was less severe than for small banks, which suffered an important decrease in efficiency. In the recovery phase, the reduction of risk and efficiency gains have been the main positive drivers of productivity, particularly for large banks. The mark-up component has also contributed positively to TFP of small banks in the post-crisis years while input prices have affected them negatively. In general, the negative effect of raising equity capital has been more limited as a TFP driver; however, its effect has become more important since the last years of the crisis, especially for small banks. Finally, the transformation of savings banks into commercial banks had positive effects on TFP since the cost structure of saving banks was identified to be relatively more expensive.

In addition, our analysis suggests that since the onset of the crisis, the reduction of banks' output and the restructuring process have brought new opportunities for exploiting scale economies and enhancing cost efficiency. Some of these opportunities were seized in the last two years of our sample period by almost all types of banks, particularly as result of the consolidation process which followed the crisis.

Overall, we find that by the end of our sample period, there would still be room for further potential improvements in productivity via exploiting scale economies and enhancing cost efficiency in the system (Figures 1 and 2). These opportunities appear to be greater for the smaller banks in the sample.

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