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# Why high productivity growth of banks preceded the financial crisis<sup>☆</sup>

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## ABSTRACT

The high levels of operating efficiency, profits, and market values for banks in the years before the financial crisis raise reasonable doubts about the accuracy of the assessments of the efficiency of banking intermediation. We examine the productivity growth in Spanish banks in the pre-crisis period by separating out the contributions to productivity growth from business practices and from industry-wide technological progress. We find that more than two thirds of the estimated productivity growth in the years 2000–2007 is attributed to banks' practices, such as the expansion of credit in the housing market, the high recourse to securitization and short-term finance, the reduction in liquidity holdings, and the leveraging process of banks' balance sheets, that the literature claims are the ultimate causes of the crisis. We estimate that the remaining cumulative annual growth rate is 2.8% for the industry's technical progress, which is similar to that in the period of 1992–2000.

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## 1. Introduction

Banks and other financial intermediaries perform the economic functions of providing liquidity, transferring funds from savers to investors, and collecting and diffusing information (Diamond, 1984; Diamond and Dybvig, 1983; Gorton and Winton, 2003; Merton, 1995). These functions involve value-added activities that facilitate payments and manage cash, select and monitor borrowers, and

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provide advice and consultation services. Banks use labor, capital, and other inputs to perform these activities and earn revenues from interest-rate differentials and fees. The level of efficiency when performing banking intermediation activities is a key factor in economic development (Buera et al., 2011; Greenwood et al., 2010; Mehra et al., 2011). Further, the changes in the costs of intermediation have important macroeconomic consequences for investment and growth (Bernanke et al., 1999; Christiano and Ikeda, 2011; Hall, 2011).

In conventional competitive markets, profits are the reward for providing services demanded by costumers at the lowest cost. The expansion of banks' balance sheets around the world and the record-high growth rates of profits and productivity up to 2007 should have been an indicator of substantial efficiency gains in financial intermediation. However, the outburst of the severe financial crisis in 2007 showed that at least in the case of banks, the usual indicators of performance might have failed to disclose the "true" economic results. Potential explanations for this paradox might be as follows. Managerial incentives can exist that distort reported profits (Rajan, 1994). Also, financial innovations for regulatory arbitrage (Acharya et al., 2011) and the measurements of profits and output not adjusted for risk can exist (Haldane et al., 2010). Further, innovations of business models that change the nature of the banks' output over time (Philippon, 2012) can occur, such as the "originate to distribute" model and the market-based intermediation or shadow banking.

In this paper, we rely on bank-level productivity estimations to quantify the productivity growth of the Spanish banking industry in the years before the financial crisis (1992–2007) and examine its determinants. The Spanish example is a good case study for a better understanding of why the usual measures of efficiency and profitability for banks might not be informative about the true efficiency gains in financial intermediation. First, the estimated productivity growth of the country's banking industry before the crisis was one of the highest among developed countries. Second, Diamond and Rajan (2009a) consider what occurred in Spain as representative of the proximate causes of the crisis: (i) investors perceived a permanent reduction in interest rates when Spain joined the Euro zone, (ii) there was an unprecedented expansion of the housing industry, and (iii) banks financed a good portion of the loans with wholesale financing and short-term debt. However, Spain also has different features from the United States and other countries in two main aspects. First, securitized loans remained on the balance sheets of banks, and they were subject to capital requirements; and, second, savings banks compete on an equal basis with commercial banks.

We derive the estimates of the bank-level total factor productivity (from now on productivity) from the estimation of the banks' production function. We model the production and sales of bank services at the branch level assuming a Leontief technology (Martín-Oliver and Salas-Fumás, 2008) with two variable inputs: labor and services from information technology assets (IT capital) and a quasi-fixed input (the physical capacity of the branch). Then, we aggregate the branch-level production function to obtain the bank-level production function, which is the function that we empirically estimate with the Spanish banks' data. The estimation of the technology parameters follows the methodology developed in Olley and Pakes (1996) and extended by Levinsohn and Petrin (2003) to control for the potential simultaneity bias between the unobserved productivity shock and the management decisions on input quantities in response to the shocks.

Next, we explore what is behind the estimated productivity. For this purpose, we isolate the factors that can determine the estimated productivity values because of reasons different from "true" economic efficiency. These factors comprise, on the one hand, differences in the operating characteristics of the banks in the sample (Berger and Mester, 1997; Frei et al., 2000); on the other hand, they comprise factors related with the proximate causes of the crisis, which is the focus of this paper. In other words, we aim to explore whether certain business decisions by banks improve the short-term private performance of banks but incur the social cost of future financial instability. Examples of these business decisions are the concentration of loans in the housing market, the issuance of securities and short-term debt to finance loans, or the reduction of liquidity holdings and the increase of leverage.

Our empirical results show that the growth rate of productivity in the Spanish banking industry more than doubled during the years after the Euro, a result that is consistent with other productivity estimates obtained with other methodologies and with aggregate industry data (O'Mahony and Timmer, 2009). However, we also find that an important part of this productivity growth in the pre-crisis years is explained by business decisions that, ex-post, have been identified as drivers of

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