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Regional bank efficiency and its effect on regional growth in “normal” and “bad” times[☆]

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ABSTRACT

The financial crisis affected regions in Europe in a different magnitude. This is why we examine whether regions which incorporate banks with a higher intermediation quality grow faster in “normal” times and are more resilient in “bad” ones. For this purpose, we measure the intermediation quality of a bank by estimating its profit and cost efficiency while taking the changing banking environment after the financial crisis into account. Next, we aggregate the efficiencies of all banks within a NUTS 2 region to obtain a regional proxy for financial quality in twelve European countries. Our results show that relatively more profit efficient banks foster growth in their region. The link between financial quality and growth is valid in “normal” and in “bad” times. These results provide evidence to the importance of swiftly restoring bank profitability in euro area crisis countries through addressing high non-performing loans ratios and decisive actions on bank recapitalization.

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1. Introduction

Growth divergences across European regions have been large and persistent. Some European regions have been experiencing steady growth, while in others growth has remained anemic (Quah, 1996; Cuaresma et al., 2014). One of the reasons for this finding could be that banks perform differently in their financial intermediation function across regions. For example, easier access to credit increases resources that could be channeled into investment. There are many studies which analyzed the relationship between financial volume and growth in cross-country studies (Levine, 2005). However, Hasan et al. (2009) criticize, firstly, that cross-country studies suffer from sample heterogeneity as they cover very different economies. Therefore, a solution is to concentrate on regions to use also within-country variation (Higgins et al., 2006).¹

Secondly, Hasan et al. (2009) argue that financial development cannot only be measured by the credit to GDP ratio – a financial

volume measure. In fact, Rousseau and Wachtel (2011) show there has been only a weak link between financial volume and growth in developed countries over recent times. Therefore, Hasan et al. (2009) provide another channel of the influence of banks on regional productivity growth. Specifically, they showed for eleven European countries over the period 1996–2004 that the intermediation ability of a bank should not be assessed alone by the volume of funds which are shifted from savers to borrowers, but also by its *quality*, i.e. by its ability to channel funds to its most productive uses at a reasonable interest rate. A bank's intermediation quality can be measured by its efficiency in converting inputs into outputs while either minimizing costs or maximizing profits. A more efficient bank is assumed to foster growth as it is able to select the optimal projects to fund while calculating the optimal cost of lending given the projects' risks.

These considerations are supported by the recent financial crisis in the euro area which was driven by financial intermediaries' inefficient allocation of resources to sectors where the marginal product of capital was low. This implied that capital accumulation was not associated with technological change and hence higher potential growth. Indeed, in a number of euro area economies' capital flowed disproportionately into the non-tradable sector (construction, financial services, public sector) that pushed up wages without adequately raising productivity, and which gave rise to large intra-euro area current account imbalances, high indebtedness and major economic disruptions (Praet, 2014). Furthermore, the sluggish recovery in euro area crisis countries suggests that during the “bad time” of the crisis, there has been too little “good” deleveraging and too much

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¹ Further examples of studies examining the effect of financial development on regional growth are Guiso et al. (2004) and Moretti (2014) using Italian firm data, Pascali (2014) for long-term effects in Italy, Koetter and Wedow (2010) taking Bundesbank data about German banks, and Kendall (2012) examining Indian district data.

ever-greening and forbearance, undermining the ability of banks to support the upswing and the reallocation of labor and capital towards more productive uses.

Firstly, we test whether Hasan et al.'s (2009) finding of a positive link between the efficiency of banks in a region and productivity growth holds for an updated and extended data set for twelve European countries. As our sample includes the financial crisis and its aftermath, we thereby contribute to the literature by examining whether the results of Hasan et al. (2009) are valid in “normal” as well as in “bad” times. In addition we also address the differing banking environment in European countries. After 2007 the regulation for banks was tightened and the non-performing loans ratio increased. Estimating a bank's efficiency would be biased without accounting for these changes. For example, if a government introduces a stricter banking regulation which reduces its banking sector's profits, the efficiency estimation would wrongfully account the reduced profits to inefficiency if one neglects these changes.

As a further innovation to the literature, we demonstrate that the strength of the relationship between financial quality and productivity growth is dependent on the level of development of a region. Firms in less developed regions have more problems in obtaining funding and investments have a relatively higher marginal productivity (Guiso et al., 2004; Hakenes et al., 2015). If such a region includes more efficient banks, which are able to identify the right firms to finance, it, firstly, gains credits for its firms and, secondly, catches up faster in productivity. This result bears interesting policy implications on how to increase the speed of convergence of European regions. Potential instruments to foster bank efficiency are by adjusting regulations for savings and cooperative banks, fostering investment in commercial banks' IT or, in light of the financial crisis, swiftly addressing the high non-performing loans ratios in many countries (Barth et al., 2013; Beccalli, 2007; Koetter and Poghosyan, 2009).

Our results are corroborated by several robustness tests. Firstly, we confirm our findings for an estimation which excluded financial centers to account for the fact that we assigned a bank to a region by its headquarters – a procedure which could be considered heuristic for large commercial banks which usually are operating nationwide and are based in financial centers. Additionally, we exclude either large banks or all banks but savings banks from the sample as the latter is forced by law to operate only regionally. Another approach to deal with across region spillovers is to specifically model them. We use a spatial-lag model to account for spillovers of financial development from neighboring regions. All estimations confirm our findings. As policy makers are not only interested in economic growth, but also in reducing unemployment, we also test whether fostering bank efficiency is a potential tool to do so. While we find evidence for this hypothesis using our complete sample, it cannot be said that a region with more efficient banks is more resilient against rising unemployment during a turmoil period as the recent financial crisis.

The outline of this work is as follows: Firstly, the methodology of the analysis will be presented. After an exposition and explanation of the regional growth equation and of the estimation of banks' efficiency, a description of the data follows. Secondly, empirical evidence will be presented with an additional chapter on robustness. Lastly, we conclude our results.

2. Methodology

2.1. Regional growth equation

The regions in Europe display different growth patterns. Furthermore, although financial regulation in the euro area is being harmonized, banks are different in their efficiency of channeling funds across regions (Bos and Kool, 2006). An example is Italy in which the amount of credit, the interest charged for loans and bank

efficiency varies strongly between the northern and southern regions (Pascali, 2014; Montagnoli et al., 2015; Giordano et al., 2013). To test whether these differences in financial volume and quality of European regions affect growth, we follow Levine et al. (2000) and estimate a dynamic panel growth model of the following form:

$$\Delta Y_{r,t} = \alpha + \beta_1 \Delta Y_{r,t-1} + \beta_2 \ln FQ_{r,t} + \beta_3 \ln FV_{r,t} + \beta_4 \ln X_{r,t} + \mu_r + \epsilon_{r,t} \quad (1)$$

where ΔY is the growth rate of GDP per worker. We take GDP per worker as the variable of interest as this measure is determining the productivity of an economy. Still, we also present results for GDP per capita and unemployment as dependent variables. FQ and FV denote financial quality and financial volume, respectively. Financial quality is represented by the weighted average estimated bank efficiency of a region.² The weighting was done according to a bank's market share of a region's loans. Financial volume is measured by the regionally aggregated value of loans relative to GDP. Details on the calculation of the financial development variables follow later in Section 2.3.2. The additional variables contained in X control for further regional and country-specific variables³ and μ_r represents an unobserved region-specific effect. The subscript r indicates the European NUTS 2 region and t the year.

Eq. (1) cannot be estimated with basic panel techniques as the lagged GDP variable is correlated with the unobserved region-specific effect μ_r . However, μ_r can be eliminated by taking first differences. The result is that the differenced lagged dependent variable and the differenced error term are correlated. Arellano and Bond (1991) therefore suggest to use lagged levels as instruments for the differenced lagged dependent variable, the difference GMM estimator, if the error term is not autocorrelated. For further precision, we use the system-GMM estimator of Arellano and Bond (1995), which includes additionally lagged differences of the dependent variable as instruments, as Blundell and Bond (1998) showed that this approach is more efficient than the difference GMM estimator.

Our explanatory variables *financial quality* and, especially, *financial volume* may suffer from endogeneity as a growing economy can result in an increasing demand for credits and a growing financial industry. To deal with this potential reverse causality, we follow Levine et al. (2000) and specify both variables as endogenous and, thus, include their lagged levels and differences as instruments. Details follow in Section 3.

2.2. Estimation of banks' efficiency

Bank efficiency is measured by a banks' relative ability to convert its inputs into output while maximizing profits or minimizing costs. A bank is inefficient if it uses too many inputs or allocates them in wrong proportions. This relative measurement of efficiency is less affected by endogeneity criticism than financial volume measures because a bank's relative ability to convert its inputs should influence growth independently of whether the economy is growing fast or slowly. An efficient bank should support growth of an economy through its good intermediary function, i.e. by selecting the optimal

² As we use an estimated variable in our regression, we are confronted with a generated regressors problem if the error term of the “first stage” is not normally distributed. In our case, however, we can be sure that the latter is the case as every deviation of the error term from the normal distribution is regarded as inefficiency by the stochastic frontier estimation. For details on the latter see Section 2.2.

³ As regional controls we employ the growth rate of the working population and education. The latter is measured as the share of persons between 25 and 64 that obtained tertiary education on the first or second stage. These two variables and regional GDP were obtained from Eurostat for NUTS 2 regions. The country-specific variables are capturing the differences between countries in terms of the banking sector or economic freedom.

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