The quality of banking and regional growth
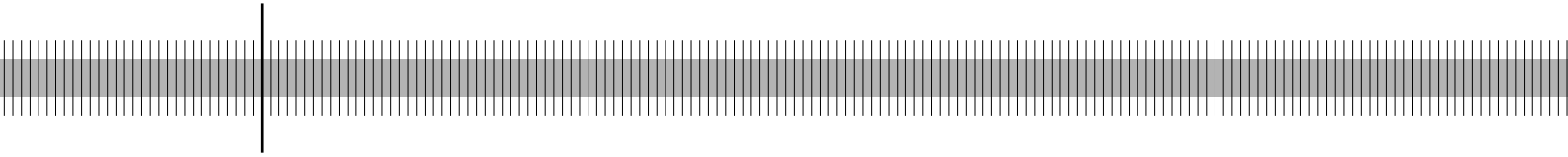
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Abstract

We test whether output growth in European economic agglomeration regions depends on financial development. To this end we suggest a relative measure of the *quality* of financial institutions rather than the usual quantity proxy of financial development. In order to measure the quality of financial development we use profit efficiency derived from stochastic frontier analysis. We show that more efficient banks spur regional growth while the typically used quantity measure of financial development is negligible. Also, our results suggest an additional channel through which better banking can spur growth: the interaction of more credit with efficient banks.

Non-technical summary

The creation of an efficient financial system is an explicit objective of the European Commission. Ongoing harmonization of regulation to foster an increasingly homogenous European banking system ultimately serves the purpose to enhance competition and thereby economic prosperity.

At the same time, regional differences continue to persist across European banking markets. Therefore, we investigate in this study whether regional bank efficiency has a positive impact on regional growth. We employ bank-specific data to estimate profit efficiency with stochastic frontier analysis for approximately 3,000 banks active in 160 European regions between 1997 and 2003. Our study thus analyzes if a micro-economic measure of banks' abilities to convert savings and deposits efficiently into loans suited to fund investments is positively affecting regional economic growth.

Our results confirm that higher mean profit efficiency fosters regional output growth. In particular, in Europe's fairly mature economic regions this quality channel for growth appears to be of larger importance compared to the traditionally employed quantity channel . In contrast to regional bank profit efficiency, neither the effect of credit volume relative to gross domestic product nor the interaction between quality and quantity are individually statistically different from zero.

The existence and economic significance of this quality channel of banking on growth is corroborated by our finding that it exhibits the largest positive magnitude when jointly specified with the quantity and interaction effects of financial development. Notably, in this parsimonious model all three measures affect growth significantly positive. However, the effect of improving regional profit efficiency is approximately three times as large as the respective two alternatives. We conclude that future studies on the finance-growth nexus should try to accommodate explicitly these three distinct mechanisms through which finance may foster growth.

Nichttechnische Zusammenfassung

Die Schaffung eines effizienten Finanzsystems ist ein erklärtes Ziel der Europäischen Kommission. Die Deregulierung und die Harmonisierung der Märkte für Finanzdienstleistungen haben vornehmlich zum Ziel, den Wettbewerb zu fördern und damit ökonomisches Wachstum zu unterstützen.

Gleichzeitig bleiben regionale Unterschiede innerhalb europäischer Bankenmärkte nach wie vor bestehen. Wir untersuchen deshalb in dieser Studie, ob regionale Bankeneffizienz einen positiven Einfluss auf regionales Wachstum in der EU hat. Zu diesem Zweck nutzen wir Bankdaten, um mittels der *Stochastic Profit Frontier Analysis* Profiteffizienz für etwa 3.000 Banken zu schätzen, welche in etwa 160 europäischen Regionen im Zeitraum von 1997 bis 2003 aktiv waren. Unser Beitrag untersucht somit, ob Banken durch ihre Mittlerfunktion einen positiven Wachstumsimpuls leisten können.

Unsere Ergebnisse bestätigen, dass es in Europas entwickelten Regionen insbesondere die Qualität des Bankwesens und nicht notwendigerweise die Menge an Krediten ist, welche einen positiven Einfluss auf wirtschaftliches Wachstum hat. Während individuelle Effekte einer höheren Kreditmenge relativ zum regionalen Bruttoinlandsprodukt und die Interaktion zwischen Bankeneffizienz und Kreditmenge keinen statistisch signifikanten Effekt zeigen, ist dies für das Profiteffizienzmaß der Fall.

Die Existenz und ökonomische Relevanz dieses Qualitätseffekts wird dadurch unterstützt, dass bei gleichzeitiger Spezifikation aller drei denkbaren Kanäle der Effizienzeffekt der mit Abstand bedeutsamste ist. Besonders bemerkenswert ist, dass in einer gemeinsamen Spezifikation der drei Kanäle alle einen positiven, signifikanten Effekt aufweisen. Dabei ist der Qualitätseffekt dreimal höher als die alternativen Kanäle. Zukünftige Studien zum *Finance-Growth Nexus* sollten daher diese unterschiedlichen Wirkungsmechanismen unterscheiden.

Contents

The quality of banking and regional growth[1]

1 Introduction

A better provision of financial services should reduce information asymmetries between lenders and borrowers and thus ease the accumulation of capital by a better selection of beneficial investment projects, improved monitoring of lenders and a mere reduction of resources wasted in the intermediation process by banks (Greenwood and Smith, 1996; Pagano, 1993).

Many studies analyze this finance-growth nexus empirically by explaining cross-country growth differentials by the volume of financial funds intermediated relative to economic output (King and Levine, 1993; Beck et al., 2000). However, a mere expansion of the quantity of credit need not indicate a qualitative improvement of intermediaries' abilities to channeling scarce financial funds from savers to borrowers. We suggest a more direct measure of the quality of finance rather than it's quantity trying to address the issue of poor empirical proxies for theoretical counterparts raised by Levine (2004).

We test if bank efficiency, estimated at the firm-level, significantly spurs growth. This relative measure of bank performance gauges the *quality* of financial institutions relative to its peers instead of the quantity of financial funds intermediated. While a number of recent studies highlight the importance of local differences in the provision of financial services and the relation between financial market structure and economic growth, we are aware of only one study attempting to empirically measure the intermediation quality of banks

more explicitly. Lucchetti et al. (2001) confirm that regional growth in Italian provinces depends positively on mean cost efficiency of banks serving local communities. Other regional studies continue to highlight the importance to account for regional differences, but usually focus on other proxies of quality. For example, Guiso et al. (2004) use household survey data to demonstrate that the probability to obtain credit differs across Italian regions. Their results show that easier access to credit is conducive to higher regional growth rates and a larger number of new firm establishments, further underpinning the importance to account for regional financial development.

But these findings for Italy are contrasted to some extent by other studies, for example for the U.S. by Clarke (2004). She reports that the interstate branching act led to an expansion of credit provided, which is correlated with state growth. However, she also points out carefully that whether larger banking markets are a determinant or a consequence of economic growth remains a conundrum. Valverde et al. (2003) add to the ambiguity with a study on five Spanish provinces. They report that five different measures of competition are mostly related to narrowed interest margins. But Granger causality tests fail to support the hypothesis of ensuing growth spurts due to higher competition. They conclude that some of the evidence in the cross-country finance growth literature between more sophisticated measures of financial development and growth could thus be explained by unspecified third factors.

Our paper contributes on the few regional studies on financial development in two respects. First, we present evidence for the positive relation between banking quality and economic growth in European regions of 23 member countries of the European Union. Thus, we maintain the apparently important regional focus while covering a more comprehensive sample of an increasingly integrating financial system. To this end we employ bank-level data obtained from the Bankscope database, which we allocate each bank to a specific European region. Second, we hypothesize that a potential candidate for the un-

observed third factor is the economic efficiency of banks to convert scarce resources into financial products and services. More specifically, Humphrey and Pulley (1997) point out that cost efficiency alone may fail to capture a bank's ability to convert inputs efficiently into outputs since the measure focuses only on the cost aspects of banking businesses. Instead, they suggest to also assess bank's skills to maximize profits for a given production plan by estimating profit efficiency. Our study is to our best knowledge therefore the first to analyze the relation between regional growth in Europe and banks' abilities to generate profits efficiently.

The remainder of this paper is structured as follows. In section 2 we introduce our empirical approach to test whether higher regional profit efficiency fosters economic growth. Section 3 provides information on our approach to allocate banks to European regions and on the data used in this study. We discuss our results in section 4, before we conclude in section 6.

2 Methodology

2.1 Regional growth

Mora et al. (2005) identify regional growth poles as opposed to periphery regions in Europe, which exhibit significantly different growth patterns, respectively. Likewise, despite the ongoing harmonization of financial industries across European countries, the efficiency of banks to intermediate financial funds remains not only heterogeneous across national banking markets but also at the regional level within countries (Bos and Kool, 2006).

Given the importance of regional differences, we hypothesize that higher regional bank efficiency should promote regional growth, too. We specify a reduced form growth model as a dynamic panel model (Levine et al., 2000):

$$y_{r,t} = \alpha y_{r,t-1} + \beta_1 f v_{r,t} + \beta_2 f q_{r,t} + \gamma x_{r,t} + \mu_r + \epsilon_{r,t}. \tag{1}$$

Variables in lower cases are denoted in logarithms, t are time indicators and r indexes European regions at the NUTS (Nomenclature des unités territoriales statistiques) 2 level according to the taxonomy of *Eurostat*.[2] To eliminate μ_r, an unobserved region-specific effect, we use the GMM difference estimator of Arellano and Bond (1991) and employ lagged levels as instruments for $\Delta y_{r,t-1}$. We specify a vector of further control variables, x, the growth rate of the working population POP.[3] Financial development is measured in two ways: the volume FV and the quality of financial development FQ. The former resembles the well-known specification of bank credit volume relative to GDP in the finance-growth literature.

2.2 Banking quality

The latter represents our approach to assess the quality of financial intermediation more directly. We measure a bank's *relative* efficiency to convert inputs into a production set while maximizing profits. Such a relative measure is conceptually less prone to reverse causality criticism. A higher ability of banks to demand inputs at given prices in optimal volumes and proportions should influence growth positively independent of whether the economy is expanding or contracting.

Secondly, a region that hosts banks that fulfil their project selection and loan monitoring functions on average more efficient relative to other regions, should benefit in terms of growth since the "right" projects receive funding at the "right" cost of lending given risk.

We assume that banks demand labor and borrowed funds at given factor

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[2]Descriptive statistics of all data used are provided in section 3.

[3]Appropriate proxies of human capital were not available at the regional level.

prices w to produce customer loans y_1 and other earning assets y_2 subject to a technology constraint, which also depends on equity z, and a pricing opportunity set such that profits before tax PBT are maximized (Humphrey and Pulley, 1997). Note that in the alternative profit model, we assume that regional banks possess some pricing discretion on the output side subject to a pricing opportunity set $H(p, y, w, z)$, where p denotes output prices. $H(\bullet)$ is another constraint next to $T(\bullet)$. As noted by Altunbas et al. (2001) this model does not only allow for the reasonable assumption that banks may have some degrees of freedom in their local market, but also to circumvent well-known measurement problems with banks' output prices (Mountain and Thomas, 1999). Then, maximum profits $\pi^*(O, P, Z)$ depend on given input prices, available equity and output quantities and we write a translog stochastic profit frontier as:

$$\ln PBT_{it} = \alpha_i + \sum_{j=1}^{J} \alpha_j \ln x_{ijt} + \frac{1}{2} \sum_{j=1}^{J} \sum_{k=1}^{K} \alpha_{jk} \ln x_{ijt} \ln x_{ikt} + \varepsilon_{it}. \qquad (2)$$

In addition to bank production data defined above, we also specify country dummies in z as well as a time trend t to account for technical change. Thus, we account for unobserved heterogeneity across European banks by controls and the bank-specific fixed effect α_i. A bank i can deviate from optimal profits before tax PBT due to random noise v_{it} or inefficiency u_{it}.

We use a recently suggested panel frontier estimator by Greene (2005), which allows for time-variant inefficiency which does not impose any monotonous trend of efficiency over time as most other estimators do. Upon estimation of equation (2), we impose homogeneity and symmetry restrictions and define the total error as $\varepsilon_{it} = v_{it} - u_{it}$ with random error term v_{it} *iid* with $v_i \sim N(0, \sigma_v^2)$. Inefficiency is *iid* with $u_{it} \sim N|(0, \sigma_u^2)|$ and independent of the v_{it}. Point estimates of efficiency are obtained as the conditional expectation of u given ε (Kumbhakar and Lovell, 2000). Hence, a value for profit efficiency PE of 80%

implies that the bank could have generated 20% more of observed profits with the given production plan, had it been employing in- and outputs efficiently

3   Data and regional allocation

We use data on financial accounts for approximately 7000 banks active in the EU-25 between 1997 and 2003 available from Bankscope. These banks are mapped to 254 NUTS 2 regions on the basis of three regional identifiers included in the Bankscope database.[4] In addition to the country and the city, a zip code is provided for most banks. The availability of these regional identifiers eased the mapping considerably.

We proceeded to map banks to NUTS 2 regions starting with Germany, which represents the country with the largest national group of banks in the sample. The mapping of German banks is facilitated by the fact that German districts *Regierungsbezirke* correspond to NUTS 2 regions. Given that we have the postcodes of banks and matching *Regierungsbezirke*, the majority of German banks is easily allocated to NUTS 2 regions.[5]

In a similar vein, we allocate French banks to their respective NUTS region with the help of their the postcode. The NUTS 2 regions in France correspond to the 26 departements, which include several postcodes. We use the information on banks' postcodes to map banks to their NUTS 2 regions. The first two digits of the French postcode identify the NUTS 2 region. Also Italian

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[4] Note there are 50 banks for which neither city nor postcode is available

[5] In order to map postcodes to *Regierungsbezirke* we relied on the so-called Regionalschlüssel which enciphers German regions via a 12 digit code. The largest territorial unit, the Federal State (Bundesland), is enciphered by the first two digits while the smallest unit, municipality (Gemeinde), is given by the 10th to 12th digit. *Regierungsbezirke* are given by the third digit. Particular care has to be taken for one case where the *Reginalschlüssel* indicates only one *Regierungsbezirk* when there are in fact two namely Brandenburg-Nordost (NUTS 2 code DE41) and Brandenburg-Südwest (NUTS code DE42).

banks are allocated to NUTS codes via their postcodes. Here, a range of postcodes corresponds to a NUTS code. The allocation of the Spanish banks was facilitated by the fact that the NUTS 2 regions coincide with the 17 Spanish autonomic regions, which are divided in 50 provinces. Given that postcodes in Spain correspond with the provinces we allocate the Spanish banks with their Nuts 2 regions. The first two letters of the postcode identify the province and consequently the NUTS region. NUTS 2 regions in Austria are conform with the Austrian *Bundesländer*. The Austrian system of postcodes is linked with the 9 *Bundesländer*. Hence, the allocation of the Austrian banks could be realized by connecting the postcodes with the NUTS 2 regions.

All banks that could not be mapped via their post code are mapped manually. In this second step we used the information on the city to allocate banks to NUTS 2 regions. This procedure reduces the number of units that have to be allocated significantly. In addition we use the postcode to double-check. [6]

Eight countries comprise only one NUTS 2 region. In these cases the allocation of banks to NUTS 2 regions is straightforward given the country location of banks. These countries are Cyprus, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Malta and Slovenia.

We aggregate point estimates of profit efficiency to serve as our proxy for the regional quality of financial intermediaries FQ. Our data from Eurostat is an unbalanced panel of the 254 different NUTS 2 regions in the EU-25.[7] We regress real gross domestic product per worker on the growth of the working population and our proxies for financial development. After the exclusion of outliers, our sample includes unconsolidated financial accounts data for 23,310 universal bank-year observations between 1996 and 2003. We depict descriptive statistics on these data in table 1.

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[6]Oversea and Offshore territories were omitted form the data set.

[7]Regions in Poland and Slovenia were dropped from the sample given implausible observations on bank data which are probably due to data errors. Hence our sample comprises 23 countries and 237 NUTS 2 regions.

Table 1: Descriptive statistics on regional and bank-specific data

	1997	1999	2001	2003	Total
Regional Data					
GDP per worker	42,665	45,619	48,425	50,434	47,146
Worker growth	3.5%	4.6%	4.4%	3.2%	4.2%
Profit Efficiency	36.8%	38.3%	33.8%	38.0%	36.3%
Loans and bonds to GDP	1.44	1.25	1.22	1.23	1.25
Regions	108	132	144	148	160
Bank data					
Personnel Expenses	1.50%	1.45%	1.43%	1.41%	1.45%
Funding cost	4.35%	3.29%	3.51%	2.60%	3.56%
Customer Loans	1,094	1,122	1,303	1,589	1,304
Other earning assets	1,157	1,048	1,081	1,331	1,181
Equity	119.1	120.7	155.1	197.9	152.6
Profits before tax	13.72	16.58	20.64	23.40	19.02
Gross total assets	2,401	2,338	2,583	3,164	2,675
No. of banks	3185	3318	3160	2802	27187

Notes: GDP per worker in Euros. All bank data except factor cost in millions of Euro.

4   Results

We depict parameters estimates for the regional growth model in equation (1) in table 2. Since especially the volume of financial funds may not be independent of economic growth, we specify both measures of financial development as endogenous variables and use lagged levels as instruments. This approach is supported by the Sargan specification tests.

Consider first the direct effect of regional bank efficiency in the first column of table 2. The effect of a one percent increase in regional bank profit efficiency spurs regional output growth by approximately 0.03%. Put differently, a higher ability of banks in the region to convert inputs profit efficiently

Table 2: Growth estimation on GDP per worker in European regions

	Quality	Quantity	Both	Interaction	All
y_{t-1}	0.955***	0.917***	0.910***	0.902***	0.931***
	[0.035]	[0.032]	[0.043]	[0.046]	[0.038]
FQ	0.026**		0.027**		0.051***
	[0.010]		[0.011]		[0.017]
FV		0.009	0.004		0.012
		[0.008]	[0.005]		[0.007]
FQ*FV				-0.010*	0.012**
				[0.005]	[0.006]
POP	-0.136***	-0.152***	-0.143***	-0.128***	-0.165***
	[0.026]	[0.038]	[0.038]	[0.043]	[0.035]
Constant	-0.003**	-0.004*	-0.002	-0.001	-0.002*
	[0.001]	[0.002]	[0.002]	[0.002]	[0.001]
No. of Obs.	954	995	945	945	945
No. of Regions	161	169	160	160	160
Sargan [chi]	45.18	53.75	53.05	46.49	55.96
Sargan [df]	33	33	39	33	45
AR1 [z-value]:	-6.34	-6.17	-5.95	-5.93	-6.17
AR2 [z-value]:	-1.97	-2.64	-2.09	-2.28	-1.97

Notes: Robust standard errors. Sargan test from two step, parameters from one-step estimation

Time dummies included but not reported. *,**,*** significant at 10%/5%/1%

into financial services and products has a positive influence on regional economic growth. Since regional mean PE is fairly low at 36%, the magnitude of the coefficient implies that already an improvement of banks operating efficiency by around one standard deviation (about 6%) would translate into 0.4 percentage points of additional economic growth. Since these economically meaningful gains could theoretically be simply accomplished by a slightly less wasteful way of banking, this result is an important indication to further foster the profit efficiency of banking in Europe.

In the second column of table 2, we next test the effect of the traditionally specified quantity variable, FV, on regional European growth. While positive, our results do not confirm a significant direct effect of larger credit volumes relative to GDP. Apparently, a mere expansion of credit volume alone does not promote growth in Europe's generally fairly mature economies. As previously, and in line with expectations, the coefficients on the lagged endogenous variable and growth of the working population are positive but smaller one and negative, respectively.

While both the quantity and the quality of the provision of financial services may have individual effects on growth, it is intuitive to also expect both effects to interact with each other. Providing more credit with low efficiency may imply a poor selection of projects. High efficiency alone, in turn, may indicate that banks scrutinize excessively their supply of loans and avoid, for example, lending to more opaque small businesses which might bear future loan write off's given a difficult and costly assessment.

Therefore, we also test if the interaction between the quality of intermediaries and the volume of intermediated funds has a significant effect on growth. The individual effect in the third column influences regional growth in Europe significantly but with a wrong sign. The negative sign, however, disappears when a parsimonious model depicted in the final column is specified. The result demonstrates that future studies on the finance-growth nexus need to account for three channels through which better banking can spur growth: a direct quality and quantity effect, respectively, as well as the beneficial interaction of more regional credit in conjunction with efficient regional banks.

Regarding the magnitude of these coefficients, we find that it is in particular more efficient banking that offers most scope to foster regional economic growth. A one percent increase in the profit efficiency of banks has approximately three times the effect on growth compared to either the same relative increase in lending volume or the interaction between both channels. We con-

clude that the quality of financial institutions in a region has a positive impact on growth independent of the quantity channel. Also after including the volume and the interaction effect, respectively, we still find a positive coefficient of bank efficiency.

The specifications in table 2 are further confirmed by the coefficient of our control variable for the growth of the working population POP. In line with theory, the coefficient is negative and significant across all specifications implying that an increase in the working population leads to a lower per capita income (Solow, 1956) .

5   Robustness

To check the robustness of our results we run additional estimations focusing on a subset of the regions in our data set. To begin with we use the regions in the EU 12, 15 and 19. The sample of regions in the EU 12 and 15 represent the financially more developed regions in the EU while the EU 19 also includes regions from the new accession countries. Columns 2 to 4 in Table 3 contain the results.

The results largely underpin the previously shown result, namely, financial development and particularly the quality of financial intermediation matters for economic growth. The results in column (1) further highlight that in more mature economies financial development predominantly works via the interplay of quality and quantity. We also exclude a number of regions which present financial centers and may thus bias our results.[8] However, as column (5) shows the exclusion of financial centers only marginally affects our results. Our measure for the quality of financial development and the interaction term retain their positive and significant coefficient while the quantity measure turns in-

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[8]These regions are Amsterdam, Frankfurt, London, Luxembourg, Madrid, Milan and Paris.

significant. Finally, we include a concentration ratio measured by the market share of the five largest banks within a region to check our results for a possible misspecification due to omitted variables. The result in column (6) shows that a higher concentration is positively and significantly related to growth and confirms the arguments in the literature (Cetorelli, 2001) . However, the inclusion only marginally affects our previously identified channels through which financial development affects economic growth.

Table 3: Robustness: Growth estimation in European regions

	EU 12	EU 15	EU 19	excl. Fin. Centers	incl. CR5 ratio
y_{t-1}	0.845***	0.847***	0.811***	0.940***	0.922***
	[0.078]	[0.078]	[0.075]	[0.036]	[0.038]
FQ	0.019*	0.021*	0.038***	0.046**	0.056***
	[0.011]	[0.012]	[0.013]	[0.018]	[0.018]
FV	0.01	0.012*	0.009	0.01	0.015**
	[0.008]	[0.006]	[0.006]	[0.008]	[0.008]
FQ*FV	0.010*	0.011**	0.009*	0.010*	0.014**
	[0.006]	[0.004]	[0.005]	[0.006]	[0.006]
POP	-0.263***	-0.150***	-0.137***	-0.163***	-0.166***
	[0.027]	[0.032]	[0.033]	[0.035]	[0.034]
CR5					0.050**
					[0.020]
No. of Obs.	844	890	917	904	945
No. of Regions	134	148	155	153	160
Sargan [chi]	75.24	64.63	67.56	58.67	56.97
Sargan [df]	45	45	45	45	45
AR1 [z-value]:	-5.46	-5.22	-5	-6.12	-6.24
AR2 [z-value]:	-1.32	-1.63	-1.87	-1.66	-1.86

Notes: Robust standard errors. Sargan test from two step, parameters from one-step

estimation. Constant and time dummies included but not reported. *,**,*** significant at 10%/5%/1%

6 Conclusion

We suggest a measure to assess the impact of the quality of financial interme-
diaries on economic growth rather than the traditionally employed quantity
proxies of financial fund volumes. To this end we measure European bank's
profit efficiency and allocate both financial quality and quantity indicators to
the NUTS 2 region of the bank. Our results show that economic growth in the
regions of the EU benefits significantly from higher regional profit efficiency.

Our results after including also the quantity channel of financial develop-
ment and the interaction between both better and more banking corroborate
the presence of an independent effect of profit efficiency on European economic
growth. In fact, the findings highlight the importance to specify all three pos-
sible channels through which banks may foster output growth. According to
our estimates improvements in efficiency have approximately three times the
effect compared to both the quantity and interaction channel. Thus, we con-
clude that it is especially the quality of financial services provision in the vein
of Schumpeter that spurs economic prosperity in Europe's relative mature eco-
nomic regions.

References

Altunbas, Y., L. Evans, and P. Molyneux (2001). Bank Ownership and Efficiency. *Journal of Money, Credit, and Banking 33*(4), 926–954.

Arellano, M. and S. Bond (1991). Some Tests for Specification of Panel Data: Monte Carlo Evidence with an Application for Employment Equations. *Review of Economic Studies 58*, 277–299.

Beck, T., R. Levine, and N. Loayza (2000). Finance and the Sources of Growth. *Journal of Financial Economics 58*, 261–300.

Bos, J. W. B. and C. J. M. Kool (2006). Bank Efficiency: The Role of Bank Strategy and Local Market Conditions. *Journal of Banking & Finance 30*, 1953–1974.

Cetorelli, N. (2001). Competition among banks: good or bad? *Economic Perspectives*, 38–48.

Clarke, M. Z. (2004). Geographic deregulation of banking and economic growth. *Journal of Money, Credit, and Banking 36*, 929–942.

Greene, W. (2005). Reconsidering Heterogeneity in Panel Data Estimators of the Stochastic Frontier Model. *Journal of Econometrics 126*, 269–303.

Greenwood, J. and B. Smith (1996). Financial Markets in Development, and the Development of Financial Markets. *Journal of Economic Dynamics and Control 21*, 145–181.

Guiso, L., P. Sapienza, and L. Zingales (2004). Does Local Financial Development Matter? *Quarterly Journal of Economics 119*.

Humphrey, D. B. and B. Pulley, Lawrence (1997). Bank's Response to Deregulation: Profits, Technology and Efficiency. *Journal of Money, Credit, and Banking 29*(1), 73–93.

King, R. and R. Levine (1993). Finance and Growth: Schumpeter Might Be Right. *Quarterly Journal of Economics 108*, 717–737.

Kumbhakar, S. C. and C. A. K. Lovell (2000). *Stochastic Frontier Analysis*. Cambridge: Cambridge University Press.

Levine, R. (2004). Finance and Growth: Theory and Evidence. *NBER Working Paper Series* (10766), 1–116.

Levine, R., N. Loayza, and T. Beck (2000). Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics 46*, 31–77.

Lucchetti, R., L. Papi, and A. Zazzaro (2001). Bank's Inefficiency and Economic Growth: A Micro-Macro Approach. *Scottish Journal of Political Economy 48*(4), 400–424.

Mora, T., E. Vayá, and J. Suriñach (2005). Specialisation and growth: the detection of European regional convergence clubs. *Economic Letters 86*, 181–185.

Mountain, D. C. and H. Thomas (1999). Factor Price Misspecification in Bank Cost Function Estimation. *Journal of International Financial Markets, Institutions and Money 9*(2), 163–182.

Pagano, M. (1993). Financial markets and growth: An overview. *European Economic Review 37*, 613–622.

Solow, R. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics 70*, 65–94.

Valverde, S. C., D. B. Humphrey, and F. Fernandez (2003). Deregulation, Bank Competition and Regional Growth. *Regional Studies 37*(3), 227–237.

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