

DEREGULATION AND CONVERGENCE OF BANKING: THE EU EXPERIENCE*

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In the last two decades, the European Union has undergone a major reduction in banking regulation. This paper investigates whether this deregulatory process was associated with increasing similarity, or convergence, of banking industries across the European Union. It reports that the deregulation at the national level and the opening of banking markets to international competition led to convergence, or greater similarity, of the banking industries' main indicators of bank profitability or earning patterns, but not necessarily their asset-liability management practices. Overall, the deregulatory process appears to explain most of the changes that occurred in the dispersion of banking structure across the European Union. (JEL: G21, G28, E44)

1. Introduction

In the last two decades, the globalization of both markets and finance has led European

policymakers to implement important changes in national financial markets, most of which have removed barriers to entry to international markets. The banking sector has been especially affected by the elimination of regulatory barriers to trade in banking services; c.f. Beckhart (1954) and Wilson (1986). As a result, their banking sectors have gone from heavily regu-

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lated, oligopolistic systems to ones in which banks can compete in terms of prices, products, quality of service and territory with few regulatory restrictions.¹ Although typically rationalized on the grounds that the resulting increased competition would enhance the performance of the financial system and the macroeconomic stability of the economy,² in practice European policymakers have deregulated to keep their banking industries viable competitively, given the liberalization taking place elsewhere (Bergner and Humphrey, 1997). Deregulation has not been entirely pleasant, however, as European banks have lost many of their monopoly rents and the frequency of bank failures has increased. For this reason, banking deregulation was revisited, leading to greater emphasis on prudential regulation.³

An important goal of the EU in its regulatory actions has been the creation of a single integrated European banking market. In its view, greater integration leads to a more homogeneous banking sector, and greater integration can be effected by eliminating regulatory barriers. The main objective of this paper is then to examine to what extent European regulatory actions have promoted cross-country banking homogeneity. Because national policymakers often adopted very different deregulatory schemes, it is natural to ask whether deregulation has in fact contributed to a more homogeneous banking sector across Europe. In particular, we investigate whether deregulation has led to a reduction in the cross-country dispersion of bank performance; e.g. asset-liability management practices, cost effectiveness, and profitability. The similarity or discrepancy in banking performance is measured by calculating the cross-country dispersion of bank performance. Well-established in the convergence literature (Barro and Sala-I-Martin, 1992), the cross-country dispersion of a variable to be analyzed is used as

¹ *The banking industry continues to have market power.* See Vives (1998), Neven and Roller (1999) and Kumbhakar and Lozano-Vivas (2004, 2005).

² *The impetus to deregulation in the European Union came from several different European Directives, which provided the foundation for the Single Market Program in financial and banking services (sectors).*

³ See Dewatripont and Tirole (1994) and Bhattacharya, Boot and Thakor (1998).

an indicator of convergence, or similarity, across sample countries. Sheldon (2001) used the efficiency dispersion across banks countries to analyze the integration of the European banking industry. Weill (2008, 2007a, 2007b) analyzed some measures of relative performance of banks both in Western Europe and Central and Eastern European nations, reporting an overall convergence in cost efficiency. This author also reported that the gap between the western and transitional European banking industries narrowed in the post 1996 era and the gap is more due to environmental factors rather than risk preferences or differences. The focus of our empirical attempt is slightly different and more comprehensive, focusing on changes in post-deregulatory practice and banking cost, profitability and asset-liability management. To the best of our knowledge, ours is the first attempt to analyze such multi-country, multi-deregulatory measures in different time periods using a single empirical approach.

Our evidence shows that the national and EU deregulation initiatives that sought to open markets to international competition were associated with reduced cross-country dispersion of banks' earning patterns, but not necessarily as much in their asset-liability practices. These findings are robust and consistent in additional analyses that we undertake in order to accommodate different types of banking systems, industry size, ownership structure and population served in respective sample countries and also when we employ an alternative method in our estimation.

The rest of the paper is organized as follows. Section 2 briefly describes the regulatory changes in EU Banking and introduces the hypotheses to be tested. The method, data and variables employed in the analysis are described in section 3, and empirical results are presented in section 4. The final section contains a summary of our findings and conclusions.

2. European Regulatory Changes

With the aim of globalizing banking and financial services, European regulatory authorities have implemented many changes since the

Table 1. Classification of Regulatory Changes.

Class	Examples
Conduct Deregulation At the National Level	<ol style="list-style-type: none"> 1. Elimination of Controls on Interest Rates, Fees and Commissions 2. Elimination of Credit Controls 3. Relaxation of Limitations on Domestic Branching 4. Reduction in Reserve and Investment Requirements
Deregulation to Strengthen Foreign Competition	<ol style="list-style-type: none"> 5. Elimination of Restrictions on Entry 6. Elimination of Capital Controls 7. First Banking Directive 8. Second Banking Directive
Prudential Regulation	<ol style="list-style-type: none"> 9. Explicit Deposit Insurance 10. Minimum Capital Requirements

1980s, the most important being deregulation at the national level, the abolition of the capital controls, deregulation and harmonization at the Community level, and the strengthening of prudential regulation. Overall, the primary goal of the liberalization program has been to assure competitive viability, and to achieve efficiency gains from less restricted competition. Because the banking industries in Europe initially ranged from heavily regulated, closed and noncompetitive to lightly regulated, open and highly competitive, the liberalization program sought regulatory changes that would make the European banking industries more homogeneous. In this sense, it was necessary to implement deregulatory measures that would change the conduct and structure of the banking industries throughout the region. In this regard, the regulatory changes can be classified into three groups. First, some changes gave banks a variety of competitive tools in order to assure their competitive viability. Second, other changes opened markets to domestic and foreign competition. Third, other changes strengthened prudential regulation. Table 1 classifies the different kinds of regulation faced by banks and used in this project.

2.1 Regulatory Changes at the National Level

The first regulatory changes undertaken in Europe abandoned various types of conduct regulations; for example, the elimination of controls on interest rates and commissions, the elimination of credit ceilings, loosening limits on branching and reducing reserve and investment

requirements. The conduct regulations prevented banks from competing freely in many domestic markets. Deregulation provided banks with competitive tools that enabled them to remain viable. The deregulation of interest rates, fees and credit ceilings directly affects market outcomes (prices and quantities). For instance, the increased competition created through the deregulation of interest rates, and the abolition of credit ceilings should have intensified price competition, thus squeezing banks' interest margins and eliminating pre-deregulation monopoly rents. Liberalization of bank branching should also have intensified competition in service quality and convenience, thereby increasing the banks' volume of business (Gual and Neven, 1992). Finally, reducing reserve requirements is essentially a reduction in a tax on intermediation. As a result, deregulation should have increased bank intermediation and reduced interest margins.

2.2 Regulatory Changes to Strengthen Foreign Competition

Eliminating domestic restrictions on entry into banking, removing capital controls and adopting the First and Second Directives of the European Union have boosted the competition of foreign banks and the development of cross-border banking activities. Even before the Second Banking Directive was implemented, domestic European policymakers had begun to allow foreign financial institutions to enter. These changes started the process of abolishing

the discriminatory power of the home country authorities over branch expansion and the composition of assets and liabilities of the foreign banks. This process deepened when the European Union promulgated important directives that increased the freedom of banks to expand abroad. The First Banking Directive and especially the Second Banking Directive, with its establishment of the “single passport” system, permitted banks to operate freely across borders within the Union. This single passport system, coupled with the removal of capital controls, accelerated the pace at which European banks internationalized.⁴

The goal of these regulatory changes has been to enable banks to exploit their cost advantages, extend the scope of their business activities and become more competitive across borders. For instance, the removal of capital controls permitted banks to lend and borrow between nations.

2.3 Prudential Regulatory Changes

The elimination of monopoly rents reduced banks’ incentives to act prudently.⁵ In addition, the enhanced powers that deregulation had conferred enabled banks to take on additional risk. Responding to this problem, and to the wave of bank failures that followed deregulation in the United States and elsewhere, European regulatory authorities sought to counter these incentives with strengthened prudential regulation. Capital requirements were the primary tool used to control this risk. The Basle Committee harmonized capital requirements and several directives of the European Union adopted them. Banking regulations and the establishment of such safety nets as deposit insurance have been justified on the basis of market failure. However, deposit insurance can lead to moral hazard and excessive risk-taking. For this reason, de-

regulators have focused on reforming deposit insurance, moving towards risk-based systems and limiting coverage.⁶ Moreover, in order to maintain the solvency of the banking sector, while preventing moral hazard, regulators have resorted to increased capital requirements. Nevertheless, as Berger et al. (1995) pointed out, binding capital requirements also diminish intermediation.

2.4 Summary and Hypotheses

As discussed earlier, the European countries initiated strong deregulatory processes in order to achieve a more competitive banking industry that has more effective asset-liability management practices affecting cost as well as profit, without sacrificing the safety and soundness of the bank. The established deregulatory measures are expected to squeeze banks’ interest margins, increase the bank’s volume of business, make banks more cost efficient, extend the scope of their business activities and increase the safety of the banking industry. It is apparent that the final goal of this deregulatory process has been to provide a similar playing field for banking industries, and consequently, to make the banking sector across Europe more homogeneous. Therefore, if the deregulatory process is to have a chance to attain its goal across the banking industries, the expected effect of such a process would have to create more similarity between banking industries in terms of cost effectiveness and profitability, as well as asset-liability practices. With this idea in mind, we attempt to test the following hypotheses and sub-hypotheses:

- Did regulatory changes in recent decades cause EU banks to adopt increasingly similar asset-liability practices (demand conditions); to converge in terms of profitability (degrees of market power); to adopt increasingly similar technologies; and to perform more efficiently (e.g. to be more similar in terms of cost effectiveness) as the deregulatory process unfolded across countries of the Union?
- Or conversely, did the opposite occur?

⁴ See Gual (1999) and Honohan (1999).

⁵ Keely (1990, p. 1198) provides evidence that anticompetitive restrictions which endow banks with market power (and hence monopoly rents) induce them to act prudently. Specifically, he finds that banks with more market power, as reflected in larger market-to-book asset ratios, hold more capital relative to assets and have a lower default risk, as reflected in the risk premiums on large uninsured CDs.

⁶ See Vives (1998) and Dermine (1999).

3. Methodology, Data and Variables

The present paper mainly focuses on the effect of deregulation on the convergence of performance of the European banking sector. The homogeneity of the banking sector of the EU has been widely studied, given that European financial integration has been at the forefront of economic research in recent years. This has been especially true because of the drive to create a Single Market for Financial Services and because of the advent of the Economic and Monetary Union. In investigating such goals, no single agreed measure of banking integration has been employed and many different approaches have been taken in the empirical literature (see e.g. Galati and Tsatsamoris (2001), Fratzscher (2001), Kleimeier and Sander (2002), Cabral et al. (2002), Hartmann et al. (2003), Baele et al. (2004) and Kok and Puigvert (2006)).

In this paper, our first goal is to investigate whether the deregulatory process across the European Union was associated with the convergence of the banking industries of the EU countries in terms of the cross-country variances of cost and profitability as well as asset-liability practices. We shall say that banking converged on account of deregulation if the industry did indeed become more similar, once the deregulatory process has been taken into account. If instead the opposite took place, we shall say that banking diverged.

As discussed in the previous section, we quantify the structure of the banking industry of each country using different indicators of bank performance such as asset-liability, management practices, cost effectiveness and profitability, all to be defined shortly. We assume that the more similar the banking industries across the European Union, the smaller the cross-sectional variances of the variables considered.

Ideally, the cross-country variance of variable i during year t would be calculated using the formula:

$$(1) \quad V_{it}^* = \frac{1}{J} \sum_{j=1}^J (x_{ijt} - \bar{x}_{it})^2$$

with

$$(2) \quad \bar{x}_{it} = \frac{1}{J} \sum_{j=1}^J x_{ijt},$$

where x_{ijt} is the value of variable i in country j during year t and J is the number of countries.

We apply our empirical exercise to a sample composed of $J = 14$ European countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom) over the period 1979–1997. One limitation is worth noting here, however. The data on x_{ijt} are not available for every country in every year over the sample period 1979–1997. Specifically, the number of countries for which data are available increased over the sample period, typically reaching 14 only near the end of the sample period. Of necessity, then, we must use a proxy for V_{it}^* . We obtain this proxy, which we denote V_{it} , using the method described below.

First, for each item i , we used ordinary least squares to fit the statistical model

$$(3) \quad x_{ijt} = \lambda_{ij} + \mu_{it} + u_{ijt}, \quad j = 1, 2, \dots, 14, \\ t = 1979, 1980, \dots, 1997,$$

where the parameters $\{\lambda_{ij}\}$ and $\{\mu_{it}\}$ are country- and time-specific fixed effects, and u_{ijt} is assumed to be a stationary error term with an unconditional mean of zero. Doing so then yields a residual for each item i , country j and year t for which x_{ijt} is available. Let N_{it} be the set of countries for which the data on item i are available in year t and let n_{it} be the number of countries contained in N_{it} . We then proxy V_{it}^* with

$$(4) \quad V_{it} = \frac{1}{n_{it}} \sum_{j \in N_{it}} \hat{u}_{ijt}^2.$$

This proxy is theoretically appropriate if the error term u_{ijt} is identically distributed across the countries with a zero mean.⁷ It may also be a

⁷ Our method of estimating $\{\lambda_{ij}\}$, $\{\mu_{it}\}$ and $\{u_{ijt}\}$ is least-squares dummy variables. This method is well-known to be consistent even with missing values. Admittedly, our samples are small, suggesting that the finite-sample properties of our estimates of $\{u_{ijt}\}$ may not be wonderful. Consider the probability limit of V_{it}^* :

$$\text{p lim}_{J \rightarrow \infty} V_{it}^* = \text{p lim}_{J \rightarrow \infty} \frac{1}{J} \sum_{j=1}^J \lambda_{ij}^2 + \text{p lim}_{J \rightarrow \infty} \frac{1}{J} \sum_{j=1}^J u_{ijt}^2.$$

reasonable approximation in many other circumstances. It is worthwhile noting, however, that our assumption of the data-generating process (3) rules out country-specific time trends and many other features that might be in the data.

Once we have obtained the cross-country dispersion measure, we investigate whether the deregulatory process that took place in the banking industry of the European Union during the 1980s and 1990s was associated with convergence. We posit that the logarithm of each of the cross-country variances under consideration is linearly related to one lag of itself and four measures of how the deregulatory process unfolded:

$$(5) \quad \ln V_{it} = \beta_{0i} + \beta_{1i} \ln V_{i,t-1} + \beta_{2i} ANATL_t + \beta_{3i} AOPEN_t + \beta_{4i} ADEPINS_t + \beta_{5i} R_t + v_{it},$$

where the β s are parameters and v_{it} is assumed to be an independently and identically distributed error term. The variables $ANATL_t$, $AOPEN_t$, $ADEPINS_t$, and R_t measure how much national deregulation had taken place by year t in our sample, how internationally open the banking markets of those countries had become by year t , how prevalent explicit deposit insurance had become by year t , and the extent to which minimal capital requirements had increased by year t , respectively.

The left-hand column of Table 1 lists ten important examples of changes in regulation that have occurred in our 14 country sample over the sample period 1979–1997. To control for deregulation processes, for each country, we defined nine control variables to be zero in each year before the regulatory change took place,

In this equation, we have normalized the λ s for each variable i to have a zero cross-country mean; we can do so without loss of generality because the mean can be absorbed into the μ s. Furthermore, even in finite samples, subtracting a cross-sectional mean from any x sweeps out the μ s. Now, note that because the first term in the left-hand member of the above equation does not vary over time, all variability in the probability limit of V_{it}^ stems from the second term. Furthermore, because our estimates of the μ s are consistent, V_{it}^* consistently estimates this second term and therefore varies approximately one-for-one with V_{it}^* .*

and one in each subsequent year. For cases in which the change spanned more than one year, we spread the transition from zero to one proportionally over the years spanned. Consistent with the classification of deregulatory variables in Table 1, we define three mean indicators of deregulation by country and year: (i) National conduct deregulation, $NATL_{jt}$. To obtain this indicator we averaged the year- t values of the four control variables for elimination of controls on interest rates, fees and commissions, elimination of credit controls, the relaxation of limitations on domestic branching, the reduction in reserve requirements and the reduction in investment requirements. (ii) Deregulatory changes strengthening of foreign competition, $OPEN_{jt}$, is the average of the year- t values of the four control variables for elimination of restrictions on entry, elimination of capital controls and implementation of the First and Second Banking Directives. And finally, (iii) prudential regulation is represented by two different indicators taking into account the two measures shown in Table 1: $DEPINS_{jt}$ is simply the control variable for whether country j had explicit deposit insurance in year t , and R_{jt} is the ratio of capital to total assets in country j in year t . We then averaged these variables across the fourteen countries in our sample to obtain the four independent variables used in our empirical analysis, denoted $ANATL_t$, $AOPEN_t$, $ADEPINS_t$ and R_t . These variables can be interpreted as the extent of national conduct deregulation, foreign competition, explicit deposit insurance, and capital requirements across in our sample countries in year t .

Table 2 lists the time periods over which the main regulatory changes occurred and shows that there are appreciable differences across the countries.

These variables are plotted in Figures 1 and 2. It is evident that between 1979 and 1997, EU governments substantially deregulated national banking markets, opened them to international competition and made deposit insurance increasingly explicit. National deregulation preceded the opening to international competition, but the latter has closed the gap since 1990. Finally, prudential regulation has been strengthened as evidenced by the increase of nearly

Table 2. Timing of Regulatory Changes.

Country	Dummy Variables		
	Conduct Deregulation at the National Level	Deregulation to Strengthen Foreign Competition	Prudential Regulation
Austria	1979-1990	1986-1993	1979/1995
Belgium	1979-1990	1980-1994	1974/1995
Denmark	1980-1988	1980-1993	1987/1995
Finland	1987-1993	1991-1993	1966/1995
France	1967-1987	1980-1992	1980/1994-1995
Germany	1979-1985	1967-1992	1966/1976
Greece	1987-1997	1981-1994	1995/1995
Italy	1983-1992	1985-1993	1987/1987
Luxembourg	1979-1990	1981-1993	1989/1995
Netherlands	1980-1986	1980-1992	1979/1995
Portugal	1984-1994	1983-1992	1992/1994
Spain	1979-1992	1986-1994	1977/1995-1996
Sweden	1978-1985	1990-1993	1974/1996
United Kingdom	1979-1990	1973-1993	1983/1995

Notes: Dates for conduct deregulation at the national level (deregulation of interest rates, fees and commissions, credit controls, domestic branching limitations and reserve and investment requirements) and entry of foreign banks are taken from banking studies related to each of the European countries (Dermine, 1990; Vesala, 1993; Honohan, 1999) and from the European Commission. Data for Austria, Belgium, Denmark, Luxembourg and Netherlands were collected specifically for this project from central bank reports for each country. The dates for the deregulation of capital controls, the First Banking directive and the Second Banking Directive are taken from Gual (1999). Dates for deposit insurance are taken from Barth *et al.* (1997).

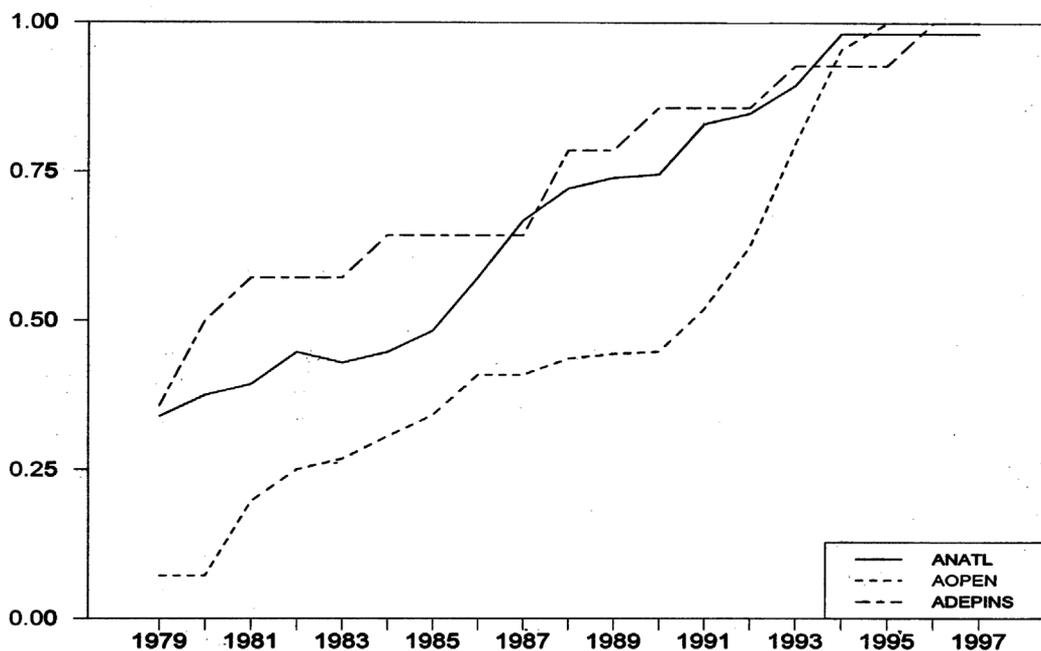


Figure 1. Three Deregulation Variables.

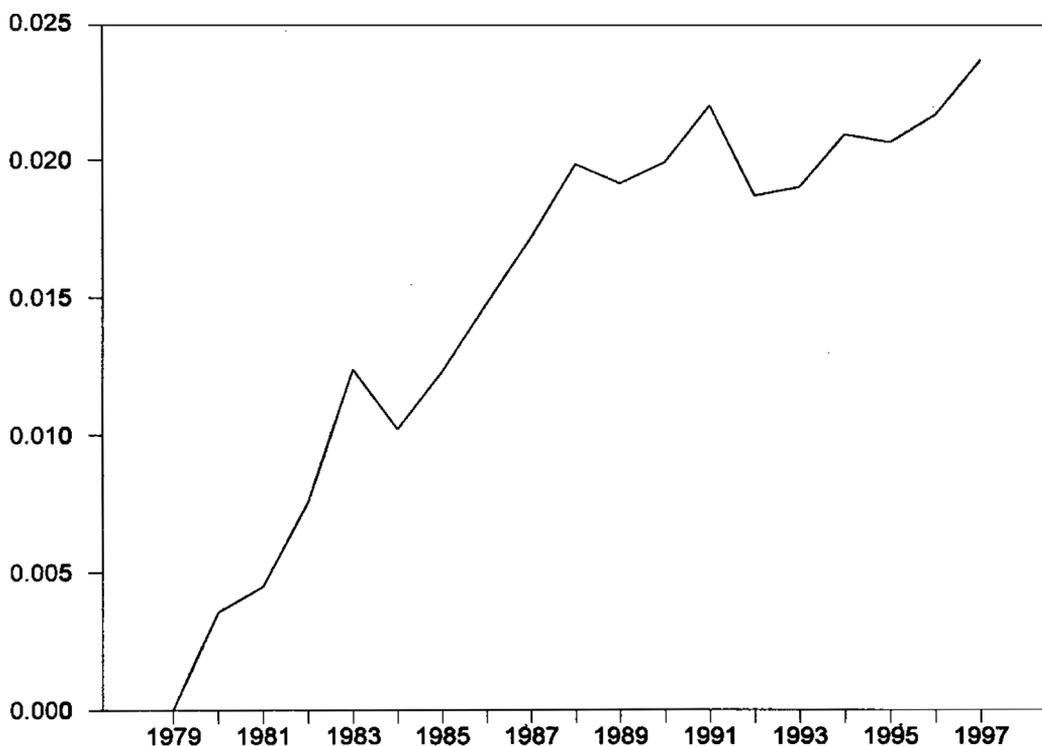


Figure 2. The Average Increase in Capital Requirements.

0.025 in the average ratio of capital to total assets.

We characterize banking industries in terms of their main indicators of their key asset-liability management strategies (e.g. loans to assets, non-bank deposits to assets, non-interest earning assets to asset ratio and net provisions to assets ratios), cost effectiveness (e.g. interest and operating expense to assets) and profitability (e.g. net interest margin, net non-interest income to assets, net income to assets and before tax profits to assets). We obtained these data from the 1999 issue of the OECD Bank Profitability Statistics.⁸

Loan to assets, non-bank deposits to assets ratios and non-interest earning assets to asset ratio – representing asset-liability practices – are calculated by taking total loan, total non-

bank deposits and total securities divided by total assets.⁹ Net provision consists of losses on loans, securities and other assets plus net additions to reserves for possible future losses. Interest expenses include the interest paid by all types of deposits. Operating expenses consist of all expenses relating to the ordinary and regular banking business, other than interest expenses. In particular, it includes employee compensation, transfers to pension reserves and expenses for property and equipment (and its related depreciation expenses). Net interest margin is the difference between interest income and interest expense as a ratio to total assets. Net non-interest income consists of commissions received less those paid in connection with payments services, securities transactions and related services and foreign exchange transactions. Net

⁸ The OECD Bank Profitability Statistics provides information of national banking data grouped and re-classified in a common income and expenditure accounts of banks to fit, as far as possible, into a common framework that is comparable across countries.

⁹ For further details on the role of deposit in banking literature, especially with regard to the measurement of efficiency, see Berger and Mester (1997), DeYoung (1997), Dietsch and Lozano-Vivas (2000), and Hasan and Marton (2003), Kumbhakar et al (2001).

income to total assets includes net interest margin plus net non-interest income minus operating expenses as ratio of total assets. Before tax profits to assets consists of net income minus net provisions divided by total assets. While these variables explicitly portray the bank conditions and stability of respective countries, they also implicitly indicate the competitive structure and the degree of rivalry among banks in a given country.

4. Empirical Results

4.1 Banking Deregulation and Convergence of Banking

We assume that our measures of regulatory structure are exogenous to our cross-sectional measures of dispersion, making ordinary least squares the appropriate method for estimating equation (5). Table 3 reports the results from doing so. According to the table, national conduct deregulation was associated with convergence of three of the four items of asset-liability management indicators, the two indicators of cost effectiveness and four indicators of profitability. The convergence was statistically significant in six cases. The opening of banking markets to international competition was associated with convergence of two of the four items of profitability, one of which was statistically significant. It was associated with convergence for one indicator of asset-liability management, as well as with one indicator of cost effectiveness and they were also statistically significant. The introduction of explicit deposit insurance was associated with divergence for half of the items but such divergence was statistically significant in only one case. Finally, the increase in capital requirements was associated with convergence for five items and divergence for five items. Four cases of convergence were statistically significant.

Overall, we found that indicators from cost effectiveness and profitability tests showed a somewhat more pronounced tendency to converge than did indicators of asset-liability management. Those results suggest that the deregulatory process may somewhat increase the dis-

person in how banks intermediate, while reducing the dispersion in their performance.

The findings in Table 3 display some evidence of the individual influence of each deregulatory process over the convergence or divergence of the EU's banking industries. In order to better understand the global effect of deregulation over the banking sectors across Europe, we also estimate the net effect associated with the national conduct deregulation, the opening of banking markets to international competition, the making of deposit insurance more explicit and the increasing of capital requirements between 1979 and 1997. In calculating the estimated net effect on $\ln V_{it}$, we used the equation

$$(7) \quad Z_{it} = \hat{\beta}_{0i} + \hat{\beta}_{1i}Z_{i,t-1} + \hat{\beta}_{2i}(ANATL_t - ANATL_{1979}) + \hat{\beta}_{3i}(AOPEN_t - AOPEN_{1979}) + \hat{\beta}_{4i}(ADEPINS_t - ADEPINS_{1979}) + \hat{\beta}_{5i}(R_t - R_{1979}), \\ t = 1980, 1981, \dots, 1997,$$

with

$$(8) \quad Z_{i,1979} = 0,$$

where Z_{it} is the size of the net effect and the β s are the estimated values of the parameters β s in Table 3.

Table 4 reports the actual changes in $\ln V_{it}$ between 1979 and 1997 as well as the net effects Z_{it} associated with the EU's deregulatory process over that period. Three conclusions can be drawn from the table. First, in every case, in which a substantial change in the cross-country variance of a variable occurred, nearly all changes were associated with the deregulatory process. This finding is consistent with the conjecture of Beckhart (1954) and Wilson (1986) that most of the changes that have occurred in banking have resulted from shifts in regulatory policy.

Second, the deregulatory process was associated with substantial convergence of most of the variables. For example, three of the asset-liability management variables (the ratio of loans to total assets; non-bank deposits to total assets

Table 3. Regression Results from Estimating.

$$\ln V_{it} = \beta_{0i} + \beta_1 \ln V_{i,t-1} + \beta_{2i} ANATL_t + \beta_{3i} AOPEN_t + \beta_{4i} ADEPINS_t + \beta_{5i} R_t + v_{it}$$

Variable	β_{2i}	β_{3i}	β_{4i}	β_{5i}
Asset-Liability Management				
Loans / Total Assets $\bar{R}^2 = 0.6106$	-0.25 (1.25)	0.16 (0.53)	0.53 (2.65)	-28.16 ^a (9.39)
Securities / Total Assets $\bar{R}^2 = 0.2483$	-1.66 ^b (0.86)	1.18 (2.36)	0.25 (0.62)	19.99 ^a (3.99)
Nonbank Deposits / Total Assets $\bar{R}^2 = 0.5531$	-1.04 (2.08)	1.69 ^a (0.67)	-0.65 (1.30)	-10.37 (20.74)
Net Provisions / Total Assets $\bar{R}^2 = 0.1226$	2.98 (7.45)	-0.83 (8.30)	0.45 (1.12)	-84.54 ^a (28.18)
Cost Effectiveness				
Interest Expense / Total Assets $\bar{R}^2 = 0.5500$	-3.87 ^a (1.53)	2.43 (2.70)	0.46 (2.30)	-22.96 ^a (2.87)
Operating Expense / Total Assets $\bar{R}^2 = 0.5294$	-5.14 ^a (1.77)	-3.88 ^a (1.11)	1.39 ^a (0.48)	-71.80 ^a (14.36)
Profitability				
Net Interest Margin / Total Assets $\bar{R}^2 = 0.3935$	-1.72 ^a (0.57)	-1.25 ^a (0.31)	0.61 (2.03)	-43.63 (48.48)
Net Noninterest Income / Total Assets $\bar{R}^2 = 0.1944$	-6.46 ^a (2.11)	5.56 ^a (1.11)	-1.28 (2.56)	91.62 ^a (18.32)
Net Income / Total Assets $\bar{R}^2 = 0.2197$	-0.65 (0.72)	0.48 (0.96)	-0.48 (0.53)	71.54 ^b (37.65)
Before-Tax Profit / Total Assets $\bar{R}^2 = 0.1608$	-0.43 ^a (0.11)	-1.40 (6.30)	-1.28 (2.13)	117.68 (98.07)

Notes: Estimation was by ordinary least squares over the sample period 1980–1997. The numbers in parentheses are standard errors. The superscripts *a* and *b* indicate statistical significance at the .05 and .10 levels, respectively.

and the net provisions to total assets) were induced to converge while only the ratio of securities to total assets was induced to diverge. It is worth noting, however, that the most important indicators of profitability (the ratios of before-tax profit and net interest to total assets) as well

as the ratio of operating expenses to total assets did tend to converge.

Third, a variable can be induced to converge (diverge) even when its components are induced to diverge (converge). For example, the deregulatory process was associated with the conver-

Table 4. Decomposition of the Change in the Logarithm of the Cross-Country Variance of Various Banking Variables, 1979–1997.

Variables	Actual Change	Change due to Regulatory
Asset-Liability Management		
Loans / Total Assets	-0.84	-0.86
Securities / Total Assets	1.11	0.97
Non-Bank Deposits / Total Assets	-0.03	-0.16
Net Provisions / Total Assets	-0.79	-0.75
Cost Effectiveness		
Interest Expense / Total Assets	1.45	1.32
Operating Expense / Total Assets	-1.02	-1.41
Profitability		
Net Interest Margin / Total Assets	-1.01	-0.98
Net Non-Interest Income / Total Assets	-0.12	-0.13
Net Income / Total Assets	1.49	1.47
Before-Tax Profit / Total Assets	-0.12	-0.08

gence of the ratio of net interest to total assets even though it was also associated with divergence of the ratios of interest income and interest expense to total assets. The deregulatory process may have led the EU’s banking industries to pursue competitive strategies that led to divergence in how they priced loans and deposits, but that nonetheless yielded convergence of net interest and before-tax profit per unit of asset, our two key measures of performance.

Overall, taking into account the partial and net effect of deregulatory process over the convergence or divergence of the main indicators of bank profitability or earning patterns, asset-liability management practices and performance of the EU banking industry the results suggest that most of the changes that have occurred in banking in Europe have resulted from shifts in regulatory policy. Particularly, it seems that national deregulation and the opening of markets to international competition has contributed positively to the convergence of banks’ earning patterns, on the other hand it seems that those deregulatory actions even have increased the bank’s volume of business but the European banking industries have converged in operating expenses over total assets, an important indicator of cost efficiency.

4.2 Robustness tests

We have estimated additional regressions as robustness checks. We created two groups of banking industries: one above the median value of the sample for a given variable and the other below the median. We then considered several variables such as industry size (the number of banks above the sample median dummy relative to below the median), population served (the number of banks to population above the sample median dummy relative to below the median dummy) and the relative importance of small banks in the economy (the proportion of small to total banks above the sample median dummy relative below the median in the country). Barth et al. (2004), Berger et al. (2004) and Claessens et al. (2001) have raised such issues in explaining economic growth in multi-country analyses. Additionally, we have classified the country sample into two clusters according to the financial structure of each country (e.g. banking oriented and market oriented countries). Roughly speaking, banking-oriented countries are those countries where the bulk of financial activity is carried out by banks, whereas market-oriented countries are just non-banking-oriented countries. We also classified the countries in banking and market-based countries according to the indexes of the organization of financial systems

proposed by Demirgüç-Kunt and Levine (1999).¹⁰ By estimating the additional regressions, we found these estimates to be strikingly similar to the results reported above. With respect to the relative importance of the smaller banks in the banking system, we find countries with higher proportions of smaller banks had weaker convergence (but not divergence). With respect to the group based on the primary financing source of respective markets, we have noticed a stronger evidence of convergence (and weaker divergence) in the relatively banking based sub-sample relative to the group market based countries.

Finally, we have re-estimated equation (5) for all the dependent variables defined in Table 3 by using an alternative methodology. We have used a panel data instead of using cross-country variance of banking variables and growth rates. We have defined as dependent variable the distance of each selected variable on the whole sample from the average value of the variable on the whole sample. In those regressions we add to equation (5) control variables in order to account for the dimension of banks and financial systems. The control variables used are industry size, population served, relative importance of small banks in the economy and a dummy variable controlling for the financial structure of the country (banking- versus market-oriented financial system), as we point out above in our previous check of robustness. Overall the results are, in general, in line with the results obtained when the cross-country variance of banking variables were used (see the appendix).

5. Conclusion

The European Union underwent major changes in banking regulation during the 1980s and 1990s. These regulatory changes had profound effects on their banking industries and their aggregate economies. This paper has investigated whether such deregulatory process led the banking industries of the member nations of the Eu-

ropean Union to become more similar. Specifically, we estimated regression equations relating the cross-country variances of 10 quantitative measures of the banking industry to four measures of how the EU's deregulatory process unfolded. The evidence indicates that the national conduct deregulation and the opening of banking markets to international competition led to convergence, or greater similarity, of the banking industries' income statements. Such convergence, however, did not surface in the typical balance sheets activities or, in other words, the asset-liability practices. The deregulatory process appears to explain most of the changes that occurred in the dispersion of banking structure across the European Union. This finding is consistent with Beckhart (1954) and Wilson (1986). Two key measures of performance, the ratios of net interest and before-tax profit to total assets, do appear to converge. This convergence took place notwithstanding the divergence of the ratios of interest income and interest expense to total assets. This fact suggests that the deregulatory process may have led to divergence in the competitive strategies followed by the EU's banking industries in pricing their loans and deposits. These findings, important to policy makers of the current and extended EU member countries, suggest that further opening of national banking markets to international competition and strengthening of prudential regulation are likely the right path to follow. This justification is in addition to the standard rationale for these policies, that they enhance the efficiency while minimizing risk and restraining moral hazard.

Although our empirical analysis does provide some suggestive evidence about whether and how decontrol has led to greater similarity of European banking systems, we should point out an important limitation. Our sample has at most 14 countries and in most years appreciably fewer. Furthermore, it has only 28 annual observations. Such small sample sizes obviously reduce the power of our hypothesis tests and narrow the range of conclusions that we can confidently make.

¹⁰ For a discussion regarding the calculation of the structure index, see Demirgüç-Kunt and Levine (1999).

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Appendix

Table 1. Regression Results from Panel Data Estimation.

$$\ln V_{it} = \beta_{0i} + \beta_1 \ln V_{i,t-1} + \beta_{2i} ANATL_t + \beta_{3i} AOPEN_t + \beta_{4i} ADEPINS_t + \beta_{5i} R_t + v_{it}$$

Variable	β_{2i}	β_{3i}	β_{4i}	β_{5i}
Asset-Liability Management				
Loans / Total Assets $\bar{R}^2 = 0.6317$	-0.014 (0.07)	-0.26 ^a (0.07)	-0.012 (0.06)	-10.39 ^a (4.16)
Securities / Total Assets $\bar{R}^2 = 0.7857$	-0.14 ^b (0.07)	-0.24 ^a (0.05)	0.058 (0.15)	8.51 ^a (1.70)
Nonbank Deposits / Total Assets $\bar{R}^2 = 0.8628$	-0.08 (0.16)	0.02 (0.10)	0.036 (0.07)	-1.09 (2.18)
Net Provisions / Total Assets $\bar{R}^2 = 0.1246$	-0.37 (0.93)	0.05 (0.50)	0.052 (0.13)	70.26 ^a (23.42)
Cost Effectiveness				
Interest Expense / Total Assets $\bar{R}^2 = 0.1602$	0.023 (0.02)	-0.38 ^a (0.11)	-0.09 (0.45)	-48.74 ^a (17.41)
Operating Expense / Total Assets $\bar{R}^2 = 0.6872$	-0.067 ^a (0.02)	-0.17 ^a (0.05)	0.08 ^a (0.03)	-14.94 ^a (3.73)
Profitability				
Net Interest Margin / Total Assets $\bar{R}^2 = 0.5862$	-0.20 ^a (0.07)	-0.07 (0.08)	-0.04 (0.13)	-18.31 (20.34)
Net Noninterest Income / Total Assets $\bar{R}^2 = 0.0550$	-0.27 (0.30)	0.24 (0.24)	-0.13 (0.26)	54.63 ^a (18.21)
Net Income / Total Assets $\bar{R}^2 = 0.2050$	-0.55 ^a (0.18)	0.10 (0.20)	0.02 (0.02)	65.17 ^a (18.62)
Before-Tax Profit / Total Assets $\bar{R}^2 = 0.0816$	-0.14 ^a (0.04)	-0.33 (1.48)	-0.13 (0.22)	84.29 (70.24)

Notes. The superscripts *a* and *b* indicate statistical significance at the .05 and .10 levels, respectively.