BANCA D'ITALIA

Temi di discussione

del Servizio Studi

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Number 601 - September 2006

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BANK PROFITABILITY AND THE BUSINESS CYCLE

by Ugo Albertazzi* and Leonardo Gambacorta*

Abstract

An important element of the macro-prudential analysis is the study of the link between business cycle fluctuations and banking sector profitability and how this link is affected by institutional and structural characteristics. This work estimates a set of equations for net interest income, non-interest income, operating costs, provisions, and profit before taxes, for banks in the main industrialized countries and evaluates the effects on banking profitability of shocks to both macroeconomic and financial factors. Distinguishing mainly the euro area from Anglo-Saxon countries, the analysis also identifies differences in the resilience of the respective banking systems and relates them to the characteristics of their financial structure.

JEL classification: C53, G21.
Keywords: bank profitability, economic cycle, macro-prudential analysis.

Contents

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1. Introduction[1]

The knowledge of the link between business cycle fluctuations and banking sector profitability is important in order to evaluate the stability and soundness of the financial and banking sector. Bad economic conditions can worsen the quality of the loan portfolio, generating credit losses, which eventually reduce banks' profits. Depending on their capitalization, the capacity of banks to sustain the activity of the private sector may also be jeopardized, and the fluctuations of the business cycle may be exacerbated (Gambacorta and Mistrulli, 2004). Structural factors are important in studying the link between bank profitability and business cycle fluctuations; relevant examples are the presence of lending relationships, the level of competition in the local credit markets, and the development of the stock and capital markets.

These considerations are at the basis of a different approach to the issue of financial stability which is often referred to as macro-prudential analysis. The latter is an important tool for bank regulators as it supports micro-prudential supervision by evaluating the overall robustness of the macroeconomic environment and by detecting early signals of financial distress (Kaminsky, 1999; Logan, 2000; Borio, 2003). This is not achieved by trying to anticipate the shock that triggers a "crisis", but rather by detecting situations of "fragility" that involve the structure of the financial system (Davis, 1999; Bell and Pain, 2000; IMF, 2001).

Empirical findings show that bank profitability is an important predictor of financial crises (Demirgüç-Kunt and Detragiache, 1999). However, the monitoring of bank profits is made difficult by the fact that bank profit components are observed only at low frequencies, at best quarterly; detailed public information is available only for large and listed companies. Accordingly, studying how macroeconomic and structural indicators influence banks' profits is important as such indicators are observed with higher frequency (especially those on the financial markets).

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[1] We would like to thank Marcello Bofondi, Piero Cipollone, Silvia del Prete, Eugenio Gaiotti, Andrea Generale, Paolo Emilio Mistrulli and one anonymous referee for helpful comments. Thanks also to Antonio De Ninno for excellent research assistance. The usual disclaimer applies. The opinions expressed in this paper are those of the authors only and in no way involve the responsibility of the Bank of Italy. Email addresses: ugo.albertazzi@bancaditalia.it, leonardo.gambacorta@bancaditalia.it.

Fluctuations of bank profitability matter also because of the "bank capital channel" (Van den Heuvel, 2003), which is based on the hypothesis of an imperfect market for bank equity: banks cannot easily issue new equity because of the presence of agency costs and tax disadvantages (Myers and Majluf, 1984; Cornett and Tehranian, 1994; Calomiris and Hubbard, 1995; Stein, 1998). The mechanism is the following: after a drop in bank profitability, if equity is sufficiently low and it is too costly to issue new shares, banks reduce lending, otherwise they fail to meet regulatory capital requirements and this produces real effects on consumption and investment.[2]

This paper studies the link between bank profitability and the business cycle by using data for ten industrialized countries (Austria, Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain, United Kingdom and United States) over the period 1981-2003. The dataset includes yearly figures from the balance sheet and the income statement of the aggregated national banking industries, collected by OECD in a harmonized way that minimizes the effects of differences in accounting and statistical definitions and allows meaningful comparisons across countries.[3] The main novelty of this paper lies in a comprehensive analysis of the effects of the business cycle on all income statement components (net interest income, non-interest income, operating expenses, provisions). As will be shown, studying income statements items separately will allow us to provide new insights on important aspects, such as the role of revenue diversification, the reaction of bank profitability to GDP or interest rate shocks and the degree of inertia of operating costs.

Building an econometric model of the link between business cycle indicators and the main components of bank balance sheets is also important in the light of the development of the Financial Sector Assessment Program (FSAP), jointly established by the International Monetary Fund (IMF) and the World Bank in 1999, which specifically looks at countries' financial sectors, assessing strengths and vulnerabilities in order to reduce the potential for

[2] For the "bank capital channel" to be at work it is not necessary that capital requirements be currently binding. Van den Heuvel (2003) shows that even if capital is greater than regulatory capital requirements, low-capitalized banks may optimally forgo lending opportunities now in order to lower the risk of capital inadequacy in the future.

[3] Data refer to entire banking systems except for Portugal, United Kingdom and United States, where only commercial banks are considered. Since the aim of the paper is to study the link between bank profitability and domestic economic conditions, we have considered unconsolidated data for domestic bank, leaving out foreign intermediaries and other financial firms that belong to domestic banking groups.

crisis (Hoggarth, 2003; Calari and Ingves, 2005). A recent review of this programme, in fact, indicates that the assessment of financial sector vulnerability is not presently based upon an explicitly tested model (Kupiec, 2005).

The remainder of the paper is organized as follows. Section 2 analyzes macroeconomic and structural developments in each country in the panel after the introduction of the euro. Section 3 describes the econometric model and the results for each income statement component, the overall profit before taxes and return on equity (ROE). Section 4 analyzes differences between euro-area and Anglo-Saxon countries in terms of the level of profitability, reaction of bank profit to GDP and interest rate shocks and sluggishness of operating costs. The last section summarizes the main conclusions.

2. Some facts about bank profitability and the business cycle

Since the mid-1980s, dramatic changes in regulation, demand composition and technology have modified the structure and the boundaries of credit markets (Bhattacharya, Boot and Thakor, 1998). All these changes have strengthened competition, especially in traditional lending activity, reduced intermediation margins and encouraged banks to diversify their sources of revenue and increase efficiency in production and distribution.

Since the mid-1990s cross-country variability of gross income as a percentage of total assets has decreased inside the euro area (see the dotted line in Figure 1).[4] On the other hand, when we include in the analysis Anglo-Saxon banking systems the dispersion in bank profitability remains ample (solid line). This result, which holds even considering other measures of bank profitability (i.e. profit before taxes/total assets), suggests that there is: i) variability across countries and across time; ii) a different pattern of bank profitability in euro-area and Anglo-Saxon countries. The rest of this section provides some more details of the evolution of the main macroeconomic conditions and bank indicators dividing the sample

[4] Data for the euro area is given by a simple average of the figures for the eight countries in the sample. They represent more than 90 per cent of the euro area both in terms of nominal GDP and bank credit.

in two sub-periods: 1981-1998 and 1999-2003 in order to take into consideration possible changes caused by the launch of the euro.[5]

The inflation rate has been decreasing sharply in every country considered (see Table 1). A sharp decline is observable in the euro area, where inflation went down from an average of 5.3 per cent in the years 1981-1998 to 2.3 per cent in the years 1999-2003.

Following the behaviour of the inflation rate, interest rates also show a marked decline. The money market rate went down from 9.0 to 4.8 per cent in the euro area and from 9.5 to 4.7 per cent in the United Kingdom. Lending and deposit interest rates recorded a similar pattern. It is even more important to point out that the difference between the short term lending rate and the deposit rate (the spread) also declined. The spread is often taken as a proxy for the level of competition in the national banking industry. The reduction in the euro area also reflects the process of deregulation of the banking sector that came with financial stabilization (ECB, 2002).

Financial stabilization and deregulation have had important implications on the income statements of banks: there has been a shift from net interest income to non-interest income not dependent on traditional financial intermediation. The decline in interest margins has changed the traditional role of banks and has forced them to search for new sources of revenue such as trading, services and other financial operations. Diversification has been sustained by the increased propensity of households to invest in financial assets other than government bonds, and by the greater opportunities for firms to access the capital markets. Moreover, structural changes such as industry deregulation, new information technologies and financial innovation have increased the importance of fee income. The ratio between non-interest income and gross income (a typical measure of diversification of banking activity) has increased sharply in every country considered (see Table 2). The smallest increase is observed in the United Kingdom, which is where this ratio started from the highest level. In the United Kingdom, the main European financial market, banks have been traditionally prone to provide different services from those related to pure intermediation activity. In this respect, Italian, German, Spanish and Portuguese banks lag behind (net

[5] Similar conclusions are reached even dividing the sample on the basis of the date of the Maastricht Treaty (1981-92 and 1993-2003), in order to take into account the effects of the convergence process towards the adoption of the single currency.

interest income is still a large part of their gross income); this could reflect the strong lending relationship which is often said to characterize these countries and the lower development of their stock markets.

A conjecture that has been formulated in the literature is that such revenue diversification is good as it allows banks' profits to be stabilized (Saunders and Walter, 1994; Lown et al., 2000). On the contrary, other papers stress that traditional intermediation activities remain the core business of most profitable banks in the United States (DeYoung and Rice, 2004) or argue that a higher proportion of non-interest income increases the volatility of bank profits (DeYoung and Roland, 2001; Stiroh, 2004). Given such a diversity of views, it becomes interesting to address this issue controlling for differences in macroeconomic and structural factors.

Operating expenses show a downward trend, although differences across countries still persist. In the 1980s the cost-to-income ratio, a proxy for operational efficiency, remained stable in almost all countries (Figure 2). Since early 1990s, advances in information, communications and financial technologies have allowed banks to render many of their traditional services more efficiently. The cost-to-income ratio has been declining almost everywhere but to different degrees. For example, in Germany the ratio rapidly increased in the last years of low profitability. In Italy the reduction has been particularly large, mainly in connection with the slow down of salaries and the growing reliance on incentives for early retirement which led to a sharp reduction in the growth of personnel costs. Similar patterns are observed for Spain, the UK and the US.

Provisions also show a sharp reduction. As a percentage of gross income they decreased from 17 to 12 per cent in the euro area. Reductions were also significant in the US (from 12 to 9 per cent) and particularly in the UK (from 16 to 8 per cent). In order to understand whether this reduction had any impact on profit stability, it is necessary to gauge the cyclical features of provisions. This aspect is very interesting also in light of the new forward-looking provisioning scheme experimented by Spain from mid-July 2000 in order to encourage banks to build provisions when profits are high and draw them when profits are low (Jiménez and Saurina, 2005). This scheme should have a smoothing effect on profitability and help to curb excessive bank lending in the upswing of the business cycle and to reduce credit crunches in the downswings.

Bank profitability (measured by the return on equity, ROE) has increased slightly in the euro area. In the United Kingdom and the United States, where the banking system liberalization process started earlier,[6] the ROE has increased and remains well above the euro-area average. While in the past higher profits were due to the greater capacity of Anglo-Saxon banking systems to diversify their revenues on non-traditional markets (Bowen, Hoggarth and Pain, 1999) or to expand their activities on off-balance sheet items, such as derivatives (Boyd and Gertler, 1993),[7] more recently they may depend on structural factors (i.e. flexibility of the input markets) or on different macroeconomic performance.

3. The empirical evidence

Indexing countries with *j* and years with *t*, the econometric analysis is carried out using the following benchmark model:

$$Y_{j,t} = \sum_{k=1}^{2} \alpha_k Y_{j,t-k} + \sum_{k=0}^{2} \beta_k' X_{j,t-k} + \theta_t T_t + \eta_j + \varepsilon_{j,t} \qquad (1)$$

where $Y_{j,t}$ is the income statement component examined, $X_{j,t}$ is a vector of explanatory variables, T_t is a vector of year-dummies, η_j is an unobservable time-invariant country effect. In particular, $X_{j,t} = [GDP_{j,t}, DCPI_{j,t}, MMR_{j,t}, LTR_{j,t}, SMC_{j,t}, BL_{j,t}, VSM_{j,t}, TA_{j,t}]$ where: $GDP_{j,t}$ is the level of real gross domestic product, $DCPI_{j,t}$ is the rate of inflation, $MMR_{j,t}$ is the money market rate, $LTR_{j,t}$ is the long-term government bond interest rate, $SMC_{j,t}$ is the stock market capitalization divided by GDP, $BL_{j,t}$ is the total amount of loans divided by GDP, $VSM_{j,t}$ is the stock market volatility and $TA_{j,t}$ is the amount of total assets of the entire

[6] In the United Kingdom, bank despecialization, the reduction of segmentation in the credit markets and the development of a more market-oriented economy started in the 1970s (Llewellyn, 1990). In the United States changes in market regulation, bank organization and market structures started in the 1980s (Berger, Kashyap and Scalise, 1995).

[7] According to microeconomic studies, the differences in the level of profits observed in the 1990s between Anglo-Saxon and European banking systems reflect only to a small extent differences in average bank size or efficiency. For example, few studies (Berger and Mester, 1997, and Hughes and Mester, 1998, for the United States; Altunbas, Molyneux and Thornton, 1997, and Schure and Wagenvoort, 1999, for Europe) show that the cost function has a very flat U shape (with a minimum at about 10 billion US dollars of total assets). Also managerial efficiency (the so-called *x-efficiency*) does not show appreciable differences across countries (Berger and Humphrey, 1997, for the United States, Schure and Wagenvoort, 1999, for Europe).

banking sector. Two lags have been chosen in order to obtain well-behaved residuals. All variables are taken in logs, except interest rates and ratios.

The model has been estimated using the GMM estimator suggested by Arellano and Bond (1991), which ensures efficiency and consistency provided that the model is not subject to serial correlation of order two and that the instruments used are valid (which is tested with the Sargan test). Table 3 shows the results of the estimation of equation (1), where Y_{jt} is, in turn, net interest income, non-interest income, operating costs, provisions, and profit before tax. While lagged values of the dependent variable are significant, those of the regressors turned out to be almost always not significant. One consequence of this is that the use of the empirical model for macro-prudential analysis depends on the availability of accurate and timely forecasts for the explanatory variables (Bell and Pain, 2000).

3.1 Net interest income

The first section of Table 3 reports the results for net interest income. The connection between net interest income and the business cycle is first of all represented by the effect of GDP, which turns out to be significant and positive. When GDP increases by 1 per cent, net interest income increases, in the first year, by 0.6 per cent. Due to the persistence of the dependent variable, probably connected with the presence of long-term contracts, the effect is even more sizeable in the long run, reaching 1.8 per cent.[8] The economic interpretation is simple: an improvement in economic conditions increases lending demand by households and firms (Friedman and Kuttner, 1993; Calza, Gartner and Sousa, 2003) and improves the financial conditions of borrowers, with positive effects on the profitability of the traditional financial intermediation activities.

The coefficient for the money market rate is almost nil. This result confirms those in Demirgüç-Kunt and Huizinga (1999) and Casolaro and Gambacorta (2005). On the other hand, the coefficient for the long-term interest rate turns out to be positive and significant: if the long-term interest rate rises by 1 percentage point, the net interest margin is expected to increase by more than 1 per cent in the first year and by almost 4 per cent in the long run. An

[8] The long-term effect is given by the short-term coefficient divided by the complement to one of the sum of the coefficients for the lagged dependent variables.

explanation of the different impact of short and long-term interest rates on net interest income is related to the notion of maturity transformation (the fact that banks typically have assets with longer duration than their liabilities; see Diamond and Dybvig, 1983).

Differences in the structure of local financial markets are captured by the last three regressors in Tables 3 and 4. The ratio between lending and nominal GDP reflects how important banks are in the economy: a low level may denote a market-oriented economy in which savers and borrowers (in particular firms) meet "directly" without the intermediation of banks. As expected, this ratio is positively correlated with net interest income. If the ratio of total loans to GDP increases by 1 percentage point, net interest income rises by 0.1 per cent in the short run and by 0.4 per cent in the long run.

Following a symmetric reasoning, it could be argued that a high ratio between stock market capitalization and GDP signals the presence of a large financial market competing with the banking sector. In this view, the relevant coefficient in the regression for net interest income should be negative. On the other hand, there are theoretical reasons why debt and equity are complements rather than substitutes as, for example, in Boyd and Smith (1999), where the form of finance is chosen according to whether the investment project is affected by costly state verification problems. The coefficient for the stock market capitalization relative to GDP is positive and strongly significant. A 1 percentage point increase in this ratio makes net interest income rise by 0.1 per cent and 0.3 per cent in the short and in the long run, respectively.

The net interest margin is also influenced by market volatility. A high volatility in returns should increase lending and deposit rates. Following the dealership model by Ho and Saunders (1981) and its extension by Angbazo (1997) the interest rate on loans should be more affected by volatility than that on deposits. This interpretation is in line with the positive correlation between interest rate volatility and the net interest rate margin detected at the bottom of the first part of Table 3.

3.2 Non-interest income

The results for non-interest income are reported in the second section of Table 3. The coefficients for real GDP and the short-term interest rate are not significantly different from

zero. Banks charge their customers fees in exchange for a variety of traditional financial services (transaction services such as checking and cash management; safe-keeping services such as insured deposit accounts and safety deposit boxes), investment banking activities, securities brokerage and mutual fund sales. These services may be barely correlated with GDP growth and changes in monetary conditions and more linked to trends in financial markets.

The coefficient for the inflation rate is significant and positive: an interpretation that has been suggested in the literature is that in periods of high inflation bank customers tend to carry out more transactions (Demirgüç-Kunt and Huizinga, 1999).

Also in this case, the coefficient for the long-term interest rate turns out to be significant, but with a negative sign. One possible interpretation is that when returns on long-term government bonds are higher, savers have less need of professional services provided by banks in order to manage their own portfolios. Another channel is via trading losses. If long-term non-indexed bonds are a significant component of a bank portfolio, its value is negatively correlated with interest rates. An increase in long-term interest rates generates trading losses, which determine a drop in non-interest income. This result calls for further checks since the reactivity of non-interest income to interest rates may have changed in the euro area after the introduction of the single currency (see Section 4).

With regard to the set of structural variables, while there are no specific reasons to expect a particular sign of the coefficient for the ratio between the total amount of loans and GDP, which is not significantly different from zero, the two variables related to the stock market are likely to have an impact on non-interest income. The stock market capitalization has a positive coefficient though not significant (however, the p-value, 0.12, is borderline). The coefficient of volatility is significant and positive, which is reasonably due to the fact that periods of high uncertainty often coincide with periods of large transaction volumes in the financial markets (for example, the demand for financial derivatives, used for hedging purposes, is increasing in the level of uncertainty).

3.3 Operating expenses

The results for operating expenses are reported in the third part of Table 3. Both lags of the dependent variable are significant. As will be shown below, there exist differences across countries in the level of persistence of this item, probably connected with a diverse structure of the input markets.

As we could reasonably expect, business cycle variables *per se* have no impact on the operating costs of banks. The only exception is the coefficient for the rate of inflation, which turns out to be significantly greater than zero. Since much of this effect is likely to happen through wage indexation or renegotiation, it is also natural to understand why we had to use the lagged level of inflation (the contemporary value is not statistically significant).

On the contrary, the structural variables have significant coefficients. Both lending and stock market capitalization (relative to GDP) have a positive impact on the level of operating costs. These measures could capture the higher cost of personnel incurred in order to provide the kind of services requested in countries with more developed financial markets.

3.4 Provisions

The fourth part of Table 3 reports the results for provisions (they include credit value adjustments, readjustments, and provisions for future credit losses).

Provisions show a clear pattern of correlation with those variables related to the risk they are meant to cover. First, provisions and GDP are negatively correlated. This result is in line with Salas and Saurina (2002) and Laeven and Majnoni (2003). However, it has been taken into account that banks may be forced to provision only actual losses because accounting and fiscal rules only allow specific value adjustments and do not permit tax deductibility for general provisions that cannot be explicitly documented (see, for example, the survey on provisioning practices in the EU provided by the ECB, 2001). Accordingly, we might observe differences across countries in the pro-cyclicality of provisions related to differences in regulation and accounting standards. The next section will show some evidence in this regard.

Second, provisions increase with the money market rate, consistently with the "financial instability hypothesis" (Fisher, 1933; Minsky, 1975; 1982; Kindleberger, 1978): a high level of the short-term interest rate increases the burden for borrowers and their default probability; this accentuates the financial fragility of the whole economy and the negative consequences of a recession.

At the same time, provisions are inversely related to long-term interest rates. One reasonable interpretation of this result is based on the fact that, in general equilibrium models, long-term interest rates reflect expectations about future productivity and represent a business cycle indicator rather than a proxy for debt burden (Quagliariello, 2006).

Provisions are positively related to the volatility of the stock market which, in this context, works as a proxy of the level of uncertainty and therefore of the risk. As in Bikker and Hu (2002) and Quagliariello (2006), the level of stock market capitalization seems to have no significant explanatory power.

3.5 Profit before taxes

In the fifth section of Table 3 we reported the results for profits before taxes. These are defined as the sum of interest income and non-interest income, net of operating costs and provisions. Therefore, this regression represents a summary of the previous ones and is included also in order to corroborate the analysis performed so far.

As expected, profits before taxes are positively related with GDP, mainly through the effect that the economic cycle exerts on net interest income and provisions. The effect of inflation is not significant: the positive correlation with non-interest income is compensated by the effect on operating costs and provisions. In line with Hardy and Pazarbasioglu (1999), increases in the money market rate have a negative impact on profit before taxes, mainly through an increase in the volume of provisions. The long-term rate shows a positive correlation with profit before taxes, largely connected with its impact on net interest income and provisions.

The effect of the total amount of loans and of the stock market capitalization, which increase both net interest income and operating costs, are positive. However, only the coefficient for stock market capitalization is significant. Finally, stock market volatility

negatively influences profit before taxes due to the effect on the amount of provisions determined by an increase in the overall risk, proxied by this variable. The last effect more than compensate the increase in non-interest income.

3.6 Return on equity (ROE)

After studying the different components of the income statement, it is interesting to understand whether these results extend to profits per unit of capital invested. Following Gambacorta, Gobbi and Panetta (2001) we have used the following specification:

$$ROE_{jt} = \beta_1 DGDP_{j,t} + \beta_2 DCPI_{j,t} + \beta_3 MMR_{j,t} + \beta_4 LTR_{j,t} + \\ + \beta_5 SMC_{j,t} + \beta_6 BL_{j,t} + \beta_7 VSM_{j,t} + \beta_7 SPR_{j,t-1} + \theta' T_t + \Psi \eta_j + \varepsilon_{j,t} \quad (2)$$

where ROE_{jt} is the return on equity ratio (profit after taxes as a percentage of capital and reserves) for country j in year t, $DGDP_{jt}$ is the growth rate of real GDP and SPR_{jt-1} is the spread (difference between the lending rate and the deposit rate), a proxy of the level of competition in the local banking industry. In order to avoid problems of endogeneity we used the lagged value of the spread. The model is static as lagged values of the ROE were not significant; η_j represents a fixed effect for country j.

Results are reported in the first part of Table 4. The GDP growth rate exerts a positive effect on the ROE. The stock market capitalization has the same sign as in the profit before taxes but its statistical significance is greater. The coefficient for the rate of inflation is positive but not significant, as for profit before taxes. The spread, which captures possible differences in the level of competition of the national banking industry, is positive and significant.

In order to check whether the ROE equation has been influenced by the introduction of the euro, we have included in equation (2) interaction terms between each explanatory variable and a dummy EURO that takes the value of 1 if t>1998 (see the second part of Table 4). Results for the new specification of the ROE equation are very similar to those reported in the first column of Table 4 and none of the additional interaction terms turn out to be significant (the joint test of their lack of significance is largely accepted). This result indicates the absence of structural breaks for bank profitability as a whole but it does not tell us anything about the existence of breaks for single income statement components.

4. Differences between periods and groups of countries

The aim of this section is twofold. First, we wish to explore in greater detail whether the introduction of the euro determined structural breaks in each income statement component. Second, we hope to shed some light on the existence of differences across the euro-area and Anglo-Saxon countries both in the level of profitability and in its sensitivity to macroeconomic and structural indicators.

Tests for structural breaks. – The effects of the introduction of the euro on the stability of equation (1) have been checked by means of Chow tests. The latter are reported at the bottom of Table 3 and indicate the absence of structural breaks for all income statement components except non-interest income. In order to provide further evidence on the causes of this structural instability we have estimated the following equation for non-interest income (*NII*):

$$NII_{j,t} = \sum_{k=1}^{2}(\alpha_k + \alpha_k^* EURO)NII_{j,t-k} + \sum_{k=0}^{2}(\beta_k + \beta_k^* EURO)' X_{j,t-k} + \theta_t T_t + \eta_j + \varepsilon_{j,t} \qquad (1')$$

where all dependent variables have been interacted with a dummy EURO that takes the value of 1 if t>1998 and zero elsewhere. The results, reported in the first part of Table 5, show that the instability is caused by the coefficients of the interest rates (all the other interaction terms turn out to be not significantly different from zero and are not reported in the specification). This structural break is probably due to the substantial changes caused by the new monetary policy regime.

Differences in the level of profitability. – A second check serves to understand whether the higher profitability in Anglo-Saxon countries depends on a more favourable business cycle or on structural factors such as more flexible markets for inputs, greater efficiency or a higher value added for their bank activity. This question can be answered by analyzing the fixed effects in the regressions for the ROE in Table 4. The coefficients for the United States and the United Kingdom reveal that, everything else being equal, Anglo-Saxon banks generate a return on equity that is around 3 percentage points higher than those observed on average for the euro-area banking systems (the F-test of the null hypothesis of equal ROE

averages in the two areas is rejected with a p-value of 0.00). This difference also persists if the model with interaction dummies for the introduction of the euro is considered.[9]

These results are not driven by differences in the level of taxation. First, the impact of taxation on the ROE is small given that banks can shift a large fraction of their tax burden towards depositors, borrowers or purchasers of fee-generating services (see Albertazzi and Gambacorta, 2006). Second, differences in corporate income taxation between the Anglo-Saxon and the euro-area countries are not very large. These factors explain why the results remain unchanged even if we include in equation (2) the corporate income tax rate as an additional explanatory variable.

Differences in the reaction to GDP. – An aspect to be analyzed is whether bank profitability in Anglo-Saxon countries shows a different dependence on business fluctuations. For example, Stiroh (2004) produces evidence for the United States, according to which non-interest income is more pro-cyclical than net interest income. Given the increasing importance of this form of revenue he concludes that gross income for American banks tends to be more pro-cyclical. Other papers reach different conclusions claiming that banks with diversified revenues enjoy more stable profits than those concentrated on pure traditional intermediation activity (Templeton and Severiens, 1992; Saunders and Walter, 1994). It is therefore interesting to compare the cyclical properties of bank profits in Anglo-Saxon countries, where revenue diversification is more pronounced, with those in other economies. This analysis is carried out by estimating a further regression for profit before taxes where the variable GDP_{jt} has been substituted by two interaction terms of the variable with a dummy $ANGLO_{jt}$ (that takes the value 1 if j=UK or US) and with its complement to one, $EURO_{jt}$ (see the second part of Table 5). Both coefficients are positive and the one associated with $ANGLO_{jt}*GDP_{jt}$ is greater (2.9^{**} against 1.8^{*}), suggesting that in Anglo-Saxon countries profits made by banks tend to be more pro-cyclical. However, the difference between the two coefficients is not statistically significant.

Two remarks are worth making. First, even though our findings are qualitatively similar to those of Stiroh (2004), they are not driven by the existence of a greater revenue

[9] We also analyzed the fixed effects of the equation in the fifth part of Table 3 (profit before taxes) with similar results.

diversification by Anglo-Saxon banking systems: by running similar regressions for net income and non-interest income (not reported) no difference between the coefficients of the two interaction terms is found between the two groups of countries. Some differences are detected in the regression for provisions, which turn out to vary more closely with business conditions in the UK and US (even in this case, however, the difference was marginally significant).[10] Second, differences in the pro-cyclicality between euro-area and Anglo-Saxon countries decreased after the introduction of the euro. By running the same regression for profit before taxes for the period before the launch of the single currency (1981-1998) profits made by banks of Anglo-Saxon countries tend to be more pro-cyclical (see the third part of Table 5).

Differences in the reaction to interest rates. – Another test to perform concerns the possible differences among countries in the sensitivity of net interest income to changes in the interest rates. This test is possible thanks to the fact that there are ample differences across countries with respect to the duration of banks assets, related to heterogeneity in the propensity to lend long-term and/or at fixed rates. In particular, credit markets in Italy, Spain and Portugal are characterized by a higher proportion of short-term and variable rate loans.[11] The net interest income of these banking systems is therefore expected to respond less to long-term rates and more to short-term ones. This test can be performed with the estimation of a regression for net interest income similar to the one in the first panel of Table 3 except for the regressors MMR_{jt} and LTR_{jt} (respectively the short-term and the long-term interest rate) which are substituted by four variables: $MED_{jt}*MMR_{jt}$, $NOMED_{jt}*MMR_{jt}$, $MED_{jt}*LTR_{jt}$ and $NOMED_{jt}*LTR_{jt}$. The dummy MED_{jt} takes the value of 1 if j= Italy, Spain and Portugal, while $NOMED_{jt}$ is its complement to one. As we expected, we find that (see the fourth

[10] The higher counter-cyclicality of provisioning policies of Anglo-Saxon banks could be due to the use of accounting standards that are more sensitive to the business cycle (banks tends to provision as losses are incurred, rather than in a forward-looking manner). Since this is one of the main characteristics of the new International Accounting Standards (IAS), this finding may provide some clues as to how balance-sheet policies in the euro area might change after the introduction of the IAS in the near future (see ECB, 2004). However, this issue goes beyond the scope of our study and deserves further and more complete investigation.

[11] For example, in 2004, according to the SECB harmonized statistics on banking interest rates, in Italy, Spain, and Portugal only 13, 12 and 4 per cent of loans for house purchases were issued with an interest rate fixed for more than one year, which is very little compared with France, Germany, and the Netherlands (81, 69 and 67 per cent, respectively). In the same year, in Italy and Spain only 35 and 47 per cent of loans to firms had an initial maturity of more than five years, against 66, 63 and 58 per cent in Germany, Netherlands, and France, respectively. Evidence for the mid-nineties is provided in (Borio, 1996).

column of Table 5): i) the coefficient for $MED_{jt}*MMR_{jt}$ is greater than the one for $NOMED_{jt}*MMR_{jt}$ because of the greater relevance of short-term and variable-rate loans (none of them is significant though[12]); ii) both the coefficients associated with *LLR* are positive and significant, with the coefficient for $MED_{jt}*LTR_{jt}$ (0.72^{*}) statistically lower than the one for $NOMED_{jt}*LTR_{jt}$ (1.73^{***}).

A related aspect to be investigated is suggested by the commonly held view that the German banking industry is characterized by strong lending relationships, which imply a form of implicit insurance, making the possibility to borrow less subject to business cycle fluctuations and therefore interest rates more stable (Bauer and Domanski, 1999; Brunner et al., 2004). This should be visible in our dataset as a lower dependence in Germany of net interest income on long-term interest rates.[13] In order to verify this conjecture, in the equation for net interest income we replace the long-term interest rate LTR_{jt} with two interaction terms: $GER_{jt}* LTR_{jt}$ and $(NOGER_{jt})* LTR_{jt}$, where GER_{jt} is a dummy taking the value of 1 if *j*=Germany and 0 otherwise. From the estimation of this regression it comes out that the German banking sector is in fact not significantly affected by changes in the long-term interest rate, a result that is even more noteworthy if we consider that Germany is one of the countries where banks tend to have a relatively long duration of assets.

Differences in the degree of inertia of operating costs. – It is often claimed that at least part of the higher profitability of Anglo-Saxon banking systems is connected with the higher flexibility of the input markets in which they operate and of the labour market in particular. This feature should allow Anglo-Saxon intermediaries to react more quickly to exogenous shocks to the banking market. We can check this by analyzing the degree of inertia of operating costs, as implied by the coefficients for the two lags of the dependent variables. In Figure 3 we plot the speed of adjustment of operating costs to an exogenous shock calculated for: 1) the whole sample (euro area, UK, US); 2) the euro area; 3) the euro area excluding the Netherlands which has a flexible labour market (OECD, 2006). The experiment clearly suggests that euro-area banking systems take longer to adjust their costs to an exogenous shock; this may explain the lower profitability observed in these credit markets.

[12] Recall that the money market rate is not significant in the equation for net interest income.

[13] As shown above, short-term interest rates are not significant in the equation for the net interest margin. This result holds even distinguishing between Germany and the remaining countries.

5. Conclusions

This work estimates a set of equations for net interest income, non-interest income, operating costs, provisions, and profit before taxes for banks in the main industrialized countries, in order to evaluate the effects on banking profitability of shocks to macroeconomic and financial factors. The main results are the following.

The dispersion of bank profitability among euro-area countries has declined dramatically since the mid-1990s, during the convergence process towards the third stage of EMU; it has remained high with respect to bank profits in Anglo-Saxon countries, partly owing to asynchronous economic cycles.

The introduction of the single currency has not caused structural breaks in the relationships between each bank profit component and business cycle variables. The only exception is the equation for non-interest income, whose structural instability depends on a different reactivity to interest rates. This is probably due to the new monetary policy regime.

Bank profits are pro-cyclical: GDP influences both net interest income (via lending activity) and loan loss provisions (via credit portfolio quality). There is no evidence of income-smoothing provisioning policies (i.e. provisions are not positively correlated with GDP).

Pro-cyclicality is slightly greater in the United Kingdom and in the United States. This finding does not depend on the fact that Anglo-Saxon banks have a higher ratio of non-interest income to gross income, as claimed in previous works, but is more likely related to more counter-cyclical provisioning policies. The different pro-cyclicality of bank profitability in the two groups of countries has decreased over time.

The net interest income of banks in Italy, Spain, and Portugal, where banks have assets with shorter duration, is less affected by fluctuations of the long-term interest rate and more affected by those of the money market interest rate. As a result of the widespread presence of lending relationships, the net interest income of German banks is also not significantly affected by changes in the slope of the interest rate term structure.

Controlling for macroeconomic and structural factors, banks in the United Kingdom and United States make higher profits than their counterparts in the euro area. This result

seems at least partly related to their more flexible cost structure, which allows intermediaries belonging to these banking systems to react more quickly to exogenous shocks.

Further research could be directed towards two additional issues. First, this econometric framework could be adapted to emerging and transition economies where the analysis of the strength and vulnerability of the financial sector are likely to be more pressing. Second, the relationship between bank profitability and the business cycle could be analyzed together with bank balance sheet items (i.e. lending, liquidity, capitalization) in a simultaneous equation structure (such as a panel VAR) in order to capture better the differences among countries in the bank lending channel mechanisms.

Tables and figures

Table 1

MAIN ECONOMIC INDICATORS

(percentage values)

Countries	GDP per capita (1)	Corporate income tax	Real GDP growth rate	Inflation rate	Credit/GDP	Stock market capitalization/ GDP (2)	Volatility in the stock market	Money market rate	Volatility in the money market	(a) Lending interest rate	(b) Deposit interest rate	(a)-(b) Spread
						(1981-1998)						
Austria	17.15	0.47	2.29	3.07	90.17	6.23	12.90	6.21	0.09	9.14	3.26	5.88
Belgium	15.74	0.42	1.96	3.48	72.86	21.62	12.79	7.18	0.11	11.31	5.50	5.81
France	16.49	0.42	1.96	4.38	82.64	17.30	15.75	8.75	0.08	9.87	5.20	4.67
Germany	17.43	0.60	2.01	2.69	105.66	16.61	14.31	6.02	0.07	10.78	5.14	5.64
Italy	11.38	0.47	1.89	7.36	62.18	14.08	20.80	12.67	0.07	14.80	8.35	6.45
Netherlands	16.29	0.39	2.47	2.47	94.91	51.68	13.36	6.17	0.08	9.37	3.91	5.46
Portugal	5.05	0.45	2.61	12.09	62.92	23.48	12.97	12.83	0.12	19.11	14.59	4.52
Spain	7.59	0.35	2.66	7.05	72.98	25.80	16.29	12.08	0.11	12.67	9.11	3.56
Euro area (3)	*13.39*	*0.44*	*2.23*	*5.32*	*80.54*	*22.10*	*14.90*	*8.99*	*0.09*	*12.13*	*6.88*	*5.25*
United Kingdom	9.27	0.37	2.49	5.11	97.75	71.76	14.84	9.55	0.11	9.74	8.05	1.68
United States	21.90	0.42	3.13	3.88	43.08	48.00	16.65	7.38	0.08	9.72	7.43	2.30
						(1999-2003)						
Austria	26.47	0.34	1.77	1.73	104.08	14.59	10.73	3.45	0.10	6.14	2.76	3.38
Belgium	24.69	0.39	2.01	1.83	83.56	60.64	12.33	3.45	0.10	7.41	3.05	4.35
France	24.61	0.37	2.16	1.59	82.04	78.53	22.39	3.45	0.09	6.36	2.80	3.56
Germany	25.06	0.44	1.16	1.49	129.15	45.98	22.05	3.16	0.11	9.53	2.84	6.69
Italy	21.06	0.40	1.36	2.48	80.17	49.24	20.41	3.45	0.11	5.83	1.56	4.28
Netherlands	26.33	0.35	1.62	3.07	142.10	140.66	21.38	3.45	0.10	4.04	2.80	1.24
Portugal	12.05	0.35	1.60	3.30	128.13	48.03	14.58	3.40	0.09	5.57	2.92	2.64
Spain	16.02	0.35	3.11	3.21	100.96	53.93	20.54	3.36	0.11	4.54	2.48	2.07
Euro area (3)	*22.04*	*0.37*	*1.85*	*2.34*	*106.27*	*61.45*	*18.05*	*3.40*	*0.10*	*6.18*	*2.65*	*3.53*
United Kingdom	16.95	0.30	2.30	1.79	136.50	148.25	20.49	4.71	0.12	4.82	1.97	2.85
United States	35.19	0.39	2.59	2.45	45.37	119.06	24.47	3.58	0.14	6.59	3.67	2.92

Note: (1) Thousands of euros for all countries except the United States (thousands of dollars) and the United Kingdom (thousands of pounds sterling). - (2) Data for Portugal refers to 1990-1998; those for Spain to 1987-1998. - (3) Data for the euro area is a simple average of the figures for the eight countries in the sample.

Source: Authors' calculations based on data from International Financial Statistics.

Table 2

BANK PROFITABILITY

(as a percentage of total assets)

Countries	(a) Net Interest Income	(b) Non interest income	(b)/(a+b) Diversification	(c)=(a)+(b) Gross income	(e) Operating expenses	(f) Provisions	(g)=(c)-(e)-(f) Profit before tax	(h) Taxation	(i)= (g)-(h) Profit after tax	(h)/(g)	ROE (1)
					(1981-1998)						
Austria	1.65	0.77	0.32	2.42	1.59	0.48	0.35	0.13	0.22	0.37	7.25
Belgium (2)	1.49	0.46	0.24	1.95	1.33	0.29	0.33	0.12	0.21	0.37	7.14
France	1.75	0.65	0.27	2.39	1.70	0.35	0.34	0.12	0.22	0.36	6.33
Germany	2.14	0.60	0.22	2.74	1.71	0.42	0.61	0.35	0.25	0.59	6.32
Italy	3.20	1.02	0.24	4.22	2.66	0.73	0.82	0.41	0.41	0.50	7.32
Netherlands	2.07	0.85	0.29	2.92	1.94	0.34	0.64	0.13	0.51	0.20	10.98
Portugal	3.00	0.99	0.25	4.00	2.23	0.98	0.78	0.15	0.50	0.23	6.92
Spain	3.64	0.88	0.19	4.52	2.85	0.74	0.93	0.23	0.71	0.24	7.79
Euro area (3)	*2.37*	*0.78*	*0.25*	*3.15*	*2.00*	*0.54*	*0.60*	*0.21*	*0.40*	*0.34*	*7.51*
United Kingdom (4)	2.72	1.74	0.39	4.46	2.87	0.72	0.87	0.34	0.53	0.39	11.72
United States	3.52	1.70	0.33	5.22	3.43	0.62	1.17	0.37	0.80	0.31	10.88
					(1999-2003)						
Austria	1.21	1.18	0.50	2.39	1.64	0.30	0.45	0.06	0.39	0.13	7.91
Belgium	1.02	0.82	0.45	1.83	1.17	0.12	0.55	0.11	0.44	0.20	12.37
France	0.87	1.25	0.59	2.13	1.38	0.18	0.57	0.11	0.46	0.20	9.28
Germany	1.36	0.65	0.32	2.01	1.38	0.44	0.19	0.10	0.09	0.52	2.73
Italy	2.37	1.13	0.32	3.51	2.05	0.50	0.96	0.36	0.60	0.37	8.42
Netherlands	1.55	1.16	0.43	2.71	1.88	0.20	0.64	0.17	0.47	0.26	11.61
Portugal	1.84	0.87	0.32	2.71	1.57	0.34	0.80	0.10	0.69	0.13	5.74
Spain	2.24	1.01	0.31	3.25	1.89	0.45	0.91	0.14	0.77	0.15	8.32
Euro area (3)	*1.56*	*1.01*	*0.39*	*2.57*	*1.62*	*0.32*	*0.63*	*0.14*	*0.49*	*0.23*	*8.30*
United Kingdom	1.84	1.41	0.43	3.25	1.85	0.27	1.13	0.35	0.78	0.31	15.37
United States	3.41	2.61	0.43	6.03	3.56	0.54	1.92	0.65	1.27	0.34	13.94

Note: (1) Profit after tax as a percentage of capital and reserves. Data for Austria in the first sample period refer to 1989-98. - (2) 1982-1998. - (3) Data for the euro area is a simple average of the figures for the eight countries in the sample. - (4) 1984-1998.
Source: Authors' calculations based on data from OCSE, Bank Profitability.

Table 3

REGRESSION RESULTS (1)

	(i) Net interest income			(ii) Non-interest income			(iii) Operating cost (2)			(iv) Provisions			(v) Profit before taxes		
	Coeff.		S. error	Coeff.		S. error	Coeff.		S. error	Coeff.		S. error	Coeff.		S. error
Endogenous var. $_{jt-1}$	0.849	***	0.092	0.561	***	0.056	0.774	***	0.088	0.362	***	0.081	0.306	***	0.080
Endogenous var. $_{jt-2}$	-0.200	***	0.077				-0.193	***	0.064	0.187	**	0.080	0.280	***	0.083
log of real GDP $_{jt}$	0.648	**	0.275	-0.173		0.396	0.145		0.166	-1.755	*	1.011	2.548	**	1.266
Inflation rate$_{jt}$	0.489		0.526	1.792	*	1.005	0.431	*	0.230	4.731	*	2.800	-1.145		3.370
Money market rate $_{jt}$	0.147		0.428	0.941		0.866	-0.046		0.288	4.575	**	2.160	-8.113	***	2.913
Long-term rate $_{jt}$	1.390	**	0.593	-1.909	*	1.062	0.387		0.406	-5.576	*	3.190	8.838	***	3.281
Log of total assets $_{jt}$	0.133	**	0.064	-0.095		0.098	0.136	***	0.051	0.625	**	0.258	-0.129		0.288
Lending /GDP $_{jt}$	0.149	**	0.064	0.190		0.133	0.138	***	0.042	0.023		0.353	0.159		0.407
Stock Mark. Cap. /GDP $_{jt}$	0.098	**	0.042	0.087		0.057	0.101	***	0.027	-0.047		0.178	0.381	*	0.213
Stock Mark. Volatility $_{jt}$	0.270	**	0.124	0.546	**	0.249	0.059		0.087	3.134	***	0.850	-2.073	**	0.973
Sargan test (2nd step; p-value)			0.39			0.19			0.30			0.30			0.72
MA(1), MA(2) (p-value)	0.00		0.45	0.00		0.56	0.00		0.56	0.00		0.11	0.00		0.46
Chow test (introduction of euro) (3)			0.16			0.02			0.42			0.41			0.24
No. of countries, no. of observations	10		187	10		194	10		187	10		170	10		178

Notes: (1) The model is given by equation (1), which includes two lags in order to obtain white noise residuals. The model has been estimated using the GMM estimator suggested by Arellano and Bond (1991), which ensures efficiency and consistency provided that the models are not subject to serial correlation of order two and that the instruments used are valid (which is tested for with the Sargan test). The sample goes from 1981 to 2003. *Significant at the 10% level. ** Idem, 5%. *** Idem, 1%. Lagged values of the independent variables turned out to be not significant and have been removed to save degrees of freedom, except where indicated. - (2) Inflation rate is one period lagged. - (3) Instability is detected if the p-value is greater than 0.05.

Table 4

REGRESSIONS FOR THE RETURN ON EQUITY[1]

	(i) Full sample 1981-2003			(ii) Additional controls for the introduction of the euro		
	Coeff.		S. error	Coeff.		S. error
Real GDP growth rate $_{jt}$	0.631	***	0.206	0.730	***	0.225
Inflation rate$_{jt}$	0.277		0.217	0.368		0.241
Money market rate $_{jt}$	-0.355	*	0.212	-0.406	*	0.223
Long-term rate $_{jt}$	0.330		0.285	0.332		0.302
Lending /GDP $_{jt}$	-0.037		0.027	-0.023		0.027
Stock Mark. Cap. /GDP $_{jt}$	0.057	***	0.014	0.050	**	0.020
Stock Mark. Volatility $_{jt}$	-0.262	***	0.066	-0.300	***	0.083
Spread $_{jt-1}$	0.248	**	0.108	0.282	**	0.137
Real GDP growth rate $_{jt}$*EURO				-0.053		0.588
Inflation rate$_{jt}$*EURO				-0.965		0.773
Money market rate $_{jt}$*EURO				0.638		0.844
Long-term rate $_{jt}$ *EURO				1.510		1.770
(Lending /GDP $_{jt}$) *EURO				-0.016		0.024
(Stock Mark. Cap. /GDP $_{jt}$)*EURO				-0.012		0.019
(Stock Mark. Volatility $_{jt}$)*EURO				0.113		0.127
Spread $_{jt-1}$*EURO				-0.093		0.483
R -square (adjusted)			0.49			0.49
F-test all f.e. are null (p-value)			0.00			0.00
F-test all interaction terms are null (p-value)			..			0.40
No. of countries, no. of observations	10		204	10		204

Notes: (1) The model adopted has a fixed effect specification (within group estimator). *Significant at the 10 per cent level. ** Idem, 5 per cent. *** Idem, 1 per cent.

Table 5

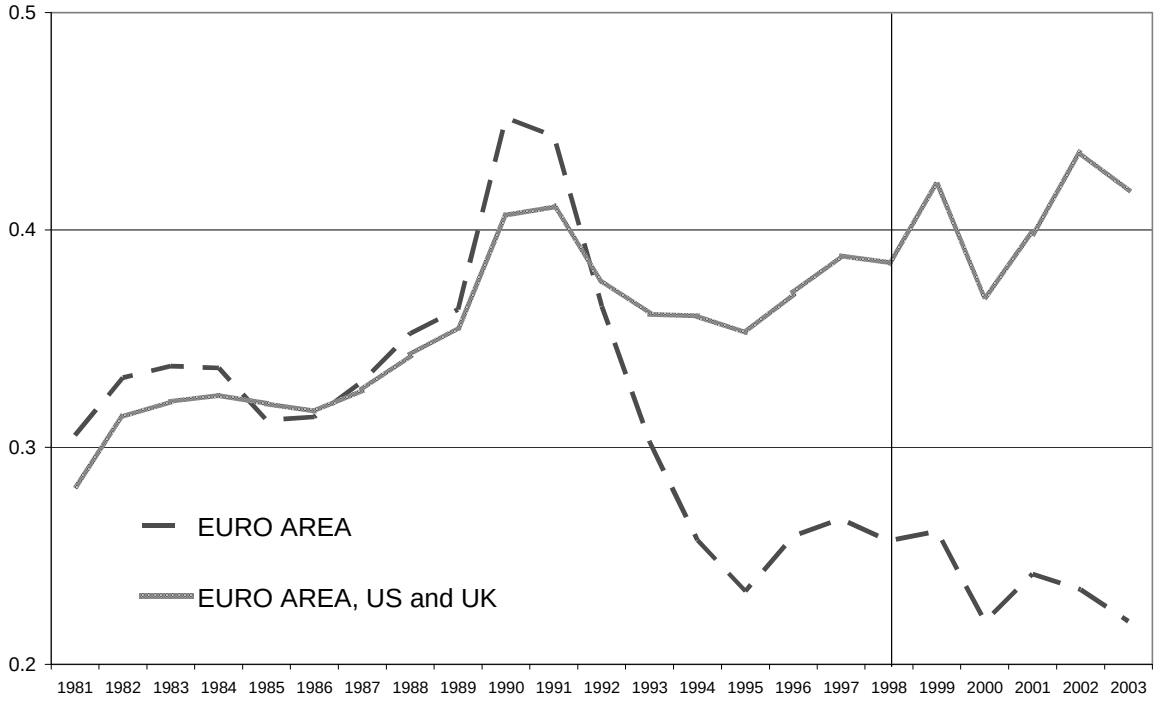
DIFFERENCES BETWEEN PERIODS AND GROUPS OF COUNTRIES (1)

	(i) Non-interest income (model with interaction variables)			(ii) Profit before taxes (difference in the reaction to GDP; all sample)			(iii) Profit before taxes (difference in the reaction to GDP; 1981-1998)			(iv) Net interest income (differences in the reaction to interest rates)		
	Coeff.		S. error	Coeff.		S. error	Coeff.		S. error	Coeff.		S. error
Endogenous var. $_{jt-1}$	0.526	***	0.056	0.300	***	0.081	0.196	**	0.097	0.821	***	0.092
Endogenous var. $_{jt-2}$				0.210	***	0.081	0.162	*	0.098	-0.189	**	0.075
log of real GDP $_{jt}$	-0.248		0.399							0.615	**	0.279
Inflation rate$_{jt}$	1.745	*	1.008	-0.335		3.450	-1.214		4.430	0.296		0.540
Money market rate $_{jt}$	1.505		0.971	-8.175	***	2.915	-8.746	***	3.365			
Long-term rate $_{jt}$	-2.450	**	1.242	8.810	**	3.783	12.25	***	4.460			
Log of total assets $_{jt}$	-0.083		0.095	-0.079		0.292	0.234		0.468	0.136	**	0.065
Lending /GDP $_{jt}$	0.196		0.134	0.062		0.415	0.206		0.782	0.159	**	0.062
Stock Mark. Cap. /GDP $_{jt}$	0.082		0.060	0.356	*	0.214	0.389	*	0.233	0.099	**	0.041
Stock Mark. Volatility $_{jt}$	0.580	**	0.283	-2.262	**	0.986	-3.165	**	1.534	0.271	**	0.124
Money market rate $_{jt}$*EURO	-7.640	**	3.309									
Long-term rate $_{jt}$*EURO	6.150	*	3.51									
ANGLO*GDP				2.920	**	1.300	3.187	**	1.600			
EURO*GDP				1.802	*	1.090	1.360	*	0.734			
Spread$_{jt-1}$												
Spread$_{jt-1}$*GDP$_{jt}$												
MED*MMR										0.657		0.741
NOMED*MMR										-0.126		0.451
MED*LTR										0.723	*	0.400
NOMED*LTR										1.734	***	0.636
Sargan test (2nd step; p-value)			0.12			0.75			0.90			0.28
MA(1), MA(2) (p-value)	0.00		0.51	0.00		0.48	0.00		0.62	0.00		0.46
No. of countries, no. of obs.	10		194	10		178	10		129	10		187

Notes: (1) The models are based on sligth modifications of equation (1), which includes two lags in order to obtain white noise residuals. The model has been estimated using the GMM estimator suggested by Arellano and Bond (1991) which ensures efficiency and consistency provided that the models are not subject to serial correlation of order two and that the instruments used are valid (which is tested for with the Sargan test). The sample goes from 1981 to 2003 unless indicated otherwise. *Significant at the 10% level. ** Idem, 5%. *** Idem, 1%. Lagged values of the independent variables turned out to be not significant and have been removed to save degrees of freedom, except where indicated.

Figure 1

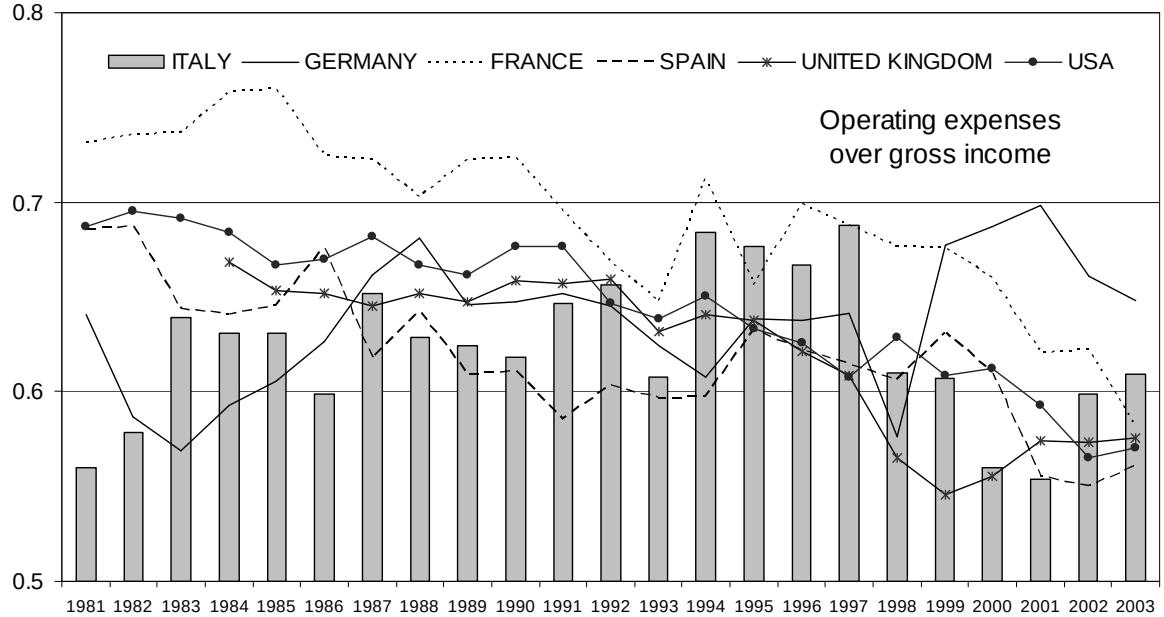
Cross-sectional dispersion of bank profitability[(1)]



Source: OECD, Bank Profitability. (1) Coefficients of variation (ratio of cross-country standard deviation to simple mean) of the gross income-to-total asset ratio

Figure 2

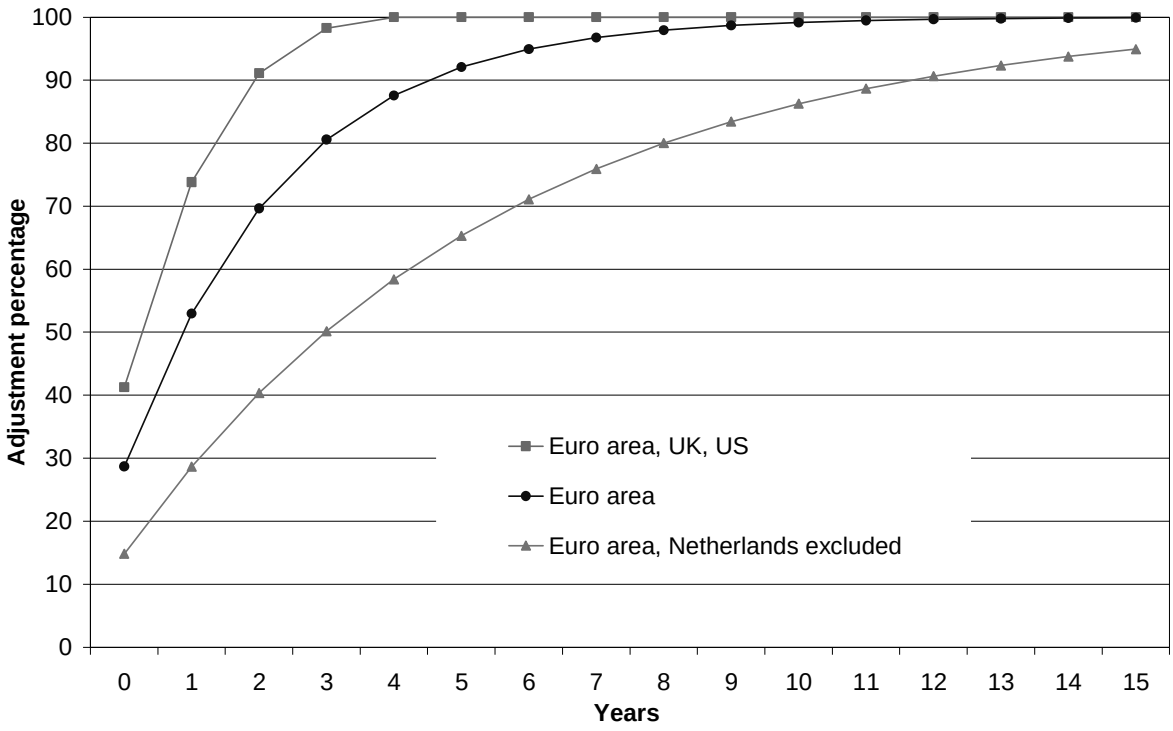
Cost-to-income ratio



Source: OECD, Bank Profitability.

Figure 3

Operating costs speed of adjustment to an exogenous shock
(percentage of the adjustment realized)



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