FINANCIAL CONVERGENCE IN THE EUROPEAN MONETARY UNION?

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Abstract

This paper reports tests of hypotheses that a variety of interest rates and other measures from financial markets in countries belonging to the European Monetary Union (EMU) were converging prior to the introduction of the euro in January 1999. We expected to find convergence because of i) removal of national barriers to flows of funds, ii) explicit and market-driven harmonization of regulation and supervisory standards, iii) coordinated macroeconomic policies, iv) privatization of state enterprises, and v) fiscal redistribution of resources. The first series of tests (σ-tests) are that standard deviations and/or coefficients of variation of cross-sections of national measures are diminishing over time, relative to a group of non-EMU countries. Evidence of convergence was found for inflation rates, short- and long-term nominal interest rates, and *ex post* real short-term rates, but not for real per capita GDP. The second series concerned levels and trends in interbank claims and noninterest income at banks. These measures are believed to be larger and growing more rapidly when banks are attempting to escape binding national regulations. Interbank claims were larger at EMU banks than at banks in other countries, but had no interpretable trends. The ratios of noninterest income to total bank income and assets were found to have positive trends. The third series of tests used a statistical cost accounting model estimated for nine countries to examine whether marginal costs of liabilities and revenues from assets were tending toward equality, as might be expected in an efficient unified economy. Within the EMU, significant differences across six major countries were observed for 1994, 1995, and 1996, but not in 1997 or 1998. Convergence seemed to be being achieved.

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I INTRODUCTION

The European Community (EC), established by the Treaty of Rome in 1957, was the forerunner of the movement toward European economic union; its latest manifestation is the European Monetary Union (EMU), which in 1999 adopted a set of fixed exchange rates among eleven European countries and defined a common currency, the euro. The European Union (EU) began issuing directives in 1977 that were designed to promote open borders and implement reforms and pave the way for integrated banking under the then new European Monetary System (EMS).

The European Central Bank was established to conduct monetary policy and manage the exchange rate between the euro and other nonmember national currencies. A policy of *mutual recognition* was adopted by the European Union to allow member countries to retain some autonomy when regulating banks that were chartered within their borders. However, with a few qualifications, a bank that is chartered in one country is permitted to establish branches in other member countries and to provide services that it is allowed to offer in its home country, throughout the EU. Further, individuals and firms in one country can transact with banks in another country using contracts based on the latter country's laws. As a result, banking markets in all member countries can expect changes and eventual convergence to a common economic regulatory environment.

The present paper reports tests of hypotheses about the extent to which convergence is evident in national financial data. Although economic union permits all factors of production to flow across borders, funds flow across borders with much greater ease than people, commodities, or machines. The next section provides some background information about trends in bank portfolios, interest rates, income, and growth among countries in the European Union and selected other countries. Formal tests of convergence are postponed until sections three and five. Section two also considers how residual regulatory heterogeneity and technical change in finance are likely to qualify patterns of convergence across countries. We recognize but do not investigate the possibility of convergence at the sub-national level. The third section proposes a set of

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models for measuring convergence and testing for its presence. The fourth section describes data resources that are used to test hypotheses. The fifth presents results of statistical tests and the sixth summarizes findings.

II CHANGE AND CONVERGENCE

The process of achieving an economic union is both time and resource absorbing. The motives and goals of the promoters of the ongoing effort to achieve European union are beyond the scope of the present paper. However, conventional arguments suggest that there are likely to be large efficiency gains from removing artificial barriers to trade and movements of factors, once a new equilibrium is achieved. In this sense European integration can be viewed as an investment that is expected to yield a positive rate of return.

a. On the concept of convergence. Convergence can be measured in several ways. Because we do not know the long-term equilibrium values of economic measures, we cannot report the extent to which European countries have achieved equilibrium. Nonetheless, it is enlightening to examine the trajectories of selected measures in different countries to see whether they are approaching common values. There is an extensive literature (See Durlauf, Steven N. and Danny T. Quah, 1999 for references) about whether growth trajectories converge to unique or multiple equilibria.

Removing barriers to exchange is not the same as attempting to achieve an optimal growth path and configuration of resources, but there are similarities. For example, one expects to observe homogeneous labor units moving from areas with low wages and opportunities to more promising areas. If such movements are effected, one should observe a movement toward a more equal distribution of per capita income across countries. Similarly, funds should flow to areas that yield higher rates of return. As funds flow away from areas where yields are low, real rates of return across countries should tend to equalize, a well-known characteristic of an efficient market. Full equalization is unlikely to obtain because labor is heterogeneous and because residual regulatory differences persist in different countries.

A different type of convergence has been mandated by the agreements, such as the Maastricht Treaty, that eventually led to the appearance of the euro in 1999. In particular, in order to qualify for membership in the EMU, governments pledged to limit the magnitude of their deficits to a small percentage of GDP. Central banks adopted policies to achieve a desired range of inflation rates. Countries with high ratios of government debt to GDP have been obliged to reduce them to an agreed level. Because new sovereign debt issues are effectively being made in euros, the possibility of devaluation by individual countries has vanished, which further reduces differences in interest rates across countries.

Even earlier, the European Union had been transferring funds from affluent regions to regions of Europe that are impoverished. It also required that government owned or controlled enterprises like banks be privatized and that they no longer receive subsidies and other forms of protection from the rigors of competition. While transfers

and privatizations will not eliminate all inequalities, these actions are likely to foster partial convergence of variables across countries.

b. Is there evidence of convergence? In this subsection we report evidence about convergence in several important economic variables for selected countries over the past few decades. As will be seen data are not easy to interpret and in important respects they are fragmentary. It is, nevertheless, important to recognize that governments and their central banks were pursuing policies designed to achieve a common trajectory long before the Maastricht Treaty went into effect in late 1993.

First, consider trends in per capita GDP between 1960 and 1997, expressed in 1990 US dollars.[1] In Figure 1 six countries have very similar trajectories, Austria, Belgium, France, Germany, Italy, and the Netherlands; apart from Austria, they are five of the original six EC countries. The other EC country, Luxembourg, had a very similar trajectory until about 1984, when it began to grow at a faster rate as it transformed itself into a financial center. By 1997 it had the highest per capita income in Europe. Ireland seems to have been following the same financial center specialization as Luxembourg, and again has been growing at a faster rate since 1984. Finland has a higher and Portugal and Spain a lower trajectory, but all are growing at about the same rate as the six countries in the cluster. The similar paths of the five original EC countries over the past 40 years suggest that increasing integration has not led to growing arithmetic disparities and, indeed, has resulted in convergence because there are smaller percentage differences in per capita income among these countries.

Figure 2 plots a simple arithmetic average of the EMU countries with comparable series for Denmark, Greece, Japan, Norway, Sweden, the UK, and the US. The average of eleven countries is growing at about the same rate as the US and Denmark, faster than Greece, Sweden, and the UK, and slower than Japan and Norway. At the end of 1997, the ranking of highest per capita income countries is Norway, Luxembourg, Denmark, Finland, Sweden, Japan, and the US.

International comparisons are always subtle. If one uses the Penn World Tables, which are unreported in this paper and end in 1992, a different ranking of the six highest per capita income countries obtains for 1992 – the US, Luxembourg, Norway, Japan, Germany, Sweden, and France. Apart from the US, which was growing at about the same rate along a higher path than the rest, and Japan and Luxembourg, which rose strongly between 1960 and 1992 and between 1984 and 1992 respectively, the EC countries were again tightly bunched, with no appreciable changes in arithmetic differences over time. The plot for Germany does decline slightly after 1990 when the country was reunified. The UK was growing slower than the EC countries. Until 1992, Greece, Ireland, Portugal, and Spain had lower incomes and were growing at a slower rate than other countries.

Table 1 reports information about inflation rates. To conserve space and avoid a discontinuity associated with German reunification, annual inflation rates are shown for

[1] We have employed constant dollar, per capita GDP data that are published by the Organization for Economic Cooperation and Development (OECD). German OECD data have no jump at the time of unification. We don't know the details about how smoothing was effected by the OECD.

the countries in every other year. Again there is clear evidence of convergence and a general downtrend in inflation rates. Because of an aversion to the destabilizing effects of deflation by most central banks, it is difficult to distinguish between convergence owing to European integration and convergence owing to falling average inflation rates. An attempt to make this distinction is reported in Section V.

Nominal money market interest rates for countries in the EMU, plotted in Figure 3, display a strong pattern of convergence between 1978 and 1999. Because of falling inflation, it is again difficult to identify the extent to which this convergence is a consequence of European integration. Figure 4 reports a plot of *ex post* real money market interest rates, which afford a better perspective on the effects of integration on convergence. Portugal is distinctive because it had large negative real rates until 1987. Apart from Portugal, real rates in the EMU were relatively volatile from 1979, approximately when the EMS was established and the European Currency Unit (ecu) was introduced, until 1992, when a series of successful speculative attacks on national currencies occurred. The attacks forced the British pound, the Italian lira, and the Danish krone to be devalued relative to the ecu, and eventually would lead to the introduction of the euro. Since 1992 real interest rates have been quite similar across EMU countries, although both Austria in 1995 and Ireland at the end of the period had negative real rates. Real interest rates have been trending down since the events of 1992; we analyze their convergence in Section V.

Nominal government bond yields in the EMU have definitely converged, in large part because risks of devaluation of national currencies have disappeared. This is evident in Figure 5 where there is also clear evidence of a decline in nominal borrowing costs for all countries. Belgium, Italy, and Spain have especially benefited from a decrease in borrowing costs. In part, the decline is a vote of confidence about the viability of the EMU and the European Central Bank's commitment to low inflation, even if the euro's value is falling relative to other major currencies.

c. Technical difficulties in assessing convergence. Complicating analysis of the effects of introducing the EMU is the ongoing technological revolution in finance. Drawing on information provided by the Bank for International Settlements, Table 2 indicates that large changes were occurring in the ways individuals executed transactions in all countries and that they were occurring at different rates in different countries. The numbers of automated teller machines and point of sale terminals and their utilization were generally rising and the numbers of checks written were falling. As banks and the payments system become automated, fewer banks and branches may be required and the character of their services will change.

Table 3 is constructed from OECD statistics on aggregate portfolios and earnings of banks in the EMU and selected other countries. When data are available a summary of bank portfolios, earnings, and number of banks are shown on four dates, 1985, 1989, 1993, and 1997 for each country. Bank portfolios are expressed as a percentage of total assets. There are enormous differences in portfolios across countries, in part due to differences in the numbers and types of banks being aggregated by the OECD.[2]

[2] The fraction of a country's banks that underlie the reported portfolios in Table 3 inexplicably varies considerably across countries and over time for a given country. For example, in the case of Italy, the

Differences also result because the percentage of interbank deposits in total assets varies considerably across countries. When interbank deposits are a large fraction of total assets in a country, the sum of loans, securities, and other assets as a percentage of total assets is tautologically smaller. We have examined but do not report bank portfolios as a percentage of total assets less interbank deposits and record that differences in the fraction of loans in total assets are smaller with this correction, but are still substantial. Reported aggregate interbank claims on the asset and deposits on the liability sides of balance sheets are positively correlated, but not equal in any country. Except for banks in Greece, Portugal, and Spain, cash and balances with a central bank are smaller than five percent of total assets in all countries. After netting out interbank deposits, loans as a fraction of net assets are lowest in Belgium, Greece, Italy, and Portugal. Similarly, after netting out interbank deposits, deposits as a fraction of net assets are lowest in Belgium, France, and Italy. Clearly, the nature of intermediation varies across EMU countries, before the emergence of the euro.

The average rate of return on assets in the penultimate column of Table 3 has also been extraordinarily volatile over the reported years, given the large samples of banks being considered. The three largest EMU countries, France, Germany, and Italy, have pronounced negative trends, as do Austria and Japan. This pattern may be a consequence of growing international competition in banking. Banks in Denmark, Ireland, and the US have the highest and banks in Belgium, Finland, France, and Japan have the lowest average rates of return in our OECD database.

Table 4 reports information assembled by the European Central Bank about trends in the numbers of banks, branches, and automatic teller machines (ATMs) in the European Union, between 1980 and 1997. Trends in the number of banks reported in the top section of the table are strongly negative in most EU countries, but are positive in the least affluent countries, Portugal and Greece. They are also positive in Luxembourg and Ireland, which seem to be becoming international financial centers. In the middle section of the table the number of branches per thousand inhabitants is reported. Positive trends are evident in the cases of Greece, Ireland, Italy, Portugal, and Spain; with the exception of Spain, all had low ratios of branches to population in 1985. Negative trends are apparent in the cases of Finland, Belgium, Denmark, and the Netherlands, which had relatively high ratios in 1985. Convergence in branch structures may be occurring. The bottom section shows a universally positive trend in ATMs per capita, which is plausible with the introduction of new technology.

Figure 6 reports information that has been assembled by the OECD about trends in income at banks. The ratios of non-interest income to gross operating income and to total assets have been trending higher since about 1980. The increase in the gross operating income ratio is understandable because of the general decrease in inflation and nominal interest rates. The OECD includes realized capital gains in its definition of non-interest income. The increase in the total assets ratio reflects ongoing changes in bank

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number of banks in the OECD database fell from 422 in 1985 to 255 in 1997 while the population of Italian banks was 1,192 in 1985 and 935 in 1997. In some other countries all existing banks are in the database. These changes in the number of reporting banks seem to have had large effects on portfolio shares, making intertemporal comparisons of portfolio shares unreliable in several countries, especially so in the cases of Denmark, Italy, and Japan.

practices that are partly a response to changes in technology. They are analyzed further in Section V. The following quotations illustrate the complexity of analyzing unification:

> "It is anticipated that differences in structure between the EU financial systems will continue to prevail in the medium term for a variety of reasons (structural as well as cyclical). In this respect, diverse fiscal treatments at a national level could favour or divert financial intermediation. In Finland, for instance, the tax system favours bank intermediation, since most of the bank accounts held by individuals are tax exempt. Conversely, different tax treatments (e.g. in Belgium where capital gains are tax exempt) have stimulated a significant growth in undertakings engaging in collective investment in transferable securities (UCITS) and investment funds." [European Central Bank, 2000, pp. 8-9]

> "Banks responses to the changing financial systems have been most clearly visible in their financial accounts. They are first reflected in their off-balance-sheet activities. . . . Major off-balance-sheet items are related to traditional types of business (loan commitments, guarantees, etc.) and derivative activities. Off-balance-sheet activities have been growing at remarkably high rates in many EU countries. The derivatives business also has a quite different degree of relative importance across the EU countries. . . . The other noticeable change in banks' financial accounts concerns the development of non-interest income. The competition from non-bank financial institutions and the resulting pressure on intermediation margins has led banks to offset the decrease in their interest income by shifting to other sources of income such as fees and commissions." [European Central Bank, 2000, p. 10]

Finally, there is anecdotal evidence of persistent regulatory heterogeneity among the countries in the EMU. Banks operating in different regulatory environments can be expected to respond to European unification in different ways. While an exhaustive comparison of regulations is beyond the scope of the present paper, the following statements by Tommaso Padoa-Schioppa, a member of the Executive Board of the European Central Bank, convey the problem well:

> "Can it be said that with the introduction of the euro, there will no longer be segmentation in the financial market? Here too, the answer is negative. . . . For instance, the rules and practices governing the working of the labour market are a very significant obstacle to further consolidation and restructuring of the banking sector, and may contribute to maintaining some degree of segmentation. . . . Proximity to customers is a crucial element in the service industry. . . . Segmentation might also be induced by other remaining differences between national regulation and legislation in Member States. This holds true not only for supervisory matters, but also, for instance, for bankruptcy legislation or for company law, since both have a substantial influence on lending decisions." [Padoa-Schioppa, 2000a]

> "An additional complication is that the national central banks are very often entrusted with the responsibility of supervising banks, but as supervisors they are a national authority. I have worked for a national authority for 30 years now, and I know that these bodies are expected to look after their own national interests. National interests very often involve promoting the strength and competitiveness of the national banking system, or of the national financial centre. . . . Moreover, co-operation between national authorities needs to be stepped up in order to ensure effective banking supervision." [Padoa-Schioppa, 2000b]

III MODELS FOR MEASURING AND TESTING FOR CONVERGENCE

In Section V of this paper three classes of formal tests of hypotheses about convergence are reported. They are respectively a) tests that time series in the foregoing charts are converging, b) tests that bank portfolios and their resulting income flows are changing, and c) tests that the ratios of bank net income to total assets and shadow rates of return on assets and liabilities in bank portfolios in different countries are converging. For reasons that are evident in the preceding quotations, none of these tests is straightforward. The present section develops justifications for these tests.

a) Testing for convergence of time series. Much of the recent discussion of convergence has emerged from the economic growth literature, which has been well summarized in a recent paper by Durlauf and Quah [1999]. They describe and critique two measures, β and σ. Unconditional β convergence can crudely be paraphrased to imply that deviations from some known equilibrium value or path decrease at a constant geometric rate. It is not well defined when an equilibrium value is unknown and there is little theoretical guidance about what the rate of convergence should be. Further, as Milton Friedman [1992] has recently reminded us, informal graphical arguments about β convergence based on the notion that rates of growth are negatively related to initial levels of, say, per capita GDP are examples of a potentially serious 'regression fallacy'. Friedman proposes as a check against inappropriate inferences that terminal per capita GDP be related to rates of growth of per capita GDP. If the result does not indicate a positive relation, convergence may be inferred, even if the estimate of the rate of convergence is not identified.

An alternative recommended by Friedman is that one should examine whether the standard deviations of a set of cross-sectional measures of series that are believed to be converging diminish over time. This corresponds to the aforementioned σ measure, which as Durlauf and Quah explain is also underidentified [pp. 274- 6 and, especially, pp. 285 - 7]. Thus, without a firm theoretical foundation attempts to measure convergence are unavoidably hazardous, a conclusion with which we reluctantly concur. Nevertheless, below we test for convergence by examining whether a series of cross-section standard deviations have a negative trend.

There are strong arguments for believing that some series are heteroskedastic, quite independently of whether convergence is occurring. For example, nominal interest rates cannot be negative in most economies. As nominal interest rates fall toward zero, there is a strong presumption that the standard deviation of a series of interest rates will

also fall. Such a mechanical phenomenon should not be interpreted as convergence. A correction is necessary in order to perform tests that convergence is occurring. Somewhat arbitrarily, in empirical work we often perform tests on coefficients of variation – the standard deviation of a series divided by its mean. Because we believe that growth paths of real per capita income also have error terms that are heteroskedastic, in Section V we study coefficients of variation of that variable as well. We are aware that we are making a strong assumption when using the coefficient of variation – i.e. that the standard deviation of error terms is proportional to the mean of a series.

b) Convergence of bank portfolios and income flows. If there are no frictions and perfect capital mobility, one should expect to observe no systematic differences in the composition of bank portfolios and income flows across countries. In a world with frictions and barriers, it is plausible that banks operating in different market and regulatory environments should differ across countries. As barriers are lowered, other things equal, one should expect differences in portfolios and income flows to change, but not necessarily to diminish, until all barriers and regulatory differences are gone. When barriers are slowly removed, as in the case of a sudden storm, one should expect water or funds to flow along a path of least resistance. In the case of banks such channels are likely to involve interbank flows, both national and international, and off-balance-sheet positions where regulations are likely to be ineffectively constructed and where innovations can easily be introduced. The latter are likely to manifest themselves in fees, commissions, and other flows rather than in net interest income. Such flows have the effect of reducing international differences in real and nominal rates of return.

Thus, in the period before a new equilibrium is achieved, we expect to find distinctive increases in interbank flows and in non-interest bank revenues. They may be as much a consequence of unrelated technical innovations as European unification – again an identification problem!

c) Tests for convergence of marginal rates of return on assets and marginal costs of liabilities. From the foregoing charts that showed trends in nominal money market and government bond interest rates, there is a strong suggestion that security interest rates are converging in Europe. A different and more challenging question is whether marginal rates of return on assets and marginal costs of liabilities in bank portfolios in different countries are converging. During the past decade there has been a series of bank mergers, failures, and crises that have resulted in a sharp reduction in the number of banks and branches in several countries. During the same period there have also been increases in numbers of banks and branches in arguably under-banked countries. In this turbulent setting the prospective introduction of the euro is likely to have significantly reduced international differences in returns among financial intermediaries. We expect indications of convergence of marginal rates of return or cost to be stronger in the EMU than in other groups of countries.

We approach this question using the technique of statistical cost accounting. This method has been applied previously to samples of Indian, US, and Italian banks with some success (Cf. Hester [1964], Hester and Pierce [1975], and Calcagnini and Hester [1997]). Briefly, the method assumes that assets and liabilities have distinctive attributes and costs and that knowledge of the composition of a bank's noncash assets and liabilities should allow its profits to be predicted. Formally, let $\underline{y}$ measure a bank's net income in a

year, $\underline{a_i}$ measure the i_{th} noncash asset, and $\underline{l_j}$ measure the j_{th} liability, all divided through by the bank's total assets, $\underline{ta}$, where all assets and liabilities are the bank's average holdings over the year. Then the statistical cost accounting model for a bank in year t is:

$$1)\ y_t = \gamma_t (1 / ta_t) + \sum \alpha_{it}\, a_{it} - \sum \delta_{jt}\, l_{jt} + \varepsilon_t$$

If the parameter γ_t is negative, economies of scale are present. The parameters α_{it} measure the changes in the bank's net income that results from replacing one unit of cash with one unit of the i_{th} asset in year t; thus, they are marginal rates of return. The parameters δjt similarly measure the changes in the bank's net income that results from adding one unit of cash and one unit of the j_{th} liability in year t; they are marginal costs of liabilities. It is expected that αs should be positive and δs should be negative. A maintained hypothesis is that changes in cash assets have no effect on a bank's net income. This is arguable in the case of countries such as Italy where interest is paid on bank reserves, but defensible in the case of noninterest bearing reserves and till cash. Interbank deposits and loans are included in noncash assets and liabilities and, therefore, present no problem when the technique is applied. A bank's book net worth can be ignored because it contains no independent information; it is tautologically the difference between the reported values of the bank's assets and liabilities.

In Section V this model is estimated from samples of banks from nine different countries for each of five years.

IV DATA RESOURCES

The data analyzed in the next section of this paper have been assembled from several sources and present a number of challenges for studying trends in European banking and financial markets. Information about inflation and selected interest rates in a country comes from the International Monetary Fund's International Financial Statistics (IFS) year 2000 compact disk. No attempt has been made to use Euro Area data as reported in IFS.

Information about real per capita GDP, number of banks, aggregate bank assets, and bank income comes from files assembled by the Organization for Economic Cooperation and Development (OECD). The definition of banks that underlies bank aggregates differs across countries; data are not available in all years for some countries. Bank data are constructed from a sample of banks that countries use when reporting to the OECD. Data on the number of branches per capita in the OECD files are not the same as those reported by the European Central Bank (ECB), perhaps because of different definitions and samples of banks.

Data on automated teller machines, point of sale terminals, and information about transactions media and their use come from the Bank for International Settlements (BIS). Data on the number of branches per capita are not the same as those reported by either the OECD or the ECB. The BIS only reports information for large countries; data on some EMU countries are not available from the BIS.

Data on individual commercial banks that are used in the statistical cost accounting analysis are from International Bank Credit Analysis, Ltd. (Fitch-IBCA). This dataset, BankScope, is a collection of bank statements that have been assembled from reports that banks issued in accordance with reporting requirements established by different countries. The statements are, therefore, not strictly comparable. We restrict attention to individual commercial banks, consolidated bank holding companies with international subsidiaries, and consolidated bank holding companies with domestic subsidiaries. We avoid double counting by excluding bank holding companies that have banking units that also appear in the sample as individual commercial banks. In the empirical work reported in the present paper, we have excluded savings and co-operative banks, in an attempt to maintain some comparability across countries. Commercial and other types of banks have different behavioral characteristics. The percentages of banks in the BankScope dataset that are savings and co-operative banks in different countries differ from the percentages in the population of banks in the countries. By restricting attention to commercial banks, we avoid distortions that arise from non-proportional sampling.

The method used in selecting banks by IBCA seems to be an informal experimental design – essentially a collection of statements that have been published or are conveniently accessible. We are using the June 2000 compact disk from IBCA. On September 25, 2000, the IBCA website stated BankScope contains "Up to 8 years of detailed financial information on the top 6,000 European banks and the top 1,400 North American banks." The number of banks for which data are available for any country is substantially less than the number of existing banks. Table 5 summarizes the availability of data from BankScope. The last two columns report total assets in the BankScope sample expressed as a percentage of total banking assets as reported by the OECD for 1994 and 1997. The UK share exceeds 100% because some large international banks have their assets credited to the UK in the BankScope sample. We arbitrarily restrict attention to European countries in which there were at least 30 commercial banks available in one of the years 1993 – 98.[3] Data on US banks are included to facilitate comparisons. The second column indicates the numbers of all types of banks and the third the number of commercial banks that were available in at least one year of this period. The next five columns report the number of observations that were available for the statistical cost accounting analysis in each of the years, 1994 – 98.

For a bank in the BankScope file to be used in our statistical cost accounting analysis, its balance sheets must be available at both the beginning and end of a calendar year, must have the property that the sum of its assets equals the sum of its liabilities and net worth, and must have nonzero reported values for all variables that we study. As Table 5 suggests, many banks were lost when these rather weak standards were imposed. Further, because of national differences in accounting practices that are described in [Fédération des Experts Compatables Européens, 1996], BankScope balance sheet data can only be studied at very high levels of aggregation. Even such highly aggregated

[3] In this paper we arbitrarily excluded commercial banks located in Luxembourg because the vast majority are subsidiaries of foreign banks, with controlling banks located both in EMU and other countries. Their earnings were not expected to be well described by book values of their Luxembourg assets and liabilities. After completing the statistical cost accounting analysis reported in this paper, we did a second analysis that included Luxembourg. None of the convergence results changed; Luxembourg banks were essentially indistinguishable from other EMU banks in our sample when analyzing net income before taxes.

variables incorporate some small measurement errors, which impair the parameter estimates reported in the next section. Nevertheless, we believe this is the best available international source of information on commercial banks and that it yields valid insights about the process of financial integration in Europe.

We know of several other studies that have used data from BankScope. Two, by Bikker and Groeneveld [1998] and De Bandt and Davis [1999], report having similar concerns about data quality when describing their research projects:

> "Apart from common factors, the structure of the banking markets in individual EU countries also – still – depends on numerous country-specific features, e.g. national institutions, the degree of government intervention, the sophistication of the financial system, etc. Moreover, national balance sheet figures are not always perfectly comparable due to existing differences in national accounting practices and definitions." (Bikker and Groeneveld, p.15)

> "We focus on the spreadsheet format provided by IBCA which offers annual data that are reasonably comparable across countries. . . . It is necessary to stress that the sample is not exhaustive for any of the countries under review, in particular because the coverage of banks by IBCA has expanded over time. The question is therefore in which direction this may bias the results. . . . Finally, some of the banks that are recorded by IBCA only report partial information. . . . The variables chosen are shown as they appear in the harmonized balance sheets of banks in the IBCA database. The data hence remains vulnerable to any differences in accounting conventions. Whereas most of the variables are straightforwardly defined, it is important to note that total income is defined not to include capital gains but only commissions in respect of non-interest income." (De Bandt and Davis, pp. 11 – 2)

V EMPIRICAL RESULTS

a) Testing for convergence of time series. The Figures discussed in Section II strongly suggest convergence of selected time series is occurring in the EMU. In this subsection we formally test whether standard deviations calculated from cross sections of countries decrease over time[4]. Specifically, standard deviations calculated from three samples of countries are considered for each variable: i) the set of seventeen countries that are plotted in Figures 1 and 2, ii) the eleven EMU countries that appear in Figure 1, and iii) the six non-EMU countries that appear in Figure 2. In the following tests we have regressed the standard deviations of the variables being examined on time with and without a correction for possible first-order serial correlation of the error terms and, when necessary, on another variable. There were few substantive differences in the estimated time trend when the correction for first-order serial correlation was made; so, we report only results without the correction.

[4] We performed both β and σ convergence tests with very similar results. To save space, we report only the results of σ tests in this paper.

The first panel in Table 6 reports results about convergence of the coefficient of variation of real per capita GDP over the period 1960 - 97. Because all economies were growing over this 38-year period, it was expected and confirmed that heteroskedasticity was present – i.e., that the cross-sectional standard deviation increased over time. As noted in Section III, a somewhat arbitrary transformation that corrects for growth is to divide the standard deviation by the mean of real per capita GDP in each year. As the table indicates, analysis of the resulting coefficients of variation indicates convergence because a significant negative trend was found in each of the three samples. Convergence was weakest for the EMU sample, before the introduction of the euro. Figure 1 suggests that relatively weak convergence in the EMU area largely reflected the divergent trajectories of three economies, Finland, Luxembourg, and Portugal.

The second and third panels are about inflation rates over the 21-year period 1978 – 98, a period coinciding with the life of the EMS. A regression of the standard deviation of cross sections of inflation rates on time indicates that a strong negative trend exists for EMU countries, but not for other countries. Because inflation rates themselves were trending downward, it is again possible that heteroskedasticity is confounding the picture. An analysis of the coefficient of variation of inflation rates, comparable to that in the preceding paragraph, suggests inflation rates were *diverging* in the case of non-EMU countries but were essentially unchanged for future EMU countries. In both panels the process of European unification appears to have a convergent effect on inflation relative to changes in inflation in the other six countries.

The fourth and fifth panels report results about nominal short-term money market interest rates, over the same 21-year period. The IMF incompletely reported the money market rate for Luxembourg, so there are only ten EMU interest rates being studied. The hypothesis is that European integration should result in a rapid convergence of nominal interest rates. One distorting event occurred in 1992 when there were speculative assaults on several European currencies, both in and outside of the future EMU. We have included a binary variable that takes on a value of one for 1992 and zero for other observations. When regressing the standard deviation of short rates on the binary variable and the trend variable, time, the t-ratios for the trend variable were significantly different from zero at the .05 level and negative for all groups, but considerably more negative for the EMU countries than for the other countries. The coefficients on the binary variable were all positive, but not significantly so for the ten EMU countries. As noted in Section II, it is difficult to determine if the negative trend was a result of the downtrend in mean money market rates or convergence. Again, in an attempt to separate these two possible sources of a downtrend, we assumed that the effect of the downtrend in interest rates could be eliminated by deflating data for a year by the mean interest rate. We regressed the coefficient of variation on time and the binary variable. As in the preceding paragraph, the result suggests that European monetary integration was effective in facilitating convergence, because the coefficient of variation had an insignificantly negative coefficient on the trend variable for the sample of prospective EMU countries, but was positive for the non-EMU countries and significant at conventional levels. The non-EMU countries appear to be experiencing diverging nominal money market rates; the EMU countries were at the same time weakly converging. The coefficient on the binary variable was not significant in regressions of the coefficient of variation in any of the three samples; the mean and the standard deviation of short rates rose proportionately

in response to the speculative attacks of 1992. Nominal money market rates and inflation are telling the same story about convergence.

Panels six and seven in the table present results for government bond yields over the same period. Regressions of both the standard deviation and the coefficient of variation on time are reported. In all three groups standard deviations have a significantly negative time trend, but about twice as large in absolute value for the eleven EMU countries as for the non-EMU countries. The coefficient of variation has a significantly negative trend for the EMU countries; for the non-EMU countries the trend was positive and significant at the .05 level in a two-tailed test. This set of results strongly argues that bond interest rates in EMU countries were converging, relative to the other countries.

Panels eight and nine present results for *ex post* real money market interest rates over the same years. Real rates were constructed by subtracting rates of inflation of the GDP deflator from nominal rates studied above. Inspection of Figure 4 indicates that real interest rates in Portugal were exceptionally volatile between 1978 and 1986. Panel eight reports results with Portugal included and panel nine reports results with Portugal excluded from the set of EMU countries. Cross-sectional standard deviations are again regressed on time. In panel eight, the standard deviation has a significant negative trend for EMU countries, but not for non-EMU countries. In panel nine, which excludes Portugal, the same result obtains, although obviously the absolute value of the trend is smaller than in panel 8.

b) Convergence of bank portfolios and income flows. In this subsection, we attempt to analyze trends in interbank positions and off-balance sheet activities using information that has been reported by the OECD. From Table 3a, it is clear that trends in interbank assets and liabilities are very heterogeneous across the seventeen countries. There is no general trend evident for interbank positions across the countries, but there are some large changes for individual countries. In some cases, such as Italy, the change between 1989 and 1993 is the result of a restructuring of the way accounts are assembled. In large countries outside the EMU, such as Japan, the UK, and the US, the fractions of total assets held as interbank assets and liabilities are small relative to the average for countries in the EMU. The role of such cross holdings of funds in the EMU is unclear and deserves further inquiry.

Figure 6 reports plots of ratios of aggregate non-interest income to aggregate gross operating income and total assets for EMU countries and for seven non-EMU countries. Time series of non-interest income are not long enough for Ireland and the Netherlands to allow meaningful plots of these series. As the foregoing quotation from an ECB paper suggested, there is a positive trend in the ratios. Table 7a reports results of regressions of the ratio of non-interest income to gross income on time. Nine of sixteen (and six of nine EMU) country ratios of non-interest income to gross operating income have positive time trends that are significant at the .05 level; only Japan has a negative trend that is statistically significant. In Table 7b, five of sixteen (four of nine EMU) countries have trends in the ratio of non-interest income to total assets that are significantly positive. Three (two EMU) countries had significant negative trends. Because these OECD measures of income include realized capital gains and interest rates were falling, we initially viewed this result as only weakly supporting the hypothesis suggested by the ECB paper that EMU banks are rapidly increasing off balance sheet

activities. However, an unreported comparison of the ranking of either of these trends with the ranking of changes in money market interest rates between 1985 and 1998 suggests that there is no close relation. The charts in Figure 6 tend to support the ECB paper hypothesis in the most recent years. All EMU countries had increases in both ratios between 1994 and 1997. We further note that both ratios were rising rapidly in the US and that interest rates were not falling much there. We conclude that EMU banks probably have been significantly increasing off balance sheet activities, especially in the most recent years.

c) Testing for convergence of marginal rates of return on assets and costs of liabilities. In this subsection we report results of a statistical cost accounting analysis of banks in six EMU countries, Austria, France, Germany, Italy, the Netherlands, and Spain, and Denmark, the United Kingdom, and the United States for the years 1994 – 1998. The goal in this exercise is to determine whether marginal rates of return on assets and costs of liabilities at commercial banks are converging in three different populations, the subset of EMU countries, "Europe" consisting of the eight European countries, and the eight European countries and the United States. The dependent variable is net income before taxes (divided by a bank's total assets), which is subject to a number of adjustments; a better measure would have been net current operating income, but it is not available in BankScope. Asset and liability variables are deflated by a bank's total assets.

Tables 8 and 9 report results from estimating parameters of equation 1) for the nine countries and the three groups of countries for 1994 and 1998 respectively. In Table 8, with the exception of the United States, all coefficients for financial assets and liabilities have the expected signs and frequently are different from zero, using a 5% level of significance in a two-tailed test. These coefficients have the dimension of percent per year and can be interpreted respectively as marginal rates of return and marginal costs. If there were no frictions, the marginal rates and costs should be equal for a given asset in all countries. In 1994 a restrictive monetary policy in the US led to a doubling of short-term interest rates. The statistical cost accounting model is based on the assumption that interest rates in a country are constant over an interval of estimation. The US result suggests that banks with relatively more liabilities and fewer assets were more profitable when interest rates rose in 1994. An interpretation is that banks with such a portfolio composition also had a positive gap. Coefficients on fixed assets vary widely and have different signs. The composition of fixed assets varies widely across countries; they surely are not valued at market. We offer no interpretation for these coefficients. With the exception of the Netherlands, the coefficients on the reciprocal of total assets are not different from zero and thus provide no support for a hypothesis that there are economies of scale. In six of the nine countries, the F-tests imply that a hypothesis of no relation between portfolio composition and net income cannot be rejected. The statistical cost accounting model receives only modest support from the 1994 data.

In contrast, results for 1998 support the statistical cost accounting approach strongly. Only the regression for Germany has an F value consistent with not rejecting the null hypothesis. In all twelve regressions, coefficients on assets have positive signs and coefficients on liabilities have negative signs. In most cases estimated parameters are significantly different from zero. An interpretation of the change between 1994 and 1998 is that European unification has increasingly compelled banks to compete and to allocate

bank funds more efficiently at the margin. Again, there is little evidence of economies of scale, although the coefficient on the reciprocal is significant in the case of France.

Table 10 reports time series of mean reported net income expressed as a percentage of total assets and the estimated parameters for each of the financial asset and liability variables for the years 1994 – 98. As in the preceding two tables, estimated parameters have the expected signs in the vast majority of cases, although their values are noisy.[5] Income before tax tends to be highest in the three non-EMU countries, Denmark, the UK, and the US; it is rising in the EMU countries.

To test whether parameter differences in Table 10 are statistically significant, we employ analysis of covariance. Table 11 reports F-test results of three hypotheses for each of the five years: i) There are no differences in regressions estimated for all nine countries, ii) There are no differences in regressions estimated for the eight European countries, and iii) There are no differences in regressions estimated for the six EMU countries.

The first row in Table 11 indicates that there is no evidence of convergence in regression estimates of rates of return and cost and scale economies over the set of nine countries. The second row, reporting degrees of freedom, shows that the number of banks in BankScope increased about 20% over the five years. Confining attention to Europe, the third row indicates that the F values from the analysis of covariance decreased monotonically over time. However, the null hypothesis that marginal rates of return and cost are identical across countries is rejected in every year. The fifth row reports F values for the six EMU countries. The null hypothesis is rejected in the first three years, with steadily decreasing F values, but cannot be rejected in 1997 or 1998.[6] Thus, one can conclude that European integration has caused bank marginal rates of return and cost to converge to the point where they are no longer significantly different by 1997 in the EMU. A similar conclusion cannot be made for the larger groups of countries. The only *caveat* is that the number of banks in the BankScope EMU sample grew by about one-third during this five-year period, as shown in the sixth row. It might have been a cleaner test of convergence if the same group of banks had been studied, but that would have required a large decrease in the number of banks in each country's sample in every year.

VI SUMMARY

Europe and especially the countries in the EMU are in the process of removing artificial barriers to the flows of goods, people, and funds across borders. This is very much a work in progress. The equilibrium toward which the economies of Europe are moving is not well defined. There is no strong argument for believing that economic measures in a set of countries should move monotonically to their equilibrium values. As explained in Section II, there are many forces impelling Europe toward a new equilibrium. These include the removal of barriers and the consequent movement of

[5] Detailed tables for 1995 – 97, analogous to those for 1994 and 1998, are available from the authors.
[6] As implied in footnote 3, the same result obtains when the sample is expanded to seven countries by adding Luxembourg.

factors of production, explicit and market-driven harmonization of regulation and supervisory standards, privatization of state sponsored enterprises, and fiscal redistribution of resources by the European Union.

The present paper reports results from three different tests of convergence. First, we employ σ tests that examine whether standard deviations of selected measures decrease over time as European consolidation proceeds. As explained in Section III, because some series we study are likely to have heteroskedastic error terms for reasons that are quite unrelated to European consolidation, we have somewhat arbitrarily also examined trends in coefficients of variation of a series. We found that five of the original EC countries and Austria did seem to have relative convergence in real per capita income, as seen in Figure 1, but in panel 1 of Table 6 the trend in the coefficient of variation among then prospective EMU countries was smaller in absolute value than was the corresponding trend for other countries being considered. The other countries included the world's two largest economies, the US and Japan, and other major EU countries that are not in the EMU. Convergence in real per capita GDP is not conspicuously more evident among countries in the EMU, at least until 1997.

There is evidence of convergence in inflation rates, real and nominal money market rates, and in government bond rates. Convergence is strongly suggested in Figures 3 – 5 and in panels 2 – 9 of Table 6. In panels that report estimated trends in standard deviations, trends for all groups of countries are negative and always largest in absolute value and significant at the .05 level for EMU countries. In panels that report estimated trends in coefficients of variation, trends for EMU countries were always negative and smaller than those for other groups of countries. We interpret these results as supporting the general thesis that European unification has led to convergence in financial markets, even though there remain differences in institutions and practices across countries. As argued in the introduction, convergence should be first seen in financial markets, because funds flow across borders more easily than labor or other factors of production.

Second, we study whether there are distinctive differences and changes in bank portfolios and earnings that might be expected to accompany financial integration in the context of continuing regulatory distortions. Banks can avoid regulations by shifting accounts and activities to other countries and off balance sheets where regulations are less stringent and enforcement is weaker. These tests are seriously compromised by the ongoing rapid technological change in finance, which is evident in Tables 2 and 4c, because such change also affects these variables. Changes in payments technology are remarkably heterogeneous across countries, both in the EMU and elsewhere. Interbank deposits were expected to be high and rising as banks struggled to compete in markets with heterogeneous regulations. In Table 3 it can be seen that interbank deposits vary enormously across countries as a fraction of total assets; they tend to be high in EMU countries but there is no general trend.

Trends in the ratio of non-interest income to gross income and to total assets are reported in Figure 6 and Table 7. They also convey a mixed picture. The trend is generally positive in both series, but this could be an artifact of the fact that interest rates have been falling, because non-interest income includes realized capital gains in the OECD accounts. As we report in the preceding section, there is no close relation between

changes in interest rates and the trends in Table 7. A clear majority of the EMU country trends are positive, which suggests that income from fees and other off balance sheet sources were rising relative to total bank income and assets. Both sets of the non-EMU country trends were about equally divided between being positive and negative. We are inclined to accept the interpretation that growing non-interest income reflects both an equilibrating adjustment to continuing regulatory barriers, new financial services, and technical progress in intermediation.

Third, the analysis of BankScope data provides further evidence of convergence in financial markets of EMU countries over the years 1994 - 98. Using statistical cost accounting, we report evidence of convergence of marginal rates of return on assets and cost of liabilities in Tables 8 – 11. The complete results of the analysis for 1994 and 1998 are reported in Tables 8 and 9. The method yielded mostly plausible results in both years, but was much more successful in 1998. An interpretation is that variations in assets and liabilities across banks were more closely related to variations in bank net income then, because banks were forced increasingly to compete for assets and liabilities in markets with well-established shadow prices. Table 10 reports parameter estimates obtained for banks in nine countries and three larger regions in each of the years 1994 – 98, and mean rates of return on total assets. The estimates are noisy, in part because of small and changing samples, heterogeneous national accounting methods, and fluctuations in national money market rates. Table 11 reports results of analyses of covariance for the three larger regions. The resulting F ratios imply that there were significant variations in the estimated rates of return and cost for all nine countries (eight European countries and the US) and for the eight European countries, when they were aggregated into a region. In other words, a hypothesis of convergence to a single set of market prices was rejected.

However, when attention was confined to countries in the EMU area, an analogous hypothesis of convergence could be rejected in each of the years 1994, 1995, 1996, but not in 1997 and 1998. The obvious conclusion is that European unification has proceeded to the point in 1997 and 1998 that one can no longer reject the hypothesis that there is a single market for banks in the EMU. While differences undoubtedly exist across local markets, there appears to be movement towards equality in marginal rates of return across countries. Efficiency gains from having a single set of shadow prices (marginal rates of return and cost) in banking markets should result in improved allocations of resources in the years to come.

Madison, Wisconsin October 10, 2000

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Table 1 - Gross Domestic Product Deflators (1995=100)
(Annual % Growth Rates for the Calendar Years Shown[a])

	1971	1973	1975	1977	1979	1981	1983	1985	1987	1989	1992	1994	1996	1998
Austria	6.02	7.66	7.89	8.61	3.58	6.56	3.66	3.08	2.11	2.74	4.33	2.85	1.28	0.63
Belgium	5.55	7.32	12.34	7.52	4.50	5.68	5.65	7.73	1.43	4.91	3.62	1.83	1.16	1.58
Denmark	7.94	10.76	13.84	9.86	7.90	11.78	8.38	4.92	5.13	5.23	2.89	1.72	2.48	2.07
Finland	7.61	14.11	13.27	9.93	8.78	10.46	8.57	6.39	4.68	6.53	0.86	2.00	-0.23	2.87
France	6.34	8.47	12.97	9.25	10.11	11.39	9.73	5.76	2.95	3.26	1.99	1.79	1.47	0.74
Germany	7.74	6.36	5.66	3.73	3.80	4.24	3.26	2.05	1.88	2.41	5.04	2.51	1.03	1.03
Greece	3.15	19.43	12.32	12.92	18.63	19.74	19.12	17.67	14.26	14.77	15.12	11.84	7.38	4.91
Ireland	10.53	14.78	23.87	13.26	13.67	17.44	11.73	5.27	2.20	5.44	2.77	1.71	2.28	5.64
Italy	6.64	13.77	15.95	19.16	15.65	19.13	14.47	9.01	6.12	6.46	4.55	3.48	5.17	2.83
Luxembourg[b]	-0.81	12.20	-0.86	1.17	6.35	7.18	6.82	2.98	0.93	3.47	4.28	5.34	0.03	n.a.
Netherlands	8.49	8.84	9.81	6.02	6.54	6.42	1.46	2.91	-0.72	1.22	2.38	1.84	0.32	2.91
Norway	6.67	9.17	10.04	8.32	5.52	12.86	6.99	5.21	6.93	5.71	-0.43	-0.16	4.70	-0.52
Portugal	5.07	7.99	16.22	26.39	19.69	17.61	24.60	21.73	10.13	12.13	10.62	6.07	3.08	4.13
Spain	7.83	11.84	16.78	23.38	16.93	12.57	11.77	7.71	5.85	7.01	6.87	3.99	3.18	2.23
Sweden	7.29	7.12	14.91	10.96	7.48	9.55	10.03	6.73	5.07	8.03	1.05	6.82	1.42	1.26
United Kingdom	8.95	6.85	26.64	13.48	15.18	11.94	5.94	5.74	5.73	7.89	3.51	1.08	3.05	2.47
Western Europe[c]	6.56	10.42	13.23	11.50	10.27	11.53	9.51	7.18	4.67	6.08	4.34	3.42	2.36	2.32
EMU Countries	6.46	10.30	12.17	11.67	9.96	10.79	9.25	6.78	3.41	5.05	4.30	3.04	1.71	2.46
United States	5.04	5.60	9.33	6.44	8.33	9.33	3.96	3.16	3.00	3.81	2.43	2.08	1.94	1.17
Japan	5.57	12.87	7.69	5.84	3.04	3.69	1.39	1.55	0.15	2.14	1.73	0.17	-1.44	0.70

Source: IMF, International Financial Statistics, Compact Disk, August 2000.

a) Years 1990 and 1991 were excluded since figures from Germany before and after the reunification are not comparable

b) Data for Luxembourg are from OECD (1990=100)

c) Mean of national inflation rates; Switzerland is not included.

Table 2 - Trends in the Use of Transactions Media – Volumes

	ATMs/mil. resident		POS terms./ mil. resident		ATM cards/ thou. resident		Ann. ATM trans. per resident		Annual checks written per res.	
	1993	1998	1993	1998	1993	1998	1993	1998	1993	1998
Belgium	279	562	5251	9124	836	1178	11	16	13.786	8.520
Canada	556	774	2142	12960	476	1829	38	53	73.000	55.592
France	325	490	9185	9949	372	514	13	21	85.076	81.932
Germany	308	556	345	2816	552	1114	12[a]	17	11.501	8.001
Italy	268	482	1360	5977	287	471	4	8	10.947	11.554
Japan	936	1127	168	127	1769	2030	3	6	2.628	2.056
Netherlands	291	419	1600	8569	82	261	20	27	14.274	2.968
Sweden	256	281	3064	8405	1313	776	28	38	8.398	.339
Switzerland	439	722	1433	7167	716	1060	7	11	2.210	1.081
United Kingdom	328	416	4639	10304	888	1421	21	31	49.591	42.399
United States	367	692	600	6289	2059	2767	30	41	233.528	247.873

Source: Bank for International Settlements, 1998, 2000.
a. 1994

Table 3 – Aggregate Bank Portfolios

COUNTRY	YEAR	ASSET (*)					LIABILITIES (*)						R.O.A. before tax (%)	*Number of banks*
		Cash & balance with C. B.	Inter-bank deposits	Loans	Securities	Other assets	Capital & reserves	Borrow. from C. B.	Inter-bank deposits	Non-bank deposits	Bonds	Other liabilities		
AT (1)	1987	1.9	35.7	45.7	11.4	5.4	3.5	0.1	36.7	40.2	15.1	4.5	0.654	*1252*
	1989	2.0	31.9	49.2	11.6	5.2	4.3	0.0	33.6	41.0	17.2	3.9	0.716	*1240*
	1993	1.8	29.8	51.1	11.2	6.1	5.0	0.0	29.4	44.4	16.9	4.3	0.485	*1063*
	1997	1.5	28.1	51.2	16.1	3.1	4.5	0.0	30.1	42.0	17.8	5.5	0.428	*995*
BE (1)	1985	0.2	32.5	33.5	29.4	4.3	2.5	0.0	46.2	29.7	16.5	5.0	0.200	*120*
	1989	0.2	31.7	34.2	29.1	4.7	3.4	0.0	43.7	33.9	13.2	5.9	0.129	*120*
	1993	0.2	32.5	33.4	28.5	5.4	2.5	0.0	39.7	33.0	18.0	6.8	0.258	*150*
	1997	0.2	32.0	31.8	30.3	5.7	2.6	0.0	40.8	35.3	13.2	8.0	0.251	*131*
DK (2)	1985	5.0	16.1	35.2	27.5	16.2	8.7	3.0	23.2	48.2	0.0	16.9	3.720	*217*
	1989	1.6	16.2	43.1	21.7	17.4	8.7	1.9	25.6	46.8	0.0	17.0	0.276	*199*
	1993	3.6	24.2	45.9	22.3	4.0	5.5	8.0	23.9	53.6	2.2	6.7	0.646	*112*
	1997	5.5	17.8	44.7	27.4	4.6	6.5	2.5	26.5	52.0	4.0	8.4	1.054	*92*
FI (1)	1985	4.6	4.3	63.9	9.6	17.5	6.4	2.3	3.7	64.4	2.3	20.9	0.389	*635*
	1989	4.7	3.6	65.2	13.1	13.5	6.7	0.6	2.6	50.8	6.5	32.7	0.289	*553*
	1993	1.8	6.8	53.0	20.6	17.9	5.0	0.8	2.3	49.3	8.6	34.0	-1.421	*358*
	1997	2.1	3.5	54.7	22.0	17.6	5.5	0.4	3.7	56.5	5.7	28.2	0.860	*348*
FR (1)	1988	1.4	42.2	39.5	7.6	9.3	2.9	1.5	45.1	23.7	16.6	10.1	0.481	*2050*
	1989	1.2	41.4	39.9	7.8	9.8	3.1	1.4	44.7	23.1	17.3	10.4	0.414	*2021*
	1993	0.2	39.5	40.1	14.6	5.6	4.5	0.2	38.8	25.6	24.0	7.0	0.122	*1635*
	1997	0.3	37.3	36.0	19.8	6.6	4.0	0.2	38.8	29.8	17.2	10.0	0.278	*1288*
GE (1)	1985	2.7	20.8	58.5	15.3	2.8	3.6	3.3	21.8	54.0	13.7	3.6	0.716	*4439*
	1989	2.5	24.5	55.1	15.3	2.6	3.8	4.4	22.9	52.8	12.5	3.6	0.498	*4089*
	1993	1.7	22.1	54.8	18.8	2.5	4.0	4.2	22.9	51.1	13.2	4.6	0.584	*3769*
	1997	1.1	22.6	52.2	21.5	2.7	4.1	2.5	27.9	45.1	14.8	5.6	0.468	*3284*
GR (3)	1989	18.0	5.4	31.3	36.7	8.6	3.1	0.4	1.9	82.2	0.0	12.4	0.457	*15*
	1993	17.6	7.8	23.8	36.5	14.3	4.6	0.2	2.8	78.5	0.9	13.1	1.057	*20*
	1997	17.7	13.5	31.9	32.6	4.3	5.1	2.9	7.0	78.8	0.4	5.8	0.994	*19*
IE (1)	1995	7.8	9.2	36.8	21.6	24.6	3.9	0.8	10.3	45.2	8.9	30.9	1.500	*44*
	1997	7.4	7.4	42.3	14.2	28.6	5.4	0.4	8.5	43.0	8.2	34.5	1.347	*52*

(*) Percentage of total assets. Source: Bank Profitability (OECD)
(1) All banks
(2) Commercial banks and savings banks
(3) Commercial banks

Table 3 (continued)

COUNTRY	YEAR	ASSET (*)					LIABILITIES (*)						R.O.A before tax (%)	*Number of banks*
		Cash & balance with C. B.	Inter-bank deposits	Loans	Securities	Other assets	Capital & reserves	Borrow. from C. B.	Inter-bank deposits	Non-bank deposits	Bonds	Other liabilities		
IT (1)	1985	4.5	7.1	42.6	14.5	31.3	6.4	0.1	7.4	38.1	8.0	39.9	0.967	*422*
	1989	3.1	6.6	41.2	12.2	36.9	6.2	0.1	7.1	31.3	13.4	41.8	0.948	*391*
	1993	0.6	18.7	55.1	18.7	6.9	6.7	0.0	22.6	56.2	7.6	6.9	0.809	*335*
	1997	0.4	17.8	55.3	19.3	7.1	5.7	0.0	26.6	48.7	11.5	7.5	0.328	*255*
JP (3)	1985	0.0	15.2	55.8	12.2	16.8	2.3	0.7	0.0	75.8	0.8	20.3	0.458	*77*
	1989	0.0	16.1	53.7	13.3	16.9	3.0	0.4	0.0	76.1	0.8	19.7	0.463	*145*
	1993	0.0	10.7	65.3	13.8	10.3	3.7	0.6	0.0	77.5	0.8	17.4	0.185	*140*
	1997	0.0	5.9	65.5	14.3	14.2	2.8	0.7	0.0	75.0	0.9	20.6	-0.498	*136*
LU (3)	1985	0.2	54.5	32.0	6.8	6.5	3.5	0.0	66.7	23.0	1.5	5.4	0.334	*118*
	1989	0.2	60.2	23.9	7.3	8.4	3.5	0.0	50.0	38.5	3.2	4.8	0.310	*166*
	1993	0.9	58.4	22.3	14.8	3.6	2.6	0.0	43.9	44.2	4.3	5.0	0.519	*218*
	1997	0.2	54.4	18.7	22.5	4.1	2.3	0.0	46.6	37.6	8.3	5.2	0.533	*215*
NL (1)	1993	2.7	20.6	62.8	11.6	2.4	4.1	0.3	24.1	45.4	13.6	12.5	0.679	*175*
	1997	1.8	14.4	62.4	19.0	2.4	4.3	0.7	25.0	40.6	15.0	14.5	0.732	*169*
PT (3)	1985	5.7	14.6	53.6	7.9	18.1	5.6	1.0	1.6	77.1	0.8	13.9	0.331	*24*
	1989	12.8	12.1	37.4	15.0	22.7	10.3	0.3	4.9	73.2	0.9	10.4	1.024	*29*
	1993	8.7	18.9	35.8	22.9	13.7	9.5	1.0	19.7	54.9	1.5	13.5	0.982	*35*
	1997	4.0	27.4	33.8	19.1	15.6	8.1	0.3	28.7	46.3	1.8	14.8	0.779	*44*
ES (1)	1985	9.1	12.8	41.9	21.6	14.7	7.9	2.4	13.7	61.8	3.3	10.9	0.839	*364*
	1989	9.3	13.1	44.2	22.3	11.1	8.8	3.3	10.7	63.4	1.7	12.0	1.405	*333*
	1993	4.2	18.8	41.7	17.0	18.3	8.9	6.3	16.4	54.5	1.7	12.2	0.362	*316*
	1997	2.3	17.2	47.3	18.3	14.8	8.6	1.7	17.4	55.3	3.3	13.8	0.941	*307*
UK (3)	1985	1.9	20.8	59.5	6.7	11.0	4.5	0.0	n.a.	89.1	3.5	2.9	1.090	*54*
	1989	1.5	16.1	62.2	6.9	13.3	5.0	0.0	n.a.	87.2	3.4	4.3	0.183	*49*
	1993	0.8	14.9	54.5	16.0	13.8	3.8	0.0	n.a.	71.6	10.9	13.7	0.755	*37*
	1997	0.5	12.6	53.0	19.9	14.0	4.1	0.0	12.5	52.6	13.7	17.0	1.152	*44*
US (3)	1985	5.7	6.7	63.8	17.6	6.2	6.2	0.0	2.5	75.0	0.5	15.8	0.911	*14393*
	1989	5.3	5.3	65.2	18.2	6.0	6.2	0.0	1.6	75.5	0.6	16.1	0.765	*12728*
	1993	4.2	3.2	60.7	25.8	6.2	8.0	0.0	1.2	72.9	1.0	16.8	1.760	*11001*
	1997	3.9	3.2	63.3	20.2	9.3	8.3	0.0	1.0	67.3	1.2	22.1	1.926	*9187*

(*) Percentage of total assets. Source: Bank Profitability (OECD)
(1) All banks
(2) Commercial banks and savings banks
(3) Commercial banks

Table 4a - Capacity indicator 1: Number of credit institutions

	1980	1985	1990	1995	1996	1997
FR	n. a.	2,105	2,027	1,469	1,407	1,299
AT	1,595	1,241	1,210	1,041	1,019	995
IT	1,156	1,192	1,156	970	937	935
UK	n. a.	n. a.	n. a.	564	550	551
ES	n. a.	695	696	506	458	416
FI	669	654	529	381	373	371
SE	n. a.	779	704	249	237	242
PT	35	224	260	233	228	235
LU	111	118	177	220	221	215
BE	176	165	157	145	141	134
DK	197	166	124	122	125	100
NL	n. a.	81	111	102	101	90
IE	61	58	48	56	62	70
GR	34	38	39	53	55	54
GE	5,356	4,740	4,720	3,785	3,675	3,578
EU	n. a.	12,256	11,958	9,896	9,589	9,285

Table 4b - Capacity indicator 2: Number of branches per 1,000 capita

	1980	1985	1990	1995	1996	1997
ES	0.62	0.76	0.83	0.93	0.95	0.97
LU	0.65	0.68	0.78	0.85	0.81	0.75
BE	n. a.	0.87	0.90	0.76	0.74	0.72
AT	0.45	0.54	0.58	0.58	0.58	0.58
GE	n. a.	0.61	0.63	0.59	0.58	0.57
FR	0.45	0.47	0.45	0.44	0.44	0.44
IT	0.22	0.23	0.31	0.41	0.43	0.44
NL	0.67	0.59	0.54	0.44	0.44	0.44
DK	0.71	0.72	0.58	0.42	0.42	0.42
PT	0.11	0.15	0.20	0.35	0.38	0.41
FI	0.80	0.89	0.58	0.38	0.34	0.32
IE	n. a.	0.24	0.27	0.29	0.30	0.32
UK	n. a.	0.38	0.35	0.33	0.32	0.32
SE	n. a.	0.42	0.38	0.30	0.28	0.29
GR	n. a.	0.17	0.19	0.23	0.23	0.24
EU ave. (unweigh.)	n. a.	0.52	0.51	0.49	0.48	0.48

Table 4c - Capacity indicator 3: Number of ATMs per 1,000 capita

	1985	1990	1995	1996	1997
ES	0.46	0.66	0.76	0.88	n. a.
LU	n. a.	n. a.	0.45	0.53	n. a.
AT	0.04	0.20	0.42	0.48	0.53
PT	0.01	0.06	0.36	0.45	0.52
GE	n. a.	0.18	0.44	0.46	0.50
BE	0.06	0.08	0.35	0.41	0.49
FI	0.14	0.57	0.47	0.45	0.45
IT	n. a.	0.17	0.38	0.42	0.44
FR	0.16	0.26	0.39	0.42	n. a.
NL	n. a.	0.18	0.36	0.37	0.38
UK	0.18	0.25	0.29	0.31	0.38
IE	0.07	0.14	0.26	0.28	0.33
SE	0.15	0.25	0.27	0.27	0.27
DK	n. a.	0.04	0.21	0.24	n. a.
GR	n. a.	0.02	0.13	0.14	0.15
EU ave. (unweigh.)	0.10	0.20	0.36	0.40	0.44

Source: ECB (1999).

Table 5 – Number and Share of BankScope Banks in Sample

Country	All banks	Commercial Banks	1994	1995	1996	1997	1998	BankScope sample total assets/OECD total assets	
			(Statistical Cost Accounting Studies)					1994	1997
Austria	122	37	14	20	30	33	34	27.8%	37.9%
Denmark	89	54	38	44	50	50	51	80.2%	91.7%
France[7]	329	211	162	174	172	175	178	51.0%	57.5%
Germany	1674	202	138	151	157	163	163	11.4%	48.1%
Italy	516	86	54	61	65	73	79	54.8%	68.2%
Netherlands	44	38	26	26	28	29	30	69.2%	67.8%
Spain	143	80	19	20	22	54	59	63.8%	70.3%
United Kingdom	126	122	66	67	76	84	85	120.8%	124.3%
United States	634	361	330	335	344	343	343	47.8%	67.4%

[7] One French bank, Banque d'Arbitrage et de Credit, was dropped because it reported a ratio of profits to total assets that exceeded 10000%, which severely distorted results. No other banks were dropped, although some accounting anomalies were evident, as explained in the text. An example of an anomaly that did not disqualify a bank is that occasionally banks reported having *negative* gross operating expenses!

Table 6 – Convergence tests

	Constant	Trend	Dummy 92	R-squared	Standard error	F-statistics
Panel 1 GDP per capita (CV): 60-97						
All countries	0.377 ** (0.006)	-0.190 ** (0.027)		0.586	0.0180	50.904 **
EMU countries	0.347 ** (0.004)	-0.101 ** (0.019)		0.437	0.0129	27.969 **
Non EMU countries	0.390** (0.009)	-0.224 ** (0.038)		0.486	0.0259	34.041 **
Panel 2 Inflation (SD): 78-98						
All countries	7.180 ** (0.687)	-0.233 ** (0.055)		0.489	1.5176	18.210 **
EMU countries	7.530 ** (0.685)	-0.314 ** (0.055)		0.635	1.5134	33.034 **
Non EMU countries	6.797 ** (1.040)	-0.144 (0.083)		0.137	2.2982	3.008
Panel 3 Inflation (CV): 78-98						
All countries	0.643 ** (0.110)	0.014 (0.009)		0.112	0.2429	2.399
EMU countries	0.721 ** (0.101)	-0.004 (0.008)		0.012	0.2222	0.2227
Non EMU countries	0.537 ** (0.113)	0.032 ** (0.009)		0.403	0.250	12.807 **
Panel 4 Money Market Rates (SD): 78-98						
All countries	4.326 ** (0.281)	-0121 ** (0.023)	1.483 * (0.643)	0.633	0.621	15.532 **
EMU countries	5.007 ** (0.377)	-0.172 ** (0.030)	0.506 (0.864)	0.641	0.834	16.081 **
Non EMU countries	3.197 ** (0.228)	-0.040 * (0.018)	3.031 (0.521)	0.665	0.503	17.851 **
Panel 5 Money Market Rates (CV): 78-98						
All countries	0.329 ** (.037)	0.129 (0.295)	0.012 (0.084)	0.013	0.0810	0.1174
EMU countries	0.397 ** (0.046)	-0.547 (0.372)	-0.065 (0.106)	0.137	0.1021	1.4307
Non EMU countries	0.126 (0.102)	0.024 * (0.008)	0.063 (0.232)	0.343	0.2243	4.6915 *

Table 6 (continued)

	Constant	Trend	Dummy 92	R-squared	Standard error	F-statistics
Panel 6 Government Bond Yield (SD): 78-98						
All countries	4.017 ** (0.172)	-0.113 ** (0.013)		0.780	0.3811	67.497 **
EMU countries	4.551 ** (0.273)	-0.157 ** (0.022)		0.732	0.6033	51.854 **
Non EMU countries	3.533 ** (0.249)	-0.078 ** (0.020)		0.451	0.5509	15.625 **
Panel 7 Government Bond Yield (CV): 78-98						
All countries	0.306 ** (0.013)	-0.213 * (0.101)		0.190	0.0280	4.458 *
EMU countries	0.372 ** (0.023)	-0.907 ** (0.179)		0.574	0.0497	25.629 **
Non EMU countries	0.236 ** (0.032)	0.525 (0.256)		0.181	0.0710	4.204
Panel 8 Real (ex-post) Money Market Rate (SD): 78-98						
All countries	4.209 ** (0.592)	-0.128 * (0.047)		0.280	1.3092	7.372 *
EMU countries	4.4962 ** (0.670)	-0.155 ** (0.053)		0.307	1.4815	8.432 **
Non EMU countries	3.109 ** (0.701)	-0.058 (0.056)		0.054	1.5482	1.091
Panel 9 Real (ex-post) Money Market Rate (SD): 78-98 – excluding Portugal						
All countries	2.939 ** (0.409)	-0.064 (0.033)		0.169	0.9013	3.873
EMU countries	2.650 ** (0.311)	-0.064 * (0.025)		0.258	0.6882	6.594 *

** significant at the 1% level, * significant at the 5% level.
CV= Coefficient of variation; SD= Standard Deviation.

Table 7a – Regressions of Ratios of Non-interest Income to Gross Income on Time

	Constant	Trend	R-squared	Standard error	F-statistic
Non-interest income/gross income (%)					
Austria: 87-97	19.418 ** (2.353)	2.002 ** (0.347)	0.787	3.6386	33.287 **
Belgium: 85-97	16.114 ** (1.848)	1.203 ** (0.233)	0.708	3.1411	26.698 **
France: 88-97	12.984 ** (1.827)	3.949 ** (0.294)	0.957	2.6738	179.92 **
Finland: 85-97	49.085 ** (3.044)	0.047 (0.383)	0.001	5.1739	0.015
Germany: 85-97	21.460 ** (1.528)	0.103 (0.192)	0.026	2.5962	0.290
Italy: 85-97	24.060 ** (1.927)	-0.0431 (0.243)	0.003	3.2748	0.032
Luxembourg: 85-97	17.170 ** (2.081)	1.869 ** (0.262)	0.822	3.5375	50.815
Portugal: 85-97	15.741 ** (2.109)	0.904 ** (0.266)	0.513	3.5840	11.577 **
Spain: 85-97	13.711 ** (1.086)	1.006 ** (0.137)	0.831	1.8455	54.117 **
Denmark: 85-97	17.392 (14.121)	-0.029 (1.779)	0.000	24.0018	0.000
Greece: 89-97	62.901 ** (6.656)	-0.751 (.711)	0.138	5.5064	1.116
Japan: 85-97	29.681 ** (3.836)	-2.523 ** (0.483)	0.712	6.5200	27.250 **
Norway:85-97	23.335 ** (2.703)	0.062 (0.341)	0.003	4.5949	0.033
Sweden: 85-97	26.763 ** (4.360)	1.276* (0.549)	0.329	7.4101	5.396*
United Kingdom: 85-97	35.697 ** (1.413)	0.529* (0.178)	0.446	2.4007	8.845*
United States: 85-97	27.615 ** (0.657)	0.821 ** (0.083)	0.899	1.1169	98.323 **

** significant at the 1% level, * significant at the 5% level.

Table 7b – Regressions of Ratios of Non-interest Income to Total Assets on Time

	Constant	Trend	R-squared	Standard error	F-statistic
Non-interest income/total assets (x 10,000)					
Austria: 87-97	42.541 ** (6.632)	6.800 ** (0.978)	0.843	10.2559	48.358 **
Belgium: 85-97	38.183 ** (3.898)	1.218* (0.491)	0.359	6.6252	6.1555*
France: 88-97	38.674 ** (6.524)	6.378 ** (1.052)	0.821	9.5503	36.800 **
Finland: 85-97	210.126 ** (14.762)	-4.367* (1.860)	0.334	25.0906	5.514*
Germany: 85-97	64.278 ** (4.324)	-0.680 (0.545)	0.124	7.3485	1.562
Italy: 85-97	116.256 ** (8.079)	-2.809* (1.018)	0.409	13.7308	7.617*
Luxembourg: 85-97	24.873 ** (3.240)	1.599 ** (0.408)	0.583	5.5062	15.350 **
Portugal: 85-97[a]	75.641 ** (9.087)	1.610 (1.145)	0.152	15.4443	1.978
Spain: 85-97	80.493 ** (6.196)	1.440 (0.781)	0.236	10.5311	3.403
Denmark: 85-97	134.168 (73.287)	-6.685 (9.233)	0.046	124.564	0.524
Greece: 89-97	196.726 ** (35.268)	3.088 (3.767)	0.088	29.177	0.672
Japan: 85-97	44.365 ** (5.143)	-3.850 ** (.648)	0.762	8.7414	35.308 **
Norway:85-97	108.115** (14.983)	-1.225 (1.888)	0.037	25.467	0.421
Sweden: 85-97	87.212* (35.414)	6.696 (4.462)	0.170	60.1914	2.252
United Kingdom: 85-97	196.251 ** (11.740)	-2.602 (1.479)	0.220	19.9543	3.094
United States: 85-97	127.071 ** (6.856)	8.112 ** (0.864)	0.889	11.6523	88.196 **

** significant at the 1% level, * significant at the 5% level.

a) data for 1990 and 1992 are missing. We have interpolated from adjacent years and used these imputed values in the reported regression for Portugal.

Table 8 – Statistical Cost Accounting Regression Results for 1994[a]

	Austria	France	Germany	Italy	Netherlands	Spain	EMU Countries
10000/Total assets	-44.62 (34.98)	-1.47 (2.50)	1.28 (1.41)	0.59 (6.48)	-33.68 ** (7.40)	-79.37 (37.89)	-0.32 (1.34)
Deposits	-54.49 * (19.36)	-4.29 ** (1.37)	-1.70 (1.11)	-7.43 (4.03)	-17.84 ** (3.88)	-0.14 (1.41)	-3.61 ** (0.80)
Other liabilities	-53.23 * (20.64)	-4.38 ** (1.45)	-1.66 (1.21)	-8.88 * (3.95)	-18.31 ** (3.88)	-5.06 * (1.98)	-3.81 ** (0.84)
Loans	51.89 * (21.60)	4.91 ** (1.45)	2.95 * (1.15)	8.43 * (4.14)	18.67 ** (3.82)	5.02 * (1.82)	4.49 ** (0.83)
Other earning assets	54.83 * (19.02)	4.86 ** (1.42)	1.90 (1.08)	8.41 * (3.68)	18.45 ** (3.88)	0.86 (1.74)	4.12 ** (0.79)
Fixed assets	80.34 (70.64)	3.51 (5.67)	0.18 (5.09)	5.53 (11.76)	56.05 * (22.18)	-6.62 (15.22)	3.20 (3.68)
R2	0.825	0.070	0.070	0.183	0.639	0.636	0.058
Standard error	2.00	1.55	1.11	1.03	0.65	0.93	1.44
Mean	1.55	0.58	0.83	0.45	0.76	0.85	0.70
No. of observations	14	162	138	54	26	19	413
F	6.29 *	1.97	1.67	1.79	5.91 **	3.79 *	4.18 **

Table 8 (continued)

	Denmark	United Kingdom	United States	Total Countries	European Countries
10000/Total assets	2.80 (3.15)	-3.16 (3.08)	-0.51 (1.91)	-2.46 * (1.03)	-0.95 (1.15)
Deposits	-2.50 (4.48)	-3.48 * (1.41)	2.08 (1.50)	-2.50 ** (0.57)	-3.81 ** (0.62)
Other liabilities	-3.91 (4.32)	-3.61 * (1.56)	3.33 * (1.52)	-3.35 ** (0.61)	-3.89 ** (0.64)
Loans	3.08 (4.31)	5.11 ** (1.52)	1.11 (1.46)	4.80 ** (0.60)	4.64 ** (0.64)
Other earning assets	3.60 (3.93)	3.75 ** (1.26)	-1.71 (1.52)	3.24 ** (0.57)	4.21 ** (0.59)
Fixed assets	-14.83 (14.62)	30.09 ** (10.66)	-18.96 * (7.88)	0.43 (3.20)	6.91 * (3.38)
R2	0.157	0.219	0.157	0.072	0.085
Standard error	1.11	1.94	1.33	1.56	1.51
Mean	0.51	1.59	1.88	1.22	0.80
No. of observations	38	66	330	847	517
F	0.99	2.80 *	10.02 **	10.83 **	7.94 **

a) All variables are in millions of dollars.
** significant at the 1% level, * significant at the 5% level.

Table 9 – Statistical Cost Accounting Regression Results for 1998[a]

	Austria	France	Germany	Italy	Netherlands	Spain	EMU Countries
10000/Total assets	-4.88 *	-19.16 *	4.75	3.63	-6.52	-2.36	-1.58
	(1.79)	(8.52)	(2.89)	(11.73)	(29.88)	(6.31)	(2.41)
Deposits	-1.37	-10.23 **	-1.68	-13.48 *	-12.39 *	-5.29 **	-6.20 **
	(1.91)	(2.79)	(2.38)	(5.96)	(4.63)	(1.74)	(1.31)
Other liabilities	-3.04	-11.48 **	-1.53	-12.56 *	-13.40 **	-5.39 **	-6.79 **
	(2.04)	(3.00)	(2.54)	(5.94)	(4.63)	(1.65)	(1.35)
Loans	2.82	11.37 **	2.70	11.97 *	12.77 *	6.74 **	7.22 **
	(1.95)	(2.99)	(2.45)	(5.92)	(4.63)	(1.65)	(1.34)
Other earning assets	3.18	12.71 **	2.31	16.04 **	13.39 **	5.57 **	7.63 **
	(1.97)	(2.95)	(2.25)	(5.94)	(4.44)	(1.59)	(1.27)
Fixed assets	1.26	23.83	11.15	14.28 *	110.40	12.11	8.26 **
	(1.49)	(12.71)	(17.84)	(6.83)	(62.91)	(16.58)	(3.09)
R2	0.384	0.095	0.030	0.276	0.398	0.235	0.050
Standard error	0.69	4.14	2.67	2.17	2.15	1.40	3.05
Mean	0.66	1.12	1.24	1.36	1.58	1.37	1.21
No. observations	34	178	163	79	30	59	543
F	2.91 *	3.01 **	0.81	4.63 **	2.65 *	2.71 *	4.74 **

Table 9 (continued)

	Denmark	United Kingdom	United States	Total Countries	European Countries
10000/Total assets	-4.59	1.97	-5.56	-2.98	-1.34
	(3.05)	(12.02)	(3.46)	(1.94)	(2.36)
Deposits	-17.27 **	-5.83	-6.64 **	-5.69 **	-6.11 **
	(3.72)	(3.00)	(1.96)	(0.95)	(1.15)
Other liabilities	-15.46 **	-10.69 **	-2.83	-6.73 **	-7.08 **
	(3.06)	(3.41)	(2.02)	(1.00)	(1.18)
Loans	18.55 **	9.85 **	8.33 **	7.97 **	7.69 **
	(3.43)	(3.21)	(1.99)	(0.99)	(1.17)
Other earning assets	16.52 **	5.26	6.76 **	6.78 **	7.23 **
	(3.22)	(2.78)	(1.93)	(0.92)	(1.10)
Fixed assets	18.82	89.77 **	32.91 **	11.75 **	12.05 **
	(15.67)	(23.81)	(10.80)	(2.84)	(3.26)
R2	0.406	0.255	0.119	0.044	0.058
Standard error	1.02	5.01	1.72	2.96	3.35
Mean	1.71	1.73	2.15	1.60	1.31
No. of observations	51	85	343	1022	679
F	5.13 **	4.50 **	7.59 **	7.74 **	6.89 **

a) All variables are in millions of dollars.

** significant at the 1% level, * significant at the 5% level..

Table 10a - Net Income Before Tax over Total Assets
(% per year)

	1994	1995	1996	1997	1998
Austria	1.55	0.67	0.75	0.65	0.66
Denmark	0.51	2.21	1.87	1.60	1.71
France	0.58	0.55	0.28	0.65	1.12
Germany	0.83	0.88	0.84	0.83	1.24
Italy	0.45	1.06	1.01	0.82	1.36
Netherlands	0.76	0.97	1.31	1.35	1.58
Spain	0.85	1.10	1.00	0.82	1.37
United Kingdom	1.59	1.74	1.80	1.77	1.73
United States	1.88	1.92	2.00	2.14	2.15
Total Countries	1.22	1.35	1.32	1.37	1.60
European Countries	0.80	1.01	0.93	0.97	1.31
EMU Countries	0.70	0.78	0.69	0.79	1.21

Table 10b – Estimated Marginal Cost of Deposits

	1994	1995	1996	1997	1998
Austria	-54.49	-17.12	-0.26	-0.80	-1.37
Denmark	-2.50	-7.08	-8.41	-17.95	-17.27
France	-4.29	-2.76	-2.44	-1.52	-10.23
Germany	-1.70	-1.68	-2.47	-1.67	-1.68
Italy	-7.43	-12.78	-7.84	-0.56	-13.48
Netherlands	-17.84	-17.71	-10.02	-9.81	-12.39
Spain	-0.14	0.12	-1.51	-1.78	-5.29
United Kingdom	-3.48	-3.74	-3.52	-5.22	-5.83
United States	2.08	-0.50	-0.30	-2.12	-6.64
Total Countries	-2.50	-2.76	-2.73	-2.62	-5.69
European Countries	-3.81	-3.54	-3.73	-3.59	-6.11
EMU Countries	-3.61	-2.79	-3.17	-1.93	-6.20

Table 10c – Estimated Marginal Cost of Other Liabilities

	1994	1995	1996	1997	1998
Austria	-53.23	-15.84	0.47	-1.54	-3.04
Denmark	-3.91	-10.30	-10.26	-17.66	-15.46
France	-4.38	-2.89	-2.49	-1.82	-11.48
Germany	-1.66	-1.44	-2.18	-1.63	-1.53
Italy	-8.88	-12.49	-8.70	0.21	-12.56
Netherlands	-18.31	-17.78	-9.82	-10.04	-13.40
Spain	-5.06	-3.10	-3.01	-2.15	-5.39
United Kingdom	-3.61	-3.73	-3.83	-4.65	-10.69
United States	3.33	0.05	0.07	-0.24	-2.83
Total Countries	-3.35	-3.85	-4.05	-3.63	-6.73
European Countries	-3.89	-4.08	-4.40	-3.87	-7.08
EMU Countries	-3.81	-3.04	-3.56	-2.20	-6.79

Table 10d –Estimated Marginal Rate of Return for Loans

	1994	1995	1996	1997	1998
Austria	54.83	15.28	0.89	2.12	2.82
Denmark	3.08	8.75	10.45	18.72	18.55
France	4.91	3.73	2.69	2.26	11.37
Germany	2.95	2.92	3.22	2.59	2.70
Italy	8.43	12.92	9.27	-0.07	11.97
Netherlands	18.67	18.12	9.24	9.41	12.77
Spain	5.02	5.12	5.04	4.14	6.74
United Kingdom	5.11	5.48	5.37	6.26	9.85
United States	1.11	3.47	3.17	4.14	8.33
Total Countries	4.80	5.20	5.11	4.82	7.97
European Countries	4.64	4.94	4.99	4.60	7.69
EMU Countries	4.49	4.02	4.00	2.78	7.22

Table 10e – Estimated Marginal Rate of Return for Other Earning Assets

	1994	1995	1996	1997	1998
Austria	54.83	15.26	0.82	1.79	3.18
Denmark	3.60	10.03	9.99	18.30	16.52
France	4.86	3.27	3.12	2.76	12.71
Germany	1.90	1.71	2.53	2.03	2.31
Italy	8.41	13.16	9.44	1.25	16.04
Netherlands	18.45	17.92	10.38	10.27	13.39
Spain	0.86	0.76	2.64	2.45	5.57
United Kingdom	3.75	3.60	3.44	4.69	5.26
United States	-1.71	1.12	1.39	2.87	6.76
Total Countries	3.24	3.58	3.81	3.60	6.78
European Countries	4.21	4.09	4.52	4.24	7.23
EMU Countries	4.12	3.28	3.93	2.80	7.63

Table 11 – Analysis of Covariance of Estimated Regressions
(F-tests)

Null hypothesis	1994	1995	1996	1997	1998
No differences among countries	6.247 **	5.348 **	4.684 **	5.005 **	3.268 **
Degrees of freedom	(48/799)	(48/849)	(48/896)	(48/956)	(48/974)
No European differences	3.312 **	3.071 **	2.575 **	2.528 **	1.905 **
Degrees of freedom	(42/475)	(42/520)	(42/552)	(42/619)	(42/637)
No EMU differences	3.996 **	1.929 **	1.741 **	1.200	1.255
Degrees of freedom	(30/377)	(30/415)	(30/438)	(30/491)	(30/507)

** significant at the 1% level

Figure 1 - GDP per capita, US$ - Exchange Rates and Price Levels of 1990

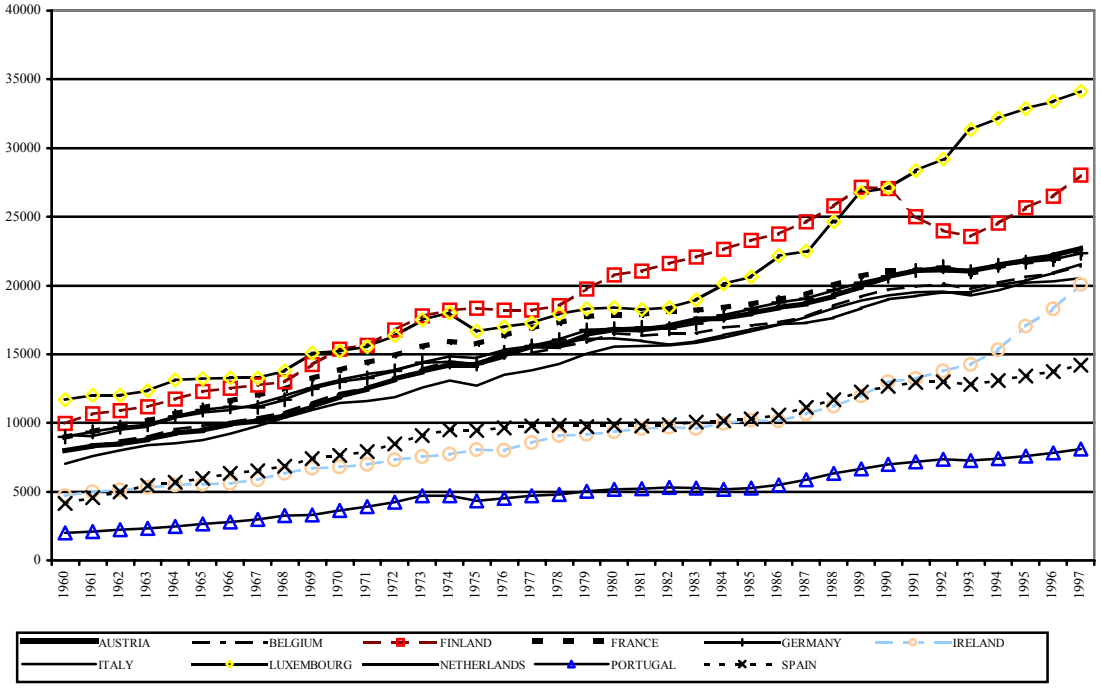

Figure 2 - GDP per capita, US$ - Exchange Rates and Price Levels of 1990

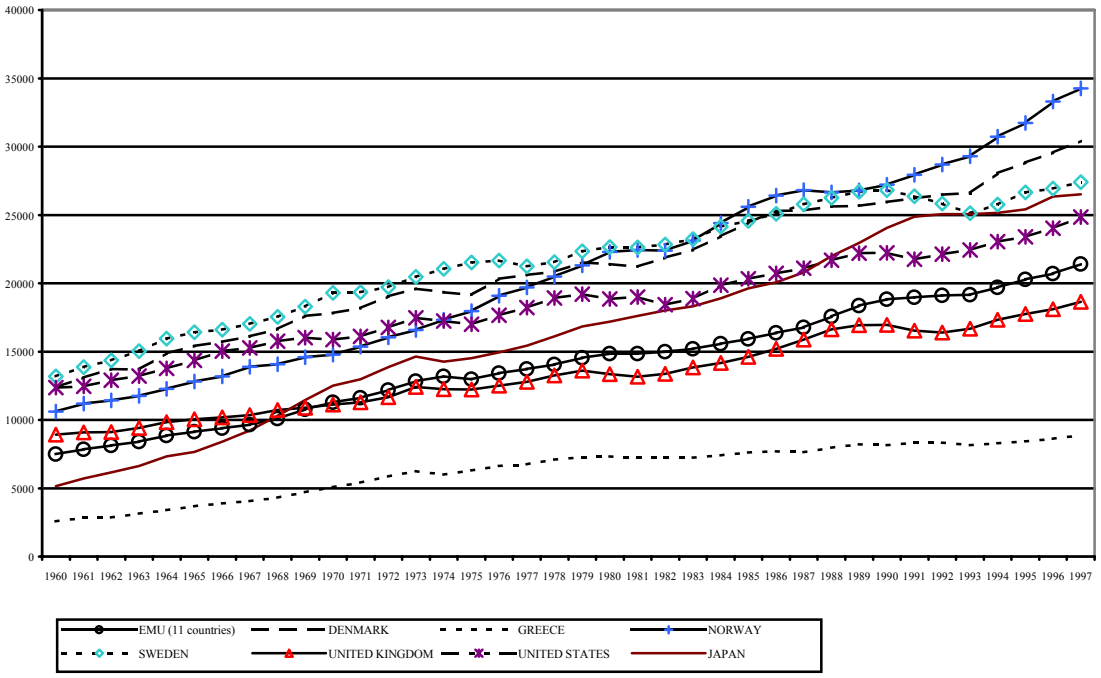

Figure 3 - Money Market Interest Rates for the EMU Countries

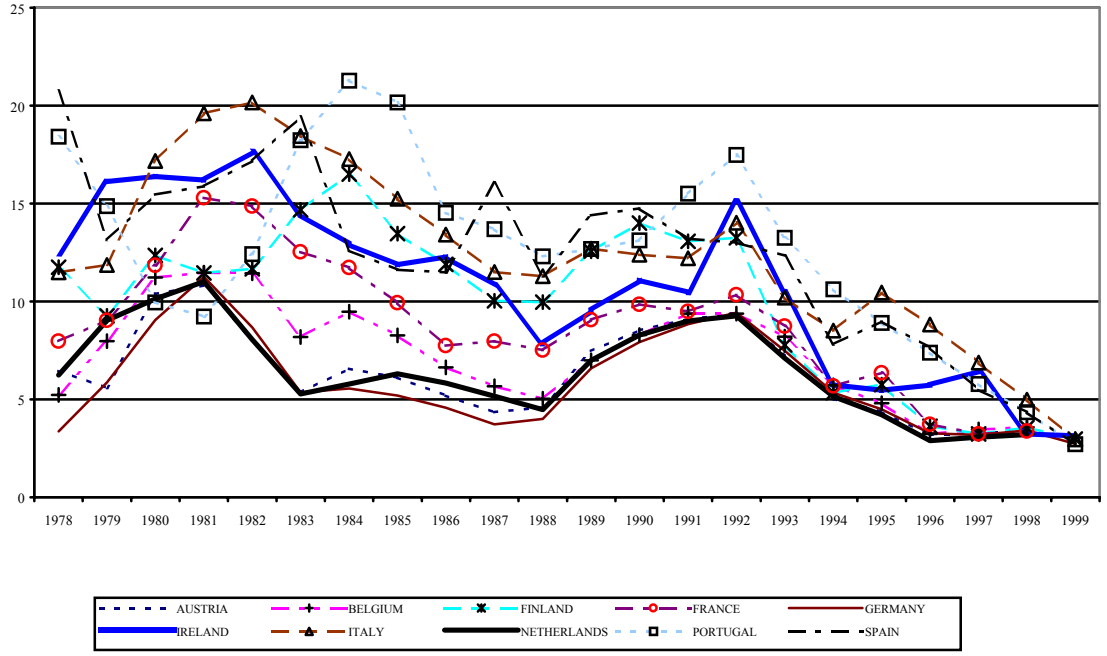

Figure 4 - Money Market Real Interest Rates for the EMU Countries

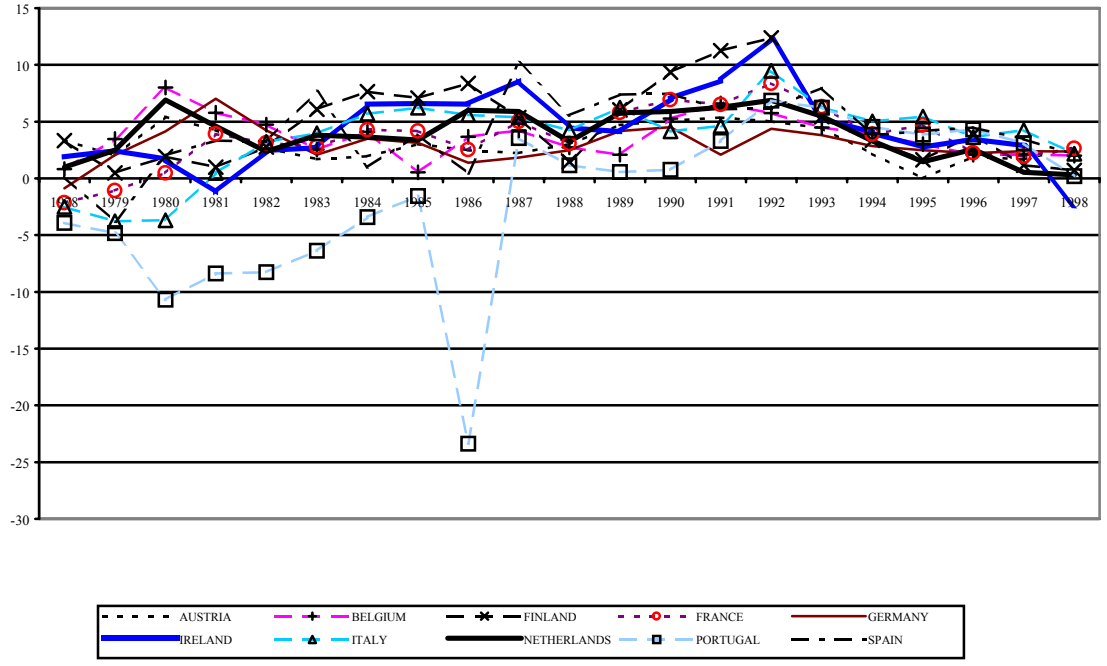

Figure 5 - Government Bond Yields for the EMU Countries

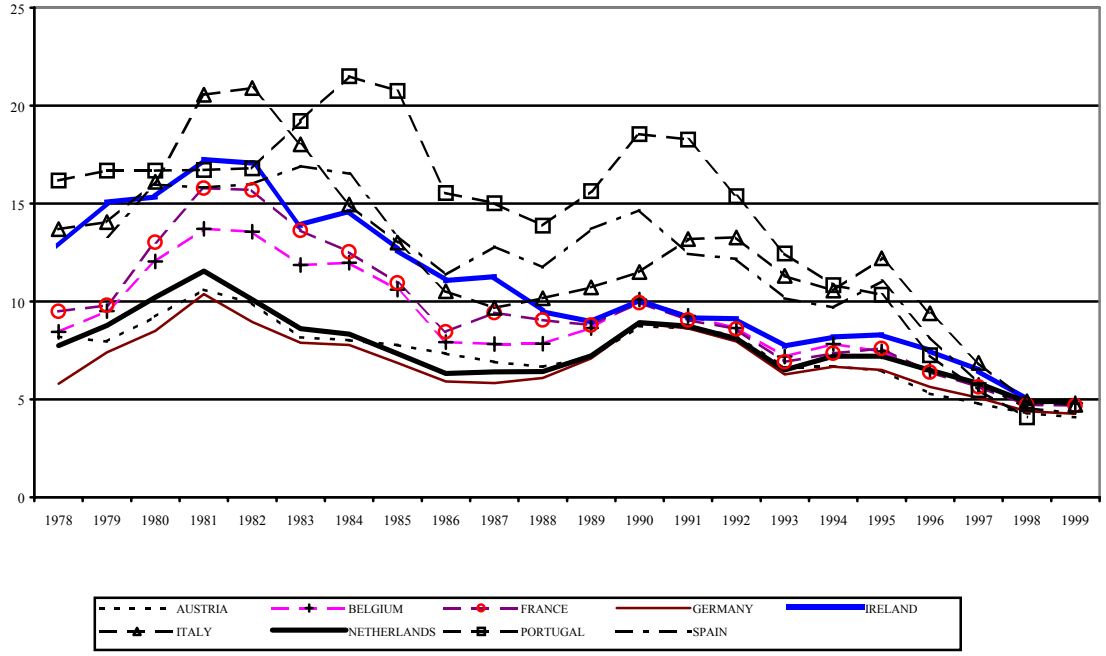

Figure 6 a - Non-Interest Income/Gross Income (%) - EMU Countries

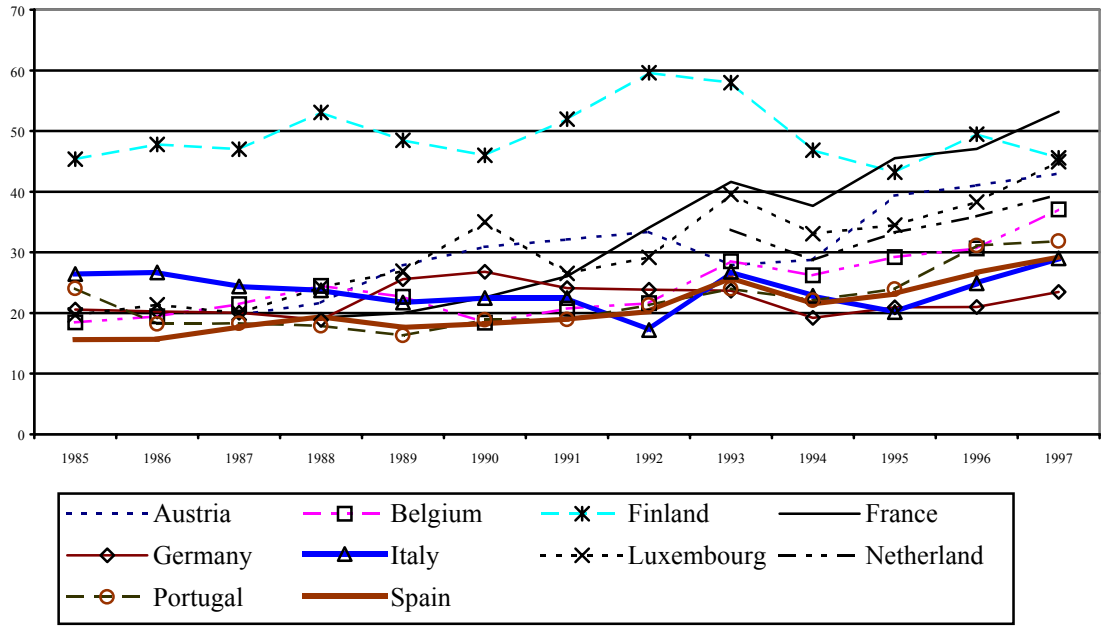

Figure 6 b - Non-Interest Income/Total Assets (%) - EMU Countries

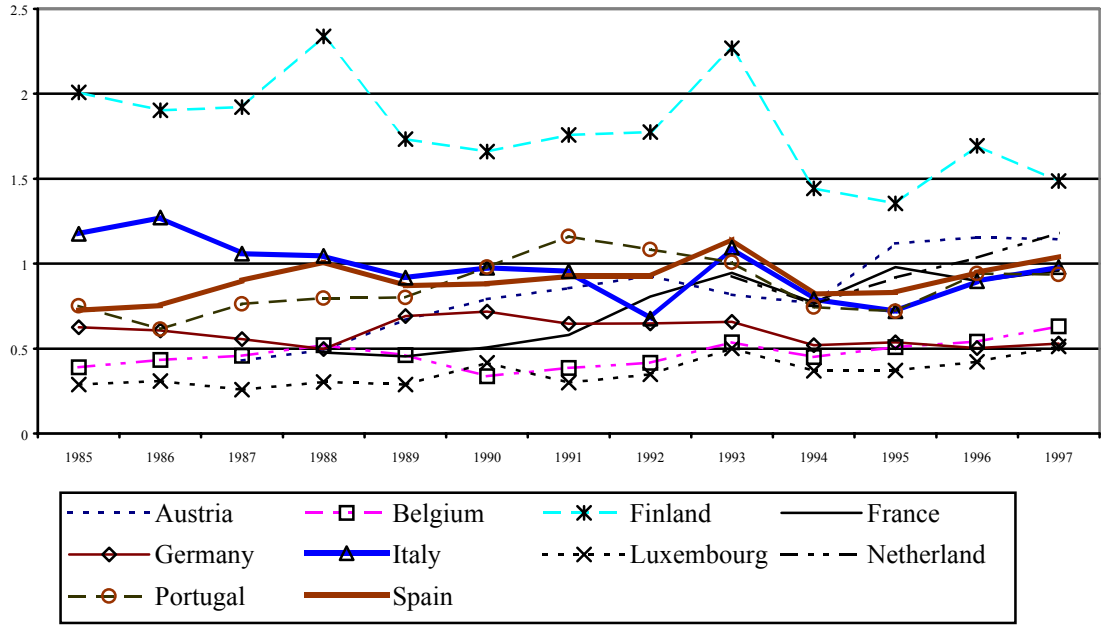

Figure 6 c - Non-Interest Income/Gross Income (%) - Non EMU Countries

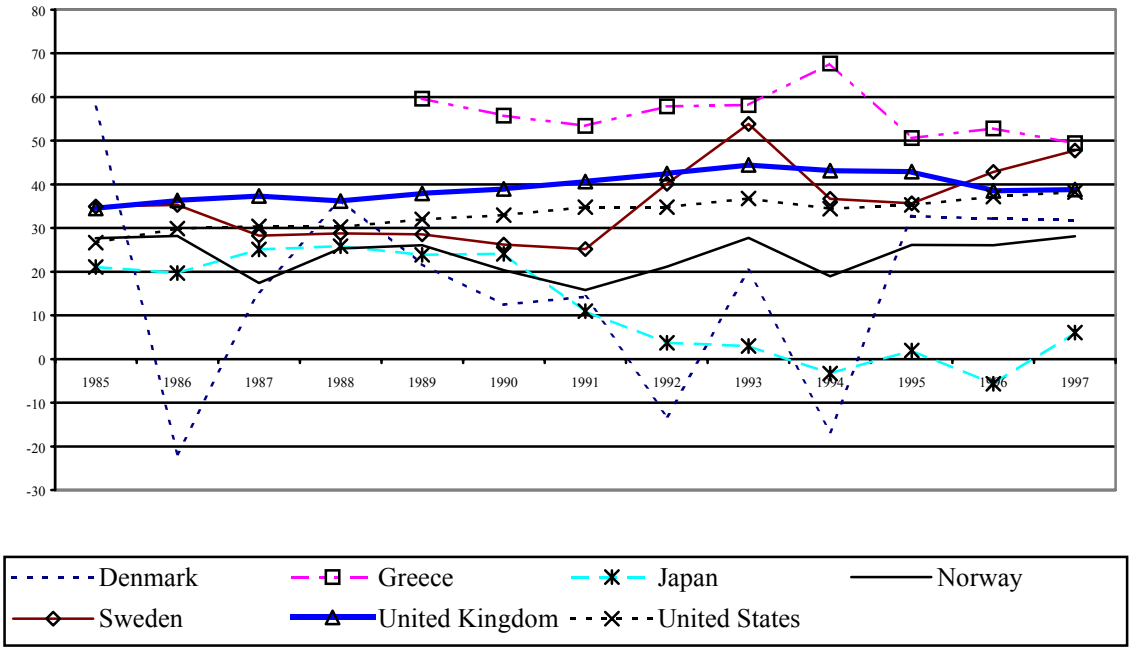

Figure 6d - Non-Interest Income/Total Assets (%) - Non EMU Countries