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WHAT IS AN EFFICIENT CAPITAL MARKET
FOR A MEDIUM-SIZED COMPANY?
THE RELATIVE EFFICIENCY OF BANKING SYSTEMS
ACROSS EU COUNTRIES

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I. Introduction

Capital market efficiency has long been considered one of the mainstays of a developed economy. Its impact on the various economic actors is the subject of a large body of research. In economic policy, measures have been implemented to provide both capital markets and financial institutions with a framework that could foster healthier economic systems.

Although much work has been done in this direction, we have identified two large gaps in previous research. First, market efficiency has been studied either in general or from the viewpoint of large institutions, without specific consideration of the needs of medium-sized companies (MSCs). Second, market efficiency has usually been measured in terms of the interest margin, which has been considered an absolute indicator of efficiency.

We take a different approach. We relate market efficiency to the conditions of the economy that is served by the market. The question is no longer: Which market is the most efficient given some absolute measure? but: Is the market efficient *relative to the economy it is serving?*

Capital markets for MSCs are usually restricted to financial institutions, mainly banks. Therefore, capital market efficiency for MSCs means the efficiency of the banking industry.

While previous approaches have afforded insights into the efficiency of the financial system for the overall economy, we argue that these results are not necessarily representative of the situation of firms in different countries in dealing with financial institutions.

The usual approach is to measure the banks' interest margins, but unfortunately these margins are affected by a number of factors and circumstances that should be taken into account; otherwise, direct comparisons can be misleading. Some previous research has adjusted the margin to take account of certain specific variables (for example, provisions for bad loans). However, these studies have been limited to quantitative factors that are easy to deal with statistically.

Note: An EU-sponsored research study.

We argue that international comparisons based on the interest margin –or some slightly adjusted version of the interest margin– are somehow arbitrary and biased. A more comprehensive study of the margin, with reference to an exhaustive list of relevant factors, is needed.

In this paper, we contrast the interest margin with the conditioning factors identified in various countries of the European Union. In many cases, the approach is necessarily qualitative, but it yields powerful insights into the relative situation of MSCs in different countries.

We shall measure efficiency across the European Union, taking the characteristics of each country into account. The main contribution of this paper lies in classifying the banking systems of the different countries in three categories: high, medium and low efficiency.

II. Conceptual framework

II.1. Research context

When considering the efficiency of the capital market for MSCs, we have to define what we mean by «capital market for MSCs». MSCs gain access to capital markets essentially through financial institutions. Banks and similar financial companies are the main providers of loans for this type of company, through the extensive use of short or long-term financial instruments. Other sources of capital, such as primary markets in debt or equity, are normally closed to MSCs. The main reason for this is the high issuance costs for small issues, as well as the lack of a credit rating or the company recognition required for such issues. Additional problems spring from the lack of liquidity that this type of issue might have.

It is for these reasons that –in order to analyse capital market efficiency for MSCs– this study will concentrate on the efficiency of the banking sector.

For the purposes of this paper, MSCs are defined as those firms for which gaining access to primary capital markets, in order to fund their operations, is not economical.

II.2. A definition of efficiency

Studies of the efficiency of financial institutions have traditionally focused on scale and scope economies in banking and –more recently– on X-efficiencies, or deviations from the efficient frontier (i.e. technical and allocative efficiencies of individual firms), as opposed to scale and scope efficiencies (see Berger, Hunter & Timme, 1993).

While such approaches have yielded insights into the efficiency of the financial system for the overall economy, there is little evidence regarding the level of service that financial institutions provide to non-financial firms, and to MSCs in particular.

Our definition of efficiency takes into account two dimensions: the interest margin, on the one hand, and on the other, a set of variables that characterise the environment in which financial institutions operate.

II.3. Factors that characterise the environment

We have identified four major factors that affect the national environment in which commercial banks operate:

1) *Credit risk.* The impact of this factor derives from the quality of the firms that are served.

2) *Political risk.* The impact of this factor arises from the political and economic stability of each country.

3) *Financial industry characteristics.* Their effect on the national environment arises from the specific characteristics of the market.

4) *Country and firm characteristics.* These include demographic, social and legal aspects.

Each of these four factors is configured by a number of categories, as shown in Table 1 below.

Table 1
Factors and categories that shape the national environment

Factor	Category
Credit risk	Quality of bank assets Quantity and quality of information Quality of firm management
Political risk	Degree of country risk Level of country development
Financial industry characteristics	Market stability Financial regulation Level of competition
Country and firm characteristics	General regulation Size of country firms Level of service Economic and geographical conditions

The above-mentioned set of variables determines the margin that financial institutions can apply to their operations. The hypothesis to be tested is that less favourable environments will lead to wider margins, and vice versa.

By comparing these two dimensions –interest margins and environmental variables– we shall be able to classify the banking industries of EU countries in three categories: *high, medium* and *low* efficiency.

III. Methodology

In this paper we adopt an eclectic methodology. The nature of our research –a comparative analysis of the efficiency of banking systems– requires a huge amount of data, and considerable effort to establish comparisons on an equal basis.

The traditional role of commercial banks is to take deposits and make loans. This means they carry out transactions that cannot easily be done in standardised capital markets. In this sense, they perform an important and indispensable function for companies that, on account of their size, lack direct access to the markets.

Our purpose is to analyse the efficiency of EU banking systems from the point of view of MSCs. According to our conceptual framework, banking efficiency is measured by the ratio of gross income (interest margin + non-interest income) to total assets, and should be related to the environment in which banks operate. We feel that this is necessary because each of the different EU countries has its own social, economic and demographic characteristics.

Our assumption is that a more favourable environment will lead to a more efficient banking system.

III.1. *Variables selected*

Table 2 lists the variables used to measure the factors mentioned in Section II. As is clear from this table, all the categories have been measured except for two, financial and general regulation, which are not included in the model because of the legal harmonisation process under way in the EU countries (see Rodríguez Fernández, 1994).

Table 2
Selection of variables for country conditions

Category	Variables	
Quality of bank assets	X1	Provisions for bad loans
Quantity and quality of information	X2	Hidden economy
Quality of firm management	X3	Credit assessment criteria
Degree of country risk Level of country development	X4	Country risk index
Market stability	X5	Interest rate volatility
Financial regulation	None	
Level of competition	X6	Banking concentration
General regulation	None	
Size of country firms	X7	Relative number of large firms
Level of service	X8	GNP per person
Economic and geographical conditions	X9	Population density

In the following chapter, we shall describe variables X1 to X9, as well as the dependent variable, «gross income/total assets».

II.2. Defining the national environment

Once we have data for each variable and country, we go through the following steps:

a) For each variable, we rank the different countries in order, assigning number 1 to the country with the most favourable situation for commercial banks.

b) For each country, we add up the scores obtained in each variable and then calculate the average.

c) Finally, we rank the countries according to the average score obtained. The lower the score, the more favourable the environment (which we classify in three categories: favourable, neutral and unfavourable).

Table 3 illustrates the process whereby a set of variables are averaged to obtain a ranking of national environments.

In our research, we include only fourteen countries, as data were not available for Ireland. Therefore, the countries studied are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

Table 3
Ranking the national environments in which commercial banks operate

Countries	Variables									Average	National Environments
	X1	X2	X3	X4	X5	X6	X7	X8	X9		
1											
2											**More**
3											
4											**Favourable**
5											
6											
7											
8											**Neutral**
9											
10											
11											**Less**
12											
13											**Favourable**
14											

III.3. Data analysis. The methods

The data allow us to construct Table 4, which shows the relative position of each country according to the two dimensions chosen: Gross Income/Total Assets and national environment.

Table 4
Level of efficiency of the banking industry

Gross Income/ Total Assets %	National Environments		
	More Favourable	**Neutral**	**Less favourable**
Lowest Values	High Efficiency		
Low Values	Medium Efficiency	High Efficiency	
Medium Values	Low Efficiency	Medium Efficiency	High Efficiency
High Values		Low Efficiency	Medium Efficiency
Highest Values			Low Efficiency

This kind of data representation is straightforward and has the advantage of suggesting the direction that European commercial banks' strategy could take in the future.

Also, we use regression analysis to explain the differences in gross income in terms of the different environmental conditions in which banks operate. This statistical tool helps us to identify countries that perform better, and also those that perform worse than average.

Finally, we use cluster analysis to identify groups of homogeneous banking systems. Each group or cluster is made up of the countries with the most similarities, depending on which variables we use.

IV. Measuring dependent and independent variables

IV.1. Dependent Variable: Gross margin across EU countries

According to theory, the key aspects of banking sector efficiency are the quality and cost of the services provided and the sector's impact on the allocative efficiency of the economy as a whole.

Traditionally, average interest margins have been used as broad measures of intermediation costs. According to Table 5, in most EU countries margins decreased over the period 1979-1993, with the exception of Italy and Sweden, where they increased.

Table 5
Interest margin as a percentage of total assets, 1979-1993

Countries	1979-1984	1985-1989	1990-1993
Austria	–	–	1.8
Belgium	1.6	1.4	1.4
Denmark	3.3	2.5	3.3
Finland	1.9	1.4	1.6
France	2.5	2.3	1.6
Germany	2.2	2.1	1.9
Greece	1.9	1.0	1.8
Italy	2.7	2.9	3.1
Luxembourg	–	–	0.8
Netherlands	2.2	2.2	1.7
Portugal	–	–	4.0
Spain	3.9	3.9	3.6
Sweden	2.1	2.3	2.3
United Kingdom	3.2	3.0	2.6

Source: OECD Bank Profitability 1995 and own calculations

Nowadays, this ratio can no longer be used in isolation, since the nature of banking has changed. In some countries more than in others, banks have moved from offering standardised loans to customers with whom they have developed a long-term relationship to engaging in a wide variety of financial services and market-oriented transactions using derivative securities.

Table 6
Non-interest income as a percentage of total assets, 1990-1993

Countries	1990	1991	1992	1993
Austria	0.78	0.85	0.90	0.74
Belgium	0.33	0.39	0.41	0.62
Denmark	0.36	0.56	–0.42	0.91
Finland	1.60	1.72	1.79	2.28
France	0.45	0.59	0.73	0.93
Germany	0.68	0.62	0.62	0.63
Greece	2.12	2.54	2.13	2.16
Italy	1.11	1.09	0.79	1.38
Luxembourg	0.41	0.31	0.34	0.48
Netherlands	0.65	0.72	0.71	0.87
Portugal	1.08	1.04	1.24	1.23
Spain	0.84	0.94	0.91	0.92
Sweden	0.70	0.74	1.53	3.24
United Kingdom	1.85	2.00	1.76	1.91

Source: OECD Bank Profitability 1995 and own calculations.

Consequently, non-interest income has soared as off-balance-sheet activities have become more important. Table 6 highlights the growing importance of fees and commissions relative to total assets, except in Austria and Germany.

Table 7
Interest margin as a percentage of gross income, 1990-1993

Countries	1990	1991	1992	1993
Austria	69.09	67.87	66.61	72.07
Belgium	81.58	79.28	78.39	66.54
Denmark	87.59	85.73	113.07	79.71
Finland	53.98	48.05	40.37	42.04
France	79.5	74.64	68.73	60.03
Germany	73.21	75.92	76.14	76.13
Greece	44.18	46.57	44.75	43.47
Italy	73.53	73.85	80.01	68.15
Luxembourg	65.00	73.49	70.81	60.46
Netherlands	71.39	70.86	71.37	66.58
Portugal	81.13	81.41	75.20	72.07
Spain	82.43	80.03	79.06	77.38
Sweden	73.79	74.82	59.88	46.18
United Kingdom	60.92	59.37	57.53	55.46

Source: OECD Bank Profitability 1995 and own calculations.

Thus, over the past few years the interest margin has lost its traditional importance in favour of gross income (interest margin plus non-interest income), which measures the intermediation and brokerage functions. The lower the ratio of Interest Margin to Gross Income, the more commercial banks act as brokers rather than asset transformers. The data in Table 7 show that in most countries the banking business has actually changed.

Some analysts argue that, as a measure, the interest margin is biased because in many cases deregulation has removed constraints that previously favoured lending to low-risk borrowers, so that the average riskiness of bank lending has probably increased. In principle, this requires some adjustment in order to arrive at a constant-risk measure of intermediation costs, e.g. by deducting the provisions on loans from the interest margin, assuming that the bank's credit policy is adequate: higher provisions mean a higher credit risk. However, the ratio of provisions to credit risk does not reveal any trend.

IV.1.1. Fees and commissions

Nowadays, there is a widespread trend toward an increase in fees and commissions, owing to the removal of interest rate controls and the fall in demand for loans in most EU countries (see Table 8).

Table 8
Loans as a percentage of total assets, 1990-1993

Countries	1990	1991	1992	1993
Austria	50.69	51.77	52.40	51.11
Belgium	34.13	35.14	34.87	37.27
Denmark	44.21	50.35	51.23	45.91
Finland	65.82	63.68	61.01	53.01
France	40.24	41.12	40.57	40.07
Germany	54.46	56.38	56.75	54.83
Greece	31.47	28.28	26.79	26.18
Italy	38.38	38.11	36.10	34.41
Luxembourg	23.97	24.40	24.68	22.29
Netherlands	61.06	62.62	62.90	62.79
Portugal	39.88	39.58	29.04	36.16
Spain	44.85	47.34	46.93	41.81
Sweden	53.50	51.80	58.10	51.03
United Kingdom	62.05	60.53	58.21	54.58

Source: OECD Bank Profitability 1995 and own calculations.

Indeed, the ratio of non-interest income to gross income has increased in all countries except Austria and Germany. In Finland, Greece and Sweden, non-interest income accounts for more than 50% of gross income, which means that it is more important than the interest margin. In all these countries, the weight of loans on the balance sheet has decreased over the period 1990-1993 (see Table 9).

Table 9
Non-interest income as a percentage of gross income, 1990-1993

Countries	1990	1991	1992	1993
Austria	30.91	32.13	33.39	27.93
Belgium	18.42	20.72	21.61	33.46
Denmark	12.10	14.27	–13.07	20.29
Finland	46.02	51.95	59.63	57.96
France	20.50	25.36	31.27	39.97
Germany	26.79	24.08	23.86	23.87
Greece	55.82	53.43	55.25	56.53
Italy	26.47	26.15	19.99	31.85
Luxembourg	35.00	26.51	29.19	39.54
Netherlands	28.61	29.14	28.63	33.42
Portugal	18.87	18.59	24.80	27.93
Spain	17.57	19.97	20.94	22.62
Sweden	26.21	25.18	40.12	53.82
United Kingdom	39.08	40.63	42.47	44.54

Source: OECD Bank Profitability, 1995 and own calculations.

Instead of using the interest margin as an indicator of intermediation cost, our approach is to calculate the ratio: gross income (interest margin + fees and commissions) divided by total assets. Table 10 shows that between 1990 and 1993 this ratio increased in most EU countries, with the exception of Portugal, Spain and the United Kingdom, where it actually decreased. For these latter countries, the data illustrate the relative unimportance of commercial banks in activities such as trading, underwriting and advisory business, probably because merchant and investment banks are more highly developed there than in any other European country. In the case of Spain and Portugal, the explanation could be an underdeveloped capital market –precisely the opposite of the case of the United Kingdom, where there is a powerful sector dedicated to the financial services industry, a sector recently acquired by German and Swiss commercial banks.

For the purposes of our study, we shall concentrate on 1993. According to Table 6, we can divide the countries into three groups:

Low Gross Income/Total Assets. Luxembourg, Belgium, France, Netherlands and Austria.

Average Gross Income/Total Assets. Germany, Greece, Finland and Spain.

High Gross Income/Total Assets. United Kingdom, Italy, Portugal, Denmark and Sweden. The case of Sweden stands apart, as its Gross Income/Total Assets increased every year from 1990 (2.68%) to 1993 (6.02%).

Table 10
Gross income as a percentage of total assets, 1990-1993

Countries	1990	1991	1992	1993
Austria	2.54	2.64	2.70	2.63
Belgium	1.79	1.85	1.87	1.85
Denmark	2.88	3.98	3.25	4.46
Finland	3.48	3.31	3.00	3.94
France	2.19	2.35	2.35	2.32
Germany	2.52	2.56	2.59	2.64
Greece	3.80	4.75	3.86	3.83
Italy	4.19	4.16	3.94	4.32
Luxembourg	1.16	1.15	1.14	1.22
Netherlands	2.28	2.46	2.48	2.62
Portugal	5.72	5.59	5.02	4.40
Spain	4.76	4.72	4.34	4.08
Sweden	2.68	2.91	3.83	6.02
United Kingdom	4.74	4.92	4.15	4.29

IV.2. Independent variables

Factor: Credit risk
Category: Quality of bank assets
Variable X_1: Provisions for bad loans

The «provisions for bad loans» variable represents the amount charged against earnings to maintain the balance in «reserves for bad loans» at a level sufficient to absorb expected loan losses, based on management's knowledge of the present quality of the loan portfolio.

Our hypothesis is that banks will keep interest margins high if they have to maintain strong reserves to face loan losses. To quantify our variable we used the ratio Provisions for Loans/Total Loans for 1993. The data were obtained from the OECD report on Bank Profitability (1995), but we had to make certain assumptions in order to obtain values for all the countries in our sample. As a general rule, we used the average of all available data. For countries such as Belgium, Luxembourg, the Netherlands and the United Kingdom, we estimated the provisions for bad loans, as they represented 80% of total net provisions; we then divided them by total loans.

According to the data, Finland is the country with the lowest provisions for bad loans, and Portugal the country with the highest (see Table 11). Therefore, Portugal would be likely to have a higher interest margin than Finland.

Table 11
Loan provisions as a percentage of total loans

Countries	1993
Austria	0.64
Belgium	0.66
Denmark	2.75
Finland	0.11
France	1.07
Germany	0.73
Greece	1.29
Italy	1.43
Luxembourg	1.34
Netherlands	0.38
Portugal	4.20
Spain	1.51
Sweden	4.12
United Kingdom	1.50

Source: OECD Bank Profitability 1995 and own calculations.

In the middle are all the other countries, although there are major differences: while the Netherlands, Austria, Belgium and Germany have provisions of less than 1% of total loans, the remaining countries have provisions of more than 1%.

Factor: Credit risk
Category: Quantity and quality of information
Variable X_2: Hidden Economy

One of the factors that help shape financial markets for medium-sized companies is the quantity and quality of information available to companies. The effect of the level of information on financial markets can be seen from several points of view. Information will provide a basis for better decisions, and hence for a smaller number of bad debts and credit defaults. It will also reduce expenses in the search for the relevant information, and will ease the financing of operations that need to be built on mutual trust.

One of the indicators which in our opinion best reflects the quality of information with which companies provide banks, or the quality of publicly available information on companies, is the extent of the hidden economy in a country. By definition, the hidden economy is that part of the economy that escapes public scrutiny. Companies that operate in the hidden economy or have dealings with it will have accounting systems and practises that do not reflect reality and therefore provide information that cannot be trusted.

The hypothesis in this case is that a larger hidden economy means less information and poorer quality information. A poor level of information, as mentioned above, should entail higher provisions for bad loans, higher personnel expenses, and lastly, would justify a greater spread.

The data

The hidden economy is difficult to measure. In this study, we rely on estimates of the percentage of GNP accounted for by the hidden economy.

Table 12
GNP and the hidden economy

Country	GNP (1)	Hidden economy (2)	GNP per capita
Greece*	57,9	30	6,340
Spain*	527,131	25	12,450
Italy*	1150,516	20	18,520
Portugal*	65,103	20	5,930
Belgium*	196,873	13	18,950
Germany*	1574,316	9	23,650
France*	1199,286	8	20,380
Netherlands*	290,725	7	18,780
UK*	876,758	6.5	16,550
Ireland**		6	
Denmark**		3.9	

(1) millions of dollars
(2) % of GNP
(3) dollars

Source: *   El Economista, 16 March 1994.
          ** Eurofarm n°. 7, June 1995.

The results

Of the nine countries for which we have statistics, Greece, Spain, Italy and Portugal stand well above Germany, France, the Netherlands, the UK, Ireland and Denmark. Belgium stands between these two groups.

Factor: Credit risk
Category: Quality of firm management
Variable X_3: Credit assessment criteria (corporate)

The quantity and quality of the information provided to banks by companies may have an impact on efficiency through margin spread via asymmetrical information. The process is as follows: if banks, given good information, can distinguish between good and bad risks, they will price according to their risks. If this quality of information is not available, then they cannot distinguish between good and bad risks. If they offer an average rate for credit, this will make up for expected losses from the whole population; what happens then is that good risks try to avoid using credit or try to identify themselves as good risks. The population of creditholders thus has a worse rating than the previous population. This will increase the proportion of bad loans, creating a need for higher credit interest rates, and this will lead to an actual increase in rates. It is a typical case of adverse selection.

The quantity and quality of information varies from one country to another, owing to a number of factors. These differences should affect credit scoring practices in these countries. Countries with a poor level of information (in both quantity and quality) can be expected to rely more on internally generated sources to make up for the lack of public information on their clients or the lack of available information to evaluate the quality of the managers and of the projects that the banks are asked to fund.

Thus, we would expect the financial systems in countries where public and general information is reliable to have more trust in the information delivered to banks on a company's new projects, and also to have a more accurate assessment of the management of the companies requesting loans. Good public information should yield a better system for assessing company management, and should inspire greater reliance on the evaluation of the people in charge of the projects that banks are being asked to finance.

Our hypothesis is that the financial systems of countries where information is public, abundant and accurate will rely in their credit-granting systems more on the information provided by potential customers, and on the information available on the management of companies. Variables that we would expect to be considered important in such a system would be the quality of an applicant's management and the quality of the proposal or business plan.

In contrast, countries with a low level of information or inaccurate information will rely more heavily on internally generated information. The variables that we would expect to be considered most important would be those that involve a lot of research on the applicant, or internally generated (and hence reliable) information. Examples of such variables might be an applicant's credit rating and previous payment history, or evidence of serviceability.

The data

Our source is «European Banking and Capital Markets: a strategic forecast», by Arthur Andersen and Andersen Consulting. The Economist Intelligence Unit, Research Report.

In the above study, banks were asked to rank eight factors in order of importance in terms of their relative effect on their credit assessment practices regarding applicants that were companies, not individuals. This analysis was carried out in eighteen different countries.

The list of factors is:

1	Quality of applicant´s management
2	Applicant´s credit rating
3	Quality of proposal/business plan
4	Evidence of serviceability
5	Prior relationship with applicant
6	Value of collateral offered
7	Applicant´s previous payment history
8	Lending margin

Of these 8 factors, we would expect countries with a low level of information to place more emphasis on numbers 2 (applicant's credit rating), 4 (evidence of serviceability), and 7 (applicant's previous payment history). We therefore add up for each country the ranking of these three factors and compare the relative positions of these three factors with the average for all the countries. An empirical justification for such a procedure is given in Exhibit A1. A lower-than-average score would indicate a low level (quantity and quality) of information, since banks in that particular country attach more importance to these factors than do those of other countries.

Table 13
Indicators of information quality

	Quality of applicant's management	Applicant's credit rating	Quality of proposal/business plan	Evidence of serviceability	Prior relationship with applicant	Value of collateral offered	Applicant's previous payment history	Lending margin	Sum of Factors 2, 4, 7	
Factor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
Average	**3.06**	**2.94**	**2.72**	**5.00**	**4.56**	**4.67**	**5.33**	**6.22**	**13.28**	
Countries										
Austria	3	1	6	7	4	1	5	8	13	*
Belgium	1	3	2	8	4	7	5	5	16	
Central and Eastern Europe	4	1	2	6	7	3	5	8	12	*
Channel Islands	5	7	3	2	4	1	8	6	17	
Denmark	3	1	2	8	5	6	3	7	12	*
Finland	8	3	1	7	2	3	5	5	15	
France	1	3	2	7	3	7	5	6	15	
Germany	1	2	6	5	3	4	8	7	15	
Greece	2	2	1	5	6	8	4	6	11	*
Ireland	1	6	3	2	5	6	8	4	16	
Italy	3	5	6	1	2	4	8	7	14	
Luxembourg	2	1	3	7	8	5	6	4	14	
Netherlands	2	5	1	7	3	4	5	8	17	
Norway	6	1	2	5	6	8	2	4	8	*
Portugal	4	3	1	1	6	6	5	8	9	*
Spain	3	2	4	5	8	1	5	7	12	*
Sweden	4	4	3	4	1	4	2	4	10	*
UK	2	3	1	3	5	6	7	8	13	*

* An asterisk identifies countries with a below average score.

We would expect countries that have to rely more heavily on internal sources, because of a lower level of information, to have:

a)   a higher ratio of bad debts;

b)   higher personnel costs (research is more time-consuming, and it pays more to have better analysis in order to reduce bad debts);

c)   a larger spread, as a consequence of the two previous points.

Factor: Political risk
Categories: Degree of country risk and level of country development
Variable X$_4$: Country risk index

Political risk is a factor that may affect interest rates through the level of foreign investment for a given interest rate level. As a consequence, the spread would increase in nominal terms, although not necessarily in proportional terms. This increase may be passed on to borrowers in the form of a higher interest margin.

Gross margin –the difference between interest income and interest expenses– is the first source of revenue for financial institutions. This margin must be large enough to yield a sufficient return on funds invested. The level to be considered «sufficient» depends, among other factors, on the risk assumed in operations.

Over time, the total financial risk that institutions take on in their operations depends on the risk of the specific project to be funded, the overall risk of the client, and also the risk of the wider economy. In all except very rare situations, riskier countries mean riskier business activity in all sectors, including the financial sector.

In the European context, we can expect to find a relatively higher gross margin in riskier countries, since margins include a premium for higher risk. The overall economy will therefore bear higher costs for financial intermediation.

The data

Political risk has been assessed using two sources: the country risk ranking published periodically by *Euromoney* magazine and the sovereign foreign-exchange debt rating from Standard and Poor's (see Table 14).

Table 14
Political risk across the EU countries

		Country risk ranking (a)	Sovereign rating (b)
1	Austria	96.66	AAA
2	Luxembourg	96.49	AAA
3	Netherlands	96.38	AAA
4	France	95.56	AAA
5	Denmark	95.42	AA+
6	Germany	95.21	AAA
7	United Kingdom	94.20	AAA
8	Belgium	91.98	AA+
9	Sweden	90.97	AA+
10	Spain	88.23	AA
11	Italy	87.66	AA
12	Finland	87.53	AA-
13	Portugal	84.99	AA-
14	Greece	71.96	BBB+

Sources: (a) *Euromoney* (March 1994). (b) Standard & Poor's *Ratings and Analysis,* March 1994.

The results

Except for Denmark, each country occupies the same relative position in both sources. Table 14 ranks the countries in order of political risk; the higher up the list, the lower the political risk and the better the conditions for financial activity.

Factor: Financial industry characteristics
Category: Market stability
Variable X_5: Interest rate volatility

The main items in the profit and loss account and the value of assets and liabilities are determined by the level of interest rates. Changes in interest rates lead to changes in interest income and expenses and the value of balance sheet accounts and, hence, in the value of shareholders' equity. The net effect of these changes depends on certain variables: duration of deposits and loans, frequency of interest rate revisions, and so on.

In any case, if a fall in interest rates is good news for a financial institution, the reverse is true of rising rates. Variability in interest rates represents a risk for banks: the greater the variation, the higher the risk. This is what is known as *market risk.*

In environments with rapidly changing rates banks tend to cover the higher risk with higher margins.

The data

Variability in interest rates in European countries was measured from the three-month interbank interest rates. The average, the standard deviation and the variation coefficient for monthly rates were calculated. The data are shown in Table 15.

Table 15
3-month interbank interest rates, 1990-1993

		Standard deviation	Average	Coefficient of variation
1	Greece	1.886	19.871	0.0949
2	Belgium	0.842	8.504	0.0990
2	Luxembourg	0.842	8.504	0.0990
4	Spain	1.713	13.542	0.1265
5	Denmark	1.287	9.955	0.1292
6	Austria	1.108	8.473	0.1307
7	Germany	0.982	7.279	0.1350
8	France	1.239	9.042	0.1371
9	Portugal	2.214	14.974	0.1479
10	Italy	1.775	11.968	0.1483
11	Netherlands	1.115	7.377	0.1511
12	Sweden	2.404	11.714	0.2052
13	Finland	2.795	11.750	0.2379
14	United Kingdom	3.400	10.788	0.3152

Source: Statistical Information Service (Servicio de Información Estadística), Bank of Spain.

The variation coefficients were chosen as indicators of market risk; it is assumed that the same standard deviation is worse with lower rates. It is easy to see that in this case the variation in the value of the balance sheet accounts will be greater.

The results

The variation coefficient gives a classification that differs somewhat from that of the standard deviation. For example, Greece has a medium to large standard deviation, but is the least variable country when measured by the coefficient of variation. The United Kingdom, on the other hand, is the most variable country on both accounts.

Factor: Financial industry characteristics
Category: Level of competition
Variable X_6: Banking concentration

According to Frankel and Montgomery (1991), the performance of a banking system depends on much more than the formal regulations governing banks. They found that differences in formal regulation across countries do not appear to match differences in performance. Also, banks are clearly affected by other, nonregulatory aspects of the banking system; one important example is the level and intensity of competition in a market.

Since the beginning of the last decade, banking and other financial services markets have undergone fundamental changes. In some countries, the process of deregulation has had far-reaching effects, promoting greater competition among financial institutions that used to operate as an oligopoly. In other national markets, the financial services industry has merely had to adapt to a new scenario where more institutions compete.

Increased competition is likely to increase the efficiency of banking, by reducing the ability of bankers to exploit their market power. A possible downside of competition, however, is that a reduction in bank profits may render banking markets less stable and could conceivably undermine macroeconomic stability.

The simplest measure of competition is the degree of concentration within a market, which is measured in terms of the value of the assets held by the five largest banks as a percentage of the value of total banking assets. The market would appear to be highly concentrated in Greece, Denmark, Sweden and the Netherlands, and relatively unconcentrated in Luxembourg and Germany, with the other countries falling somewhere in between.

Table 16
Concentration of the banking industry in EU countries

Countries	Concentration (a)
Austria	41.52
Belgium	58.18
Denmark	86.81
Finland	74.60
France	46.31
Germany	32.70
Greece	89.38
Italy	55.61
Luxembourg	15.91
Netherlands	84.36
Portugal	68.72
Spain	46.57
Sweden	85.00
United Kingdom	65.00

(a) Combined market share of the five largest banks.
Source: Bank Profitability, *The Banker* and own calculations

Factor: Country and firm characteristics
Category: Size of a country's firms
Variable X_7: Number of firms among the largest in Europe relative to GDP

MSCs differ from large companies not only in size but also in total risk. Total risk is the sum of systematic and unsystematic risk. Part of this risk is the default risk. Default risk is greater in MSCs than in large companies, owing to the effect of in-company diversification (assuming that companies are groups of business units of the same size, a larger company being one with more such units).

This in turn will imply that less developed or smaller countries will have, on average, a larger proportion of MSCs and small companies if we measure size in absolute terms. Companies in small countries that produce goods for domestic markets will be small. Much the same argument can be applied to countries with less developed economies. In both types of economy, there is likely to be a larger interest rate spread. MSCs will have less sophisticated financial management and technology. This implies suboptimal decisions, unless companies are properly advised, and more value to be added by financial institutions if management is qualified.

Larger firms are usually less risky that smaller ones, for many reasons. Larger firms are able to attract and pay for better educated and more experienced managers. They also tend to be made up of a group of businesses that can compensate for each other's cyclical ups and downs and relative success. In some cases they become «too-big-to-fail» and receive help from creditors and public agencies in situations of financial stress.

We can expect to find a higher level of bad loans among large companies, and higher costs for banks in providing basic advice. In consequence, banks which deal with larger firms are in better shape. In contrast, banks whose clients are mainly small firms are subject to higher risk, which is known as *credit risk.*

Higher credit risk helps create an environment less favourable to financial intermediation.

The data

We have measured the size of firms on a relative basis, according to the number of firms that each country has among the largest 50,854 non-financial companies in Europe.

We then compare the relative number of large firms in each country with the relative size of that country's gross national product. The relative firm sizes are shown in Table 17.

Table 17
Relative firm sizes

		Number of firms (a)	Gross domestic product (b)	Relative number of firms	Relative GDP	Relative firm size
1	Austria	2,151	78.6	0.045	0.025	1.821
2	Portugal	635	26.6	0.013	0.008	1.588
3	Luxembourg	93	4.6	0.002	0.001	1.345
4	Belgium	1,852	94.4	0.039	0.030	1.305
5	United Kingdom	10,335	533.2	0.216	0.167	1.290
6	Germany	14,248	761.4	0.298	0.239	1.245
7	Denmark	917	64.4	0.019	0.020	0.947
8	France	7,565	613.6	0.158	0.193	0.820
9	Spain	2,468	210.5	0.052	0.066	0.780
10	Netherlands	1,775	154.5	0.037	0.048	0.764
11	Greece	359	37.7	0.007	0.012	0.634
12	Italy	4,635	499.3	0.097	0.157	0.618
13	Sweden	854	107.1	0.018	0.034	0.530
	Total	47,887	3,186			

GDP in billions of dollars.
Sources: (a) Duns & Bradstreet International.
(b) OECD *Main Economic Indicators* (Dec. 1994).

Measuring relative firm size enables us to do justice to certain special cases, such as Luxembourg, which is the country with the smallest number of firms among the group of Europe's largest, but whose large firms account for a larger proportion of gross domestic product than those of the other countries in our sample. Germany is the country with the largest number of large firms, but it ranks in the middle when the relative importance of large firms in the German economy is taken into account.

The results

Austria, Portugal and Luxembourg are the three countries that rank highest in terms of the relative size of their companies. We assume that their financial institutions are exposed to a lower credit risk. Another effect, which is related to other variables such as the level of education, is that financial institutions in these countries have to devote less of their personnel's time to dealing with relatively larger firms.

All of these considerations necessarily lead to a lower gross margin in the banking industry.

Factor: Country and firm characteristics
Category: Level of service
Variable X_8: GDP PPP per person

One of the characteristics of financial institutions is that they have to provide sophisticated services no matter what environment they operate in. Though these services may vary in different countries, the financial industry has to offer a standard of service that fulfills a minimum, regardless of the environment. This effort to provide an adequate level of service may prove more burdensome in countries with less highly educated customers. Since the products offered by financial institutions are very similar and sophisticated, the effort required to provide customers with the same level of service will be different in different countries.

A clear example of this can be seen in the fact that many of the new cost-saving methods that have appeared in the industry require well-educated customers (ATM, telephone banking). The lack of well-educated customers, or of experience, implies a twofold effort: first, the delay in the introduction of some of these instruments, tools or processes; second, a more intense effort to educate customers in the use of these methods; and third, an additional effort to train the banks' own employees. The overall effect of these differences in level of education is likely to be a major additional cost in terms of operating expenses and personnel expenses.

Hypothesis for the basic variables

The basic relationship we propose to explore is the connection between the level of service and the interest margin. Our basic thesis is that a higher level of service requires a greater spread. A second hypothesis is that for the same level of service, countries with a more highly educated population will incur lower personnel and operating expenses. Conversely, for similar levels of service, countries with a lower level of education will incur higher operating and personnel costs and therefore have a greater spread.

Proxies (justification t-test)

In order to test these hypotheses we looked for a variable that could indicate the level of education in a country, a variable that would take into account a wide spectrum of factors that relate to the level of education. We have chosen «gross domestic product per person». In order to correct for some exchange rate effects, we use a version of the GDP that is adjusted for purchasing power anomalies, the so-called GDP PPP per person.

To check whether the GDP per person would affect the level of operating expenses, we have worked out some tests that relate the two variables. We have done this for 14 different countries and the results are positive (see Exhibits A2 and A3). In all cases we have found a very significant relationship, which supports the idea that a higher level of education will require either lower personnel expenses or lower operating expenses (only in the PPP case).

The data

Table 18
GDP per person

Countries	GDP PPP per person
Austria	18,017
Belgium	18,071
Denmark	17,628
Finland	14,150
France	18,540
Germany	20,482
Greece	8,267
Italy	17,373
Luxembourg	21,833
Netherlands	16,942
Portugal	9,743
Spain	12,797
Sweden	16,526
UK	16,227

Sources: Source for GDP is OECD National Accounts; population source is OECD Labour Force Economics.

Factor: Country and firm characteristics
Category: Economic and geographical conditions
Variable X_9: Population density

Motivation

The effect of the level of operating expenses on interest spread should be related to the characteristics of each particular country. We take population density to be one of these specific country characteristics. Countries with higher density may have lower levels of operating expenses owing to the availability of economies of scale.

The data

Table 19
Population density

Countries	Density (Inhab./Sq. Km)
Austria	94
Belgium	329
Denmark	120
Finland	15
France	105
Germany	226
Greece	78
Italy	189
Luxembourg	150
Netherlands	372
Portugal	107
Spain	77
Sweden	19
UK	237

Inhabitants per sq. kilometer in 1992.
Source: Population and Employment OECD Labour Force Statistics.

In order to partially justify the use of the «population density» variable over the spread, we related population density to operating expenses and found significant relationships at the 95% level (see Exhibits A4 and A5).

V. Determining the relative efficiency of the banking industry in EU countries

V.1. National conditions for banking activity

Table 20 presents the results for each variable of national conditions –the independent variables– for all constituent countries of the European Union. (It is worth recalling that we have not included Ireland in our study on account of the lack of data on the gross income of its banking industry.)

Table 20
Specific conditions for banking activity in EU countries

	National environment variables								
	Bad loans provisions	Hidden economy	Credit assessment criteria	Country risk index	Interest rates volatility	Banking concentration	Relative number of large firms	GDP per person	Population density
	X1	X2	X3	X4	X5	X6	X7	X8	X9
Austria	3		8	1	6	3	1	5	10
Belgium	4	6	2	8	2	7	4	4	2
Denmark	12	1	10	5	5	13	7	6	7
Finland	1		3	12	13	10		11	14
France	6	4	3	4	8	4	8	3	9
Germany	5	5	3	6	7	2	6	2	4
Greece	7	10	12	14	1	14	11	14	11
Italy	9	8	6	11	10	6	12	7	5
Luxembourg	8		6	2	2	1	3	1	6
Netherlands	2	3	1	3	11	11	10	8	1
Portugal	14	7	14	13	9	9	2	13	8
Spain	11	9	10	10	4	5	9	12	12
Sweden	13		13	9	12	12	13	9	13
United Kingdom	10	2	8	7	14	8	5	10	3

There is one missing value each for Austria, Luxembourg and Sweden, and two missing values for Finland. A country's score in any given variable indicates how favourable or unfavourable conditions in that country are for the activity of financial institutions. Table 21 shows the results for individual countries in terms of the average of the scores for all the environment variables.

Table 21
Conditions for the activity of financial institutions across EU countries

		National Environment Conditions	
		Average	Variance
1	Luxembourg	3.63	7.13
2	Belgium	4.33	5.00
3	Germany	4.44	3.28
4	Austria	4.63	10.55
5	France	5.44	5.53
6	Netherlands	5.56	19.03
7	Denmark	7.33	14.25
8	United Kingdom	7.44	14.03
9	Italy	8.22	5.94
10	Spain	9.11	8.11
11	Finland	9.14	25.81
12	Portugal	9.89	16.11
13	Greece	10.44	17.78
14	Sweden	11.75	3.07

The lower the average score in Table 21, the better the conditions for banking activity.

Luxembourg offers the best conditions for financial institutions. It holds the lead in level of service (highest GDP per person) and in banking concentration, and has a very good position in country risk, relative firm size, and interest rate volatility.

Luxembourg is followed by Belgium, Germany and Austria.

The four lowest-ranking countries are Finland, Portugal, Greece and Sweden. Sweden ranks next-to-last in bad loan provisions, relative number of large firms, credit assessment criteria, and population density, and also does badly in interest rate volatility and bank concentration.

The last column in Table 21 shows the variance of the data for each country. The higher the variance, the higher the variability in the results for that country. Finland has a very high variance, which indicates mixed results: it offers the best conditions in terms of bad loan provisions and ranks high in credit assessment criteria, but it also has the worst rank in population density, the second-worst in interest rate volatility, and so on.

The Netherlands, Greece and Portugal also have great scatter among their values across the different variables in the study.

In contrast, Sweden, Germany, Belgium and France have very homogeneous results.

V.2. Matrix of gross income and national conditions

We now have the information we need in order to apply our model of banking efficiency to the EU countries. Simply by inspecting Table 22, it can be seen that conditions in EU countries closely match the assumption of the model, namely that a more favourable environment should lead to a more efficient banking system.

Table 22
Comparison of gross income and national conditions

	Gross income/T.A.		National conditions	
	Value	Ranking	Ranking	Value
Luxembourg	1.22	1	1	3.63
Belgium	1.85	2	2	4.33
France	2.32	3	5	5.44
Netherlands	2.62	4	6	5.56
Austria	2.63	5	4	4.63
Germany	2.64	6	3	4.44
Greece	3.83	7	13	10.44
Finland	3.94	8	11	9.14
Spain	4.08	9	10	9.11
United Kingdom	4.29	10	8	7.44
Italy	4.32	11	9	8.22
Portugal	4.40	12	12	9.89
Denmark	4.46	13	7	7.33
Sweden	6.02	14	14	11.75

It is important to note that there are some countries with the same rank both in the dependent variable (gross income over total assets) and in national conditions, such as Luxembourg, Belgium, Portugal and Sweden, and others with minor variations, such as Austria and Spain. The discrepancies between the two rankings are of great interest because they indicate differences in efficiency that are not explained by differences in the environment.

Furthermore, we can classify the national environments into three groups: «more favourable» (to banking activities), «neutral», and «less favourable». The countries with the lowest values for average conditions in Table 22 are the ones with the most favourable conditions, and vice versa. The countries in each of these three groups can then be classified according to their gross margin ratio. All this is done in Table 23.

Table 23
Matrix of gross income and environmental conditions

Gross Income/ Total Assets (%)	National Environment		
	More Favourable	**Neutral**	**Less Favourable**
1.22 1.85 2.32	**High efficiency** Luxembourg Belgium France		
2.62 2.63 2.64	**Medium efficiency** Austria Germany	**High efficiency** Netherlands	
3.83 3.94 4.08	**Low efficiency**	**Medium efficiency**	**High efficiency** Greece Finland Spain
4.29 4.32 4.4		**Low efficiency** United Kingdom Italy	**Medium efficiency** Portugal
4.46 6.02	Denmark		**Low efficiency** Sweden

Table 23 tells us much more than a simple comparison of interest margin and gross income would do. It compares countries with similar national conditions. And this makes it possible to establish relative levels of efficiency. The qualifiers «high», «medium» and «low» refer to the classification of efficiency within each national environment group.

For example, Luxembourg, Belgium, France, Austria and Germany all have more favourable conditions than the average, but the first three have lower levels of gross income to total assets, which means greater efficiency.

Similarly, the Netherlands, Austria and Germany have almost the same gross margin ratio, but the banking system of the Netherlands operates in less favourable national conditions, which earns Dutch banks a higher efficiency label.

The countries with a high level of banking efficiency are Luxembourg, Belgium, France, the Netherlands, Greece, Finland and Spain. The United Kingdom, Italy and Sweden have a low level of efficiency, while Denmark ranks even lower. The other countries (Austria, Germany and Portugal) have a medium position; in other words, their gross margin ratios are in accordance with their national banking environment. We recall that the 1993 value of Gross Income/Total Assets for Sweden is 6.02%; this figure most likely biases the result for this country.

Besides correcting previous judgements about relative banking efficiency, the results presented in Table 23 contribute valuable information for economic policy-making and the strategic analysis of individual financial institutions.

For economic policy it will be useful to realise what the main conditions affecting financial activity are. Also, one can see where there is room for financial improvements; these improvements can come from movements upwards or to the left in the matrix.

Individual banks can benefit from knowing which countries are most promising for international expansion, or –conversely– which banking systems constitute a threat. For example, Dutch banks appear to be in a better position to do business in Austria and Germany than vice versa.

V.3 . *The regression of national environment on gross income/total assets*

This section analyses the results of regressing our independent variable, «national environment», on our dependent variable, «gross income/total assets». Our goal in undertaking such an analysis is to test the predictive capabilities of the independent variable as defined in Section III. Actual values for this variable can be found in Tables 21 and 22.

With respect to the dependent variable, issues of definition, justification and measurement are dealt with in Section IV.1. Actual figures can be found in Table 22.

The results of the Regression

Table 24 contains the result of the regression.

Table 24
Statistics of the regression

Parameter	Value
beta	0.44440
beta St Dev	0.06317
R Sq	0.80486
F Schnedecor	49.49298
Sum square	17.37787
t test	7.03512
alfa	0.25526
alfa desv st	0.48400
Y desv st	0.59255
degrees of free	12.00000
sse	4.21341

The regression equation is:

y (est) = 0.255 + 0.444 x

From these results, we can make the following observations:

a) Both the intercept and the slope are positive.
b) The intercept (alpha) is not statistically different from 0.
c) The slope of the regression (beta) is statistically different from 0 at the 99% level.
d) The coefficient R Square is 0.80. This means that the model proposed here has a high explanatory power.

The Residuals:

The following table presents the actual values for x and y, as well as the residuals obtained from the regression:

The countries with the largest residuals are Greece and Denmark

Countries with negative residuals, i.e. with markets more efficient than predicted by the model are:

Greece	−1.06%
Luxembourg	−0.64%
Finland	-0.37%
France	−0.35%
Belgium	−0.33%
Portugal	−0.25%
Spain	−0.22%
Netherlands	−0.10%

Countries with positive residuals, i.e. with markets less efficient than predicted by the model are:

Denmark	0.95%
United Kingdom	0.73%
Sweden	0.55%
Italy	0.41%
Germany	0.41%
Austria	0.32%

Table 25
Residuals

Countries	Average x	Gross Income/ Total Assets y	Residuals
Austria	4.63	2.63	0.33
Belgium	4.33	1.85	–0.32
Denmark	7.33	4.46	0.95
Finland	9.14	3.94	–0.37
France	5.44	2.32	–034
Germany	4.44	2.64	0.42
Greece	10.44	3.83	–1.06
Italy	8.22	4.32	0.42
Luxembourg	3.63	1.22	–0.63
Netherlands	5.56	2.62	–0.09
Portugal	9.89	4.4	–0.24
Spain	9.11	4.08	–0.22
Sweden	11.75	6.02	0.55
United Kingdom	7.44	4.29	0.74

The chart

On the following chart, we have plotted the dependent and independent variables.

A cursory inspection of this chart shows us the positive effect that the independent variable has on the dependent variable. We can see two groups of countries on this chart. The first, composed of Luxembourg, Belgium, Germany, Austria, France and the Netherlands, is characterized by low values in both the dependent and the independent variables. We can also see a positive trend in the relationship between these two variables in this group.

The second group, composed of Denmark, the United Kingdom, Italy, Spain, Finland, Portugal, Greece and Sweden, has a flatter trend, except for Sweden, which seems an outlier. Both groups are separated by a gap in the independent variable (the Netherlands 5.56% and Denmark 7.33%) and a gap in the dependent variable (Netherlands 2.62% and Greece 3.83%), which makes it easy to distinguish them.

Chart
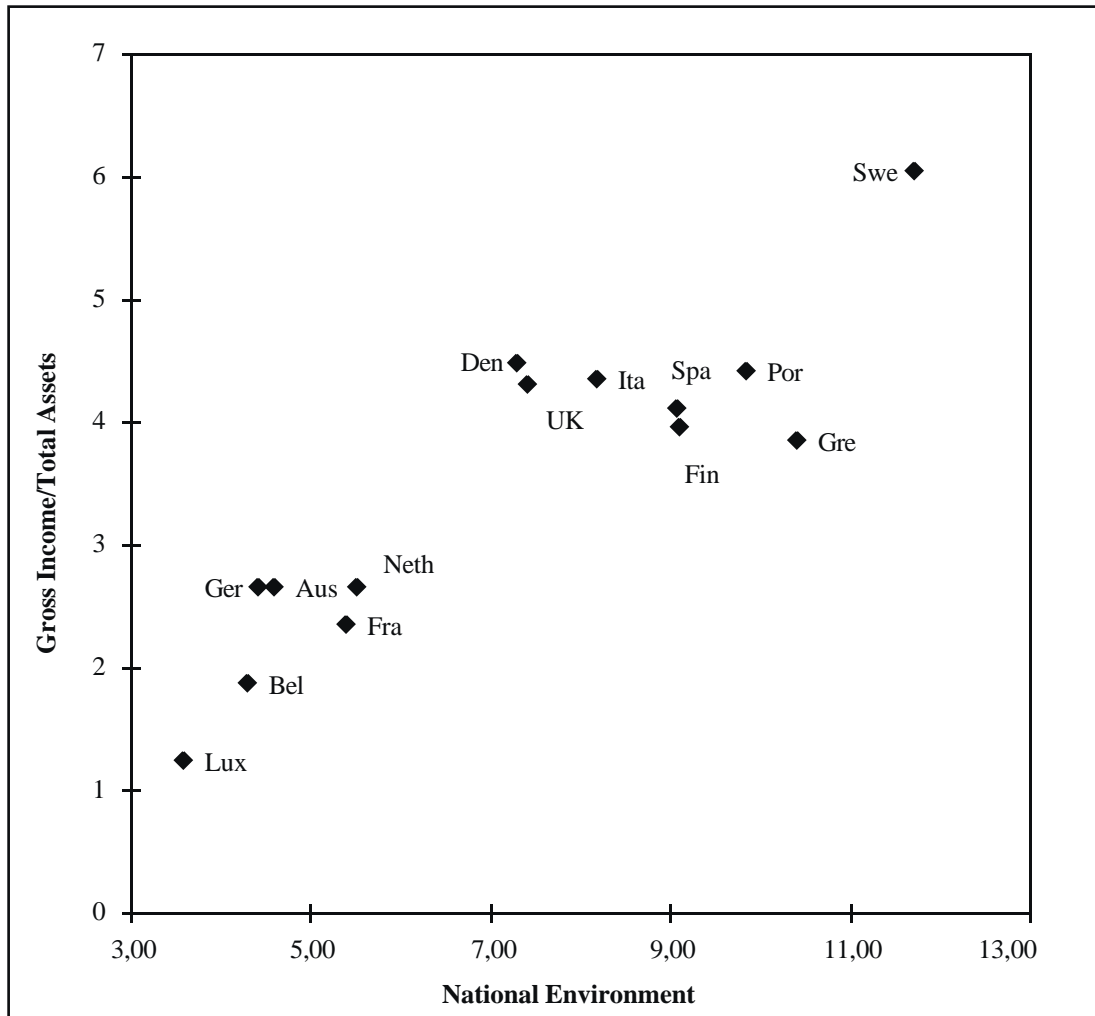
V.4 . Cluster Analysis

Finally, we use cluster analysis to summarise the data we have obtained and examine our model in greater detail.

As already mentioned in Section III, cluster analysis is a commonly used technique for grouping objects, individuals, countries, etc. into clusters, so that countries in the same cluster are more similar to each other than to countries in other clusters. The clusters display great internal homogeneity (i.e. within each cluster) and great external heterogeneity (i.e. between clusters).

The first step in our analysis is to select the variables, using our conceptual framework and available information. The algorithm we use to form the clusters is the MultiStat 4.ob1 software package from AB Research, and we choose to work with two and three clusters. The database and the results are given in Exhibit 6.

It is important to note that cluster analysis does not make any distinction between relevant and irrelevant variables but derives the most consistent, yet distinct, groups of countries across all the variables.

The first result we obtain from the MultiStat package is the dendogram: a graphic representation of the results of the clustering procedure, in which the vertical axis shows the countries included in the study and the horizontal axis shows the number of clusters formed at each step of the clustering procedure.

As far as the clusters themselves are concerned, we obtain two:

Cluster 1: Austria, Belgium, France, Germany, Luxembourg and the Netherlands.

Cluster 2: Denmark, Finland, Greece, Italy, Portugal, Spain, Sweden and the United   Kingdom.

In Cluster 1, we have the countries with lowest gross income/total assets, lowest provisions for bad loans, largest firms, least political risk, best information quality, smallest hidden economy, least interest rate volatility, most sophisticated clients and least weight of the biggest commercial banks. Cluster 2 is made up of countries with the opposite characteristics.

If, instead of two clusters, we form three, we get:

Cluster 1: Austria, Belgium, France, Germany, Luxembourg and the Netherlands.
Cluster 2: Denmark, Finland, Sweden and the United Kingdom.
Cluster 3: Greece, Italy, Portugal, Spain.

In this case, Cluster 1 is the same as before, while Clusters 2 and 3 are the product of dividing up our previous Cluster 2. The main differences between Clusters 2 and 3 are in the level of political risk, hidden economy, interest rate volatility, country characteristics and level of competition.

VI. Conclusions and ideas for further research

VI.1. Conclusions

In this paper we have argued that banking efficiency cannot be measured by the usual method of comparing interest margins across countries. It is necessary to take into account the differences in the conditions surrounding banking activity in each country.

We have identified four factors that characterise the national environment with respect to banks: credit risk, political risk, financial industry characteristics, and country and firm characteristics. The categories that shape the factors have been made explicit, and the variables that are used to measure the categories have been selected.

The values we have obtained for the different variables have led us to classify the national environments in the EU into three groups: countries with conditions more favourable to banking activities (Luxembourg, Belgium, France, Austria and Germany), countries with neutral conditions (the Netherlands, the United Kingdom, Italy and Denmark), and countries

with less favourable conditions (Greece, Finland, Spain, Portugal and Sweden). Ireland was not included in this study due to the lack of the necessary data.

The last step was to evaluate the efficiency of national banking systems within each of the three groups of countries, i.e. countries with favourable, neutral or unfavourable conditions. The countries with a high level of efficiency are: Luxembourg, Belgium, France, the Netherlands, Greece, Finland and Spain. Those with a medium level of efficiency are: Austria, Germany, and Portugal. The rest (the United Kingdom, Italy, Sweden and Denmark) have a lower level of efficiency, given the environment they offer for banking activities.

The regression and cluster analysis provide additional insights into the degree of efficiency of the EU countries.

VI.2. Further research

This study brought up many areas for further research. In the following paragraphs, we shall note those that appear most promising.

In our research, we measured the interest rate volatility of individual countries and assumed that a high variation coefficient is bad news for banking activity. This assumption was the result of numerous rounds of discussion. However, we realise that there is room for illuminating research into the impact of interest rate volatility on banking activity, in terms both of the market value of assets and liabilities and of current interest income and expenses.

The model we used to evaluate the relative efficiency of banking systems across EU countries could also be applied: (a) to capital markets –in order to include large companies; and (b) to individual banks –in order to rank institutions within a particular country.

Another implication of our results concerned the international expansion of individual banks. It would be very interesting to elicit a set of hypotheses on this point and to test them with empirical data on the expansion of particular institutions from particular countries.

Finally, from the point of view of economic policy, it could be useful to select the variables –like the nine we measured in this study– that best explain the ratio of gross income to total assets, its robustness, and the dynamics of the dependent variable, in order to obtain a predictive model of efficiency in accordance with certain aspects of the environment of the banking industry. □

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Exhibit A1

Factor: Credit Risk
Category: Quality of Bank Assets
Dependent Variable: Provisions for Bad Loans (X1)
Independent Variable: Quality of Information Index

In order to justify using «quantity and quality of information» as a variable to be included in the analysis of market efficiency, we have looked for a relationship between the information variables and other variables that are more clearly tied to the level of spread in a given financial market. In order to see this influence, we wish to test whether there is any relationship between the level of provisions for bad loans and the quality of information.

We shall test the following equation:

$$(\text{Average Provision for Loans Adjusted/Loans})_c = a + b \text{ Quality Index}_c$$

Average Provision for Loans Adjusted/Loans is a measure (expressed as a percentage) of the average impact of provisions on the aggregate loan portfolio. To calculate this variable, we first compute Annual Provision for Loans/Loans, where «Annual Provision for Loans» is the part of the banks' provisions that can be directly assigned to the loan portfolio, and «Loans» is the size of the loan portfolio for a given year.

Average Provison for Loans Adjusted/Loans, refers to the average computed for the years 1990 to 1993. The term «adjusted» refers to the need to adjust the data in cases where figures were not available for all the years, or when the provision for loans was not readily available, in which case we have to use net provisions as the primary source of information.

The Quality of Information Index is a country index that is based on three factors that affect banks' credit assessment practices; these factors have been assigned different values in different countries. The three factors are: applicant's credit rating, evidence of seviceability, and applicant's previous payment history. The index is built upon the relative importance of these three factors vis-à-vis five other factors that have a bearing on the quantity and quality of information (1).

The data

OECD Bank Profitability, loans and provisions, A&A, European Banking, and Capital Markets.

_____

(1) For a more detailed discussion see the analysis of Credit Assessment Factors.

Exhibit A1 (continued)

	Credit Assessment Criteria	Loan Provision/ Loans Adjusted%*
Austria	13	0.64
Belgium	16	0.66
Denmark	12	2.75
Finland	15	–0.11
France	15	1.07
Germany	15	0.73
Greece	11	1.29
Italy	14	1.43
Luxembourg	14	1.34
Netherlands	17	0.38
Portugal	9	4.20
Spain	12	1.51
Sweden	10	4.12
UK	13	1.50

* Source OECD Bank Profitability, 1995 and own calculations.

The Regression

Statistics of the regression

beta	–0.471929
beta St. Dev.	0.088740
R Sq.	0.702102
F Schnedecor	28.282287
Sum of squares	15.335685
t test	-5.318109362
alfa	7.806348548
alfa St. Dev.	1.195288293
Y St. Dev.	0.736367012
degrees of freedom	12
sse	6.506836515

Exhibit A1 (continued)

The Chart
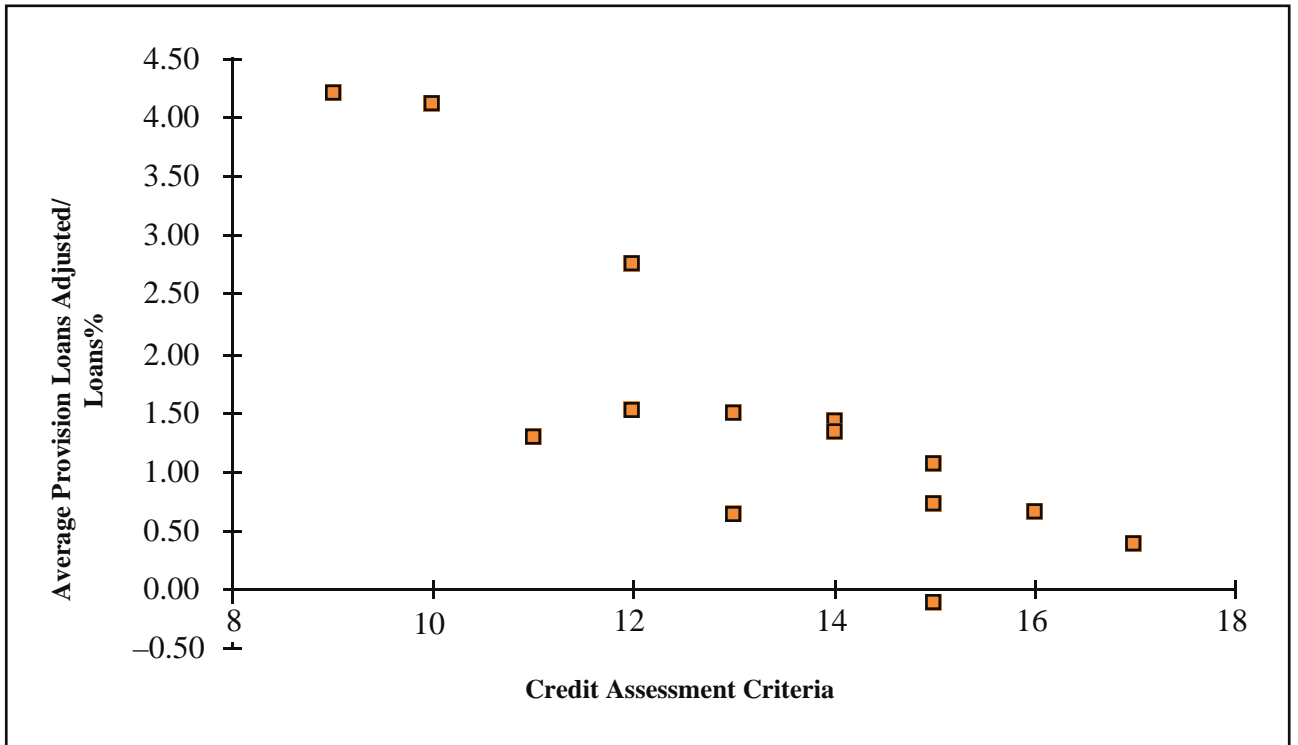
Exhibit A2

Factor: Country and firm characteristics
Category: Level of service
Dependent Variable: Operating Expenses/Total Assets
Independent Variable: GDP PPP per person (X_8)

Country	GDP PPP per person	Operating Expenses/Total Assets
Austria	18,017	1.7575
Belgium	18,071	1.3025
Denmark	17,628	2.36
Finland	14,150	4.53
France	18,540	1.48
Germany	20,482	1.745
Greece	8,267	2.6
Italy	17,373	2.8875
Luxembourg	21,833	0.4625
Netherlands	16,942	1.755
Portugal	9,743	2.77
Spain	12,797	2.8675
Sweden	16,526	4.35
UK	16,227	3.06

Statistics of the regression

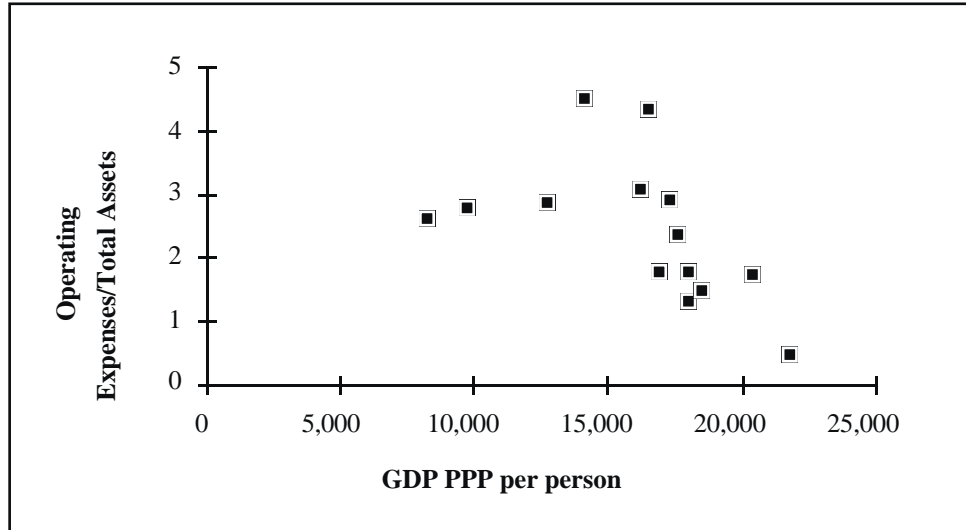|	
beta	−1.5E-04
beta St. Dev.	7.4E-05
R Sq.	2.6E-01
F Schnedecor	4.2E+00
Sum of squares	4.3E+00
t test	−2.1E+00
alfa	4.9E+00
alfa St. Dev.	1.2E+00
Y St. Dev.	1.0E+00
degrees of freedom	1.2E+01
sse	1.2E+01

Exhibit A2 (continued)

Exhibit A3

Factor: Country and firm characteristics
Category: Level of service
Dependent Variable: Operating Expenses/Total Loans
Independent Variable: GDP PPP per person (X_8)

Country	GDP PPP per person	Operating Expenses/Total Loans
Austria	18,017	3.41317
Belgium	18,071	3.68783
Denmark	17,628	4.84656
Finland	14,150	7.59556
France	18,540	3.65505
Germany	20,482	3.13902
Greece	8,267	9.27121
Italy	17,373	7.86030
Luxembourg	21,833	1.94467
Netherlands	16,942	2.81540
Portugal	9,743	8.08908
Spain	12,797	6.34592
Sweden	16,526	8.13085
UK	16,227	5.19744

Statistics of the regression

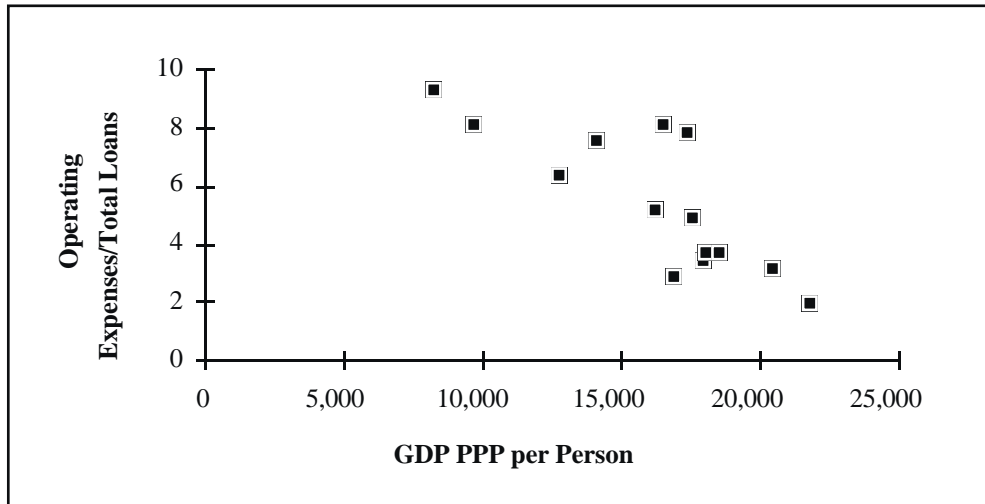|	
beta	–5.07E-04
beta St. Dev.	1.10E-04
R Sq.	6.37E-01
F Schnedecor	2.11E+01
Sum of squares	4.81E+01
t test	–4.59E+00
alfa	1.36E+01
alfa St. Dev.	1.83E+00
Y St. Dev.	1.51E+00
degrees of freedom	1.20E+01
sse	2.74E+01

Exhibit A3 (continued)

Exhibit A4

Factor: Country and firm characteristics
Category: Economic and geographical conditions
Dependent Variable: Operating Expenses/Total Assets
Independent Variable: Population density (X_9)

Country	Density (inhab/Sq Km)	Operating Expenses/TA %
Austria	94	1.7575
Belgium	329	1.3025
Denmark	120	2.36
Finland	15	4.53
France	105	1.48
Germany	226	1.745
Greece	78	2.6
Italy	189	2.8875
Luxembourg	150	0.4625
Netherlands	372	1.755
Portugal	107	2.77
Spain	77	2.8675
Sweden	19	4.35
UK	237	3.06

Statistics of the regression

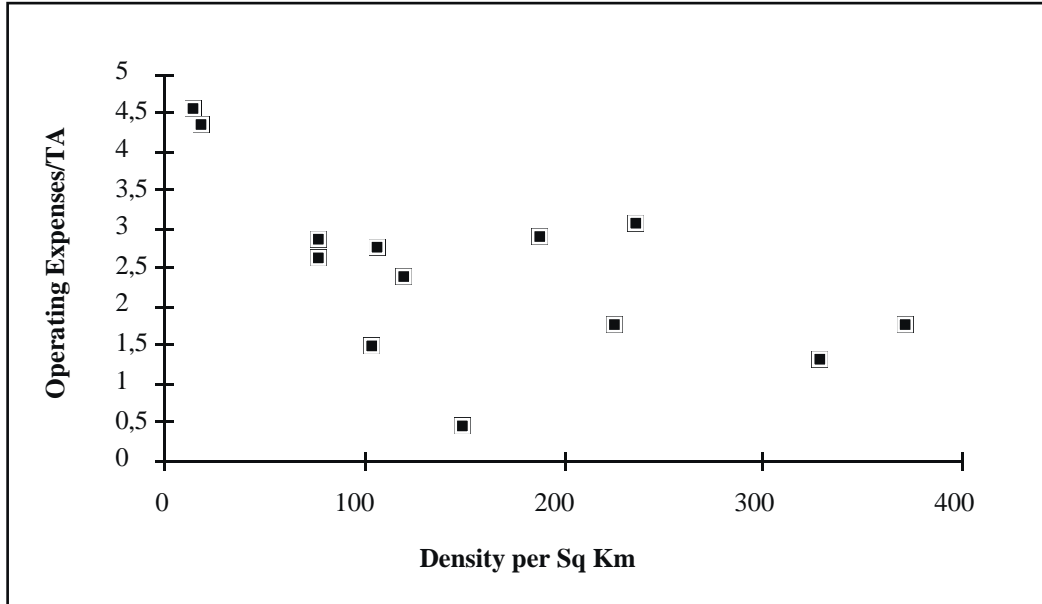|	
beta	–5.62E-03
beta St. Dev.	2.55E-03
R Sq.	2.87E-01
F Schnedecor	4.84E+00
Sum of squares	4.73E+00
t test	–2.20E+00
alfa	3.27E+00
alfa St. Dev.	4.68E-01
Y St. Dev.	9.89E-01
degrees of freedom	1.20E+01
sse	1.17E+01

Exhibit A4 (continued)

Exhibit A5

Factor: Country and firm characteristics
Category: Economic and geographical conditions
Dependent Variable: Operating Expenses/Total Loans
Independent Variable: Population density (X_9)

Country	Density (inhab/Sq Km)	Operating Expenses/Loans (%)
Austria	94	3.413
Belgium	329	3.688
Denmark	120	4.847
Finland	15	7.596
France	105	3.655
Germany	226	3.139
Greece	78	9.271
Italy	189	7.860
Luxembourg	150	1.945
Netherlands	372	2.815
Portugal	107	8.089
Spain	77	6.346
Sweden	19	8.131
UK	237	5.197

Statistics of the regression

beta	−1.26E-02
beta St. Dev.	5.36E-03
R Sq.	3.14E-01
F Schnedecor	5.50E+00
Sum of squares	2.37E+01
t test	−2.34E+00
alfa	7.33E+00
alfa St. Dev.	9.83E-01
Y St. Dev.	2.08E+00
degrees of freedom	1.20E+01
sse	5.17E+01

Exhibit A5 (continued)

Density per Sq Kilometer
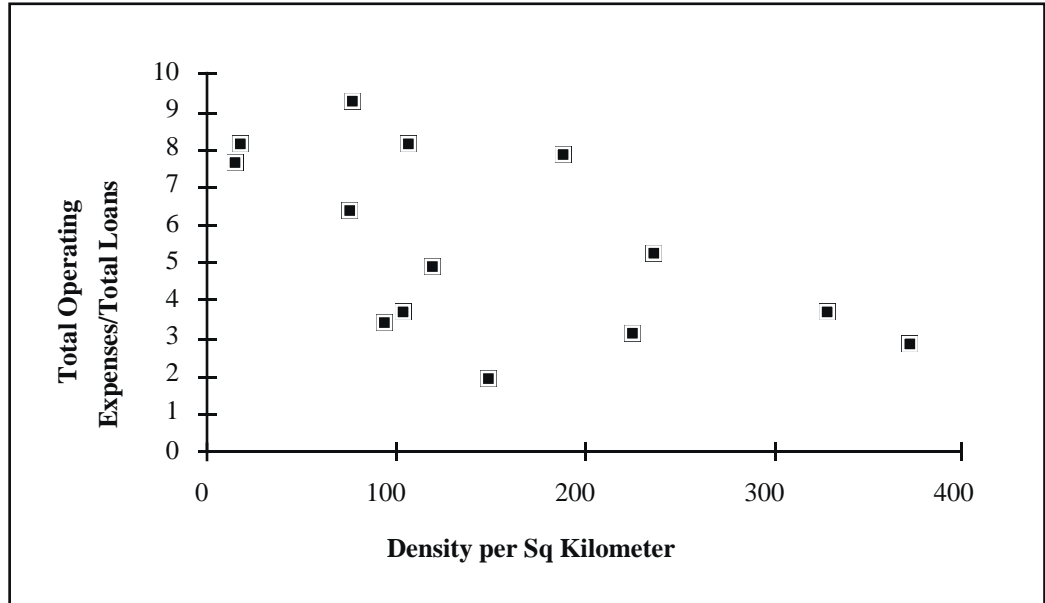
CLUSTER ANALYSIS WITH TWO CLUSTERS

File   ....:   EU banking systems
N° of data   ....:   14
N° of variables ....:   10

Mean and standard deviation of the variables

	Variable	Mean	Std. Dev.
1	Prov. bad loans	1.552	1.276
2	R.N. large firms	1.051	0.390
3	Hidden ec.	0.123	0.082
4	C. assessment	13.286	2.301
5	Country risk	90.946	6.736
6	I.R. Volatility	0.157	0.061
7	B. concentration	0.608	0.224
8	GDP/person	16185.429	3790.899
9	Pop. density	151.286	107.409
10	GI/TAssets	3.473	1.289

Total within group sum of squared deviations
Clusters

14	0.000
13	1.590
12	3.681
11	6.139
10	9.054
9	12.770
8	16.994
7	22.008
6	31.516
5	41.833
4	53.164
3	65.078
2	86.436
1	130.000

Each cluster contains the following individuals:

Group	1:	1	2	5	6	9	10		
Group	2:	3	4	7	8	11	12	13	14

Cluster means

	Variable	Total	Group 1	Group 2
1	Prov. bad loans	1.55	0.80	2.11
2	R.N. large firm	1.05	1.22	0.93
3	Hidden ec.	0.12	0.09	0.15
4	C. assesment	13.29	15.00	12.00
5	Country risk	90.95	95.38	87.62
6	I.R. Volatility	0.16	0.13	0.18
7	B. concentration	0.61	0.46	0.71
8	GDP/person	16185.43	18980.83	14088.88
9	Pop. density	151.29	212.67	105.25
10	GI/TAssets	3.47	2.21	4.42

Within group variance			22.01	64.43

CLUSTER ANALYSIS WITH THREE CLUSTERS

File   ....:   EU banking systems
N° of data   ....:   14
N° of variables   ....:   10

Mean and standard deviation of the variables

	Variable	Mean	Std. Dev.
1	Prov. bad loans	1.552	1.276
2	R.N. large firms	1.051	0.390
3	Hidden ec.	0.123	0.082
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8	GDP/person	16185.429	3790.899
9	Pop. density	151.286	107.409
10	GI/TAssets	3.473	1.289

Total within group sum of squared deviations
Clusters

|	
14	0.000
13	1.590
12	3.681
11	6.139
10	9.054
9	12.770
8	16.994
7	22.008
6	31.516
5	41.833
4	53.164
3	65.078
2	86.436
1	130.000

Each cluster contains the following individuals:

Group	1:	1	2	5	6	9	10
Group	2:	3	4	13	14		
Group	3:	7	8	11	12		

Cluster means

	Variable	Total	Group 1	Group 2	Group 3
1	Prov. bad loans	1.55	0.80	2.12	2.11
2	R.N. large firm	1.05	1.22	0.95	0.91
3	Hidden ec.	0.12	0.09	0.06	0.24
4	C. assesment	13.29	15.00	12.50	11.50
5	Country risk	90.95	95.38	92.03	83.21
6	I.R. Volatility	0.16	0.13	0.23	0.13
7	B. concentration	0.61	0.46	0.78	0.65
8	GDP/person	16185.43	18980.83	16132.75	12045.00
9	Pop. density	151.29	212.67	97.75	112.75
10	GI/TAssets	3.47	2.21	4.68	4.16

Within group variance			22.01	21.15	21.92

Dendogram
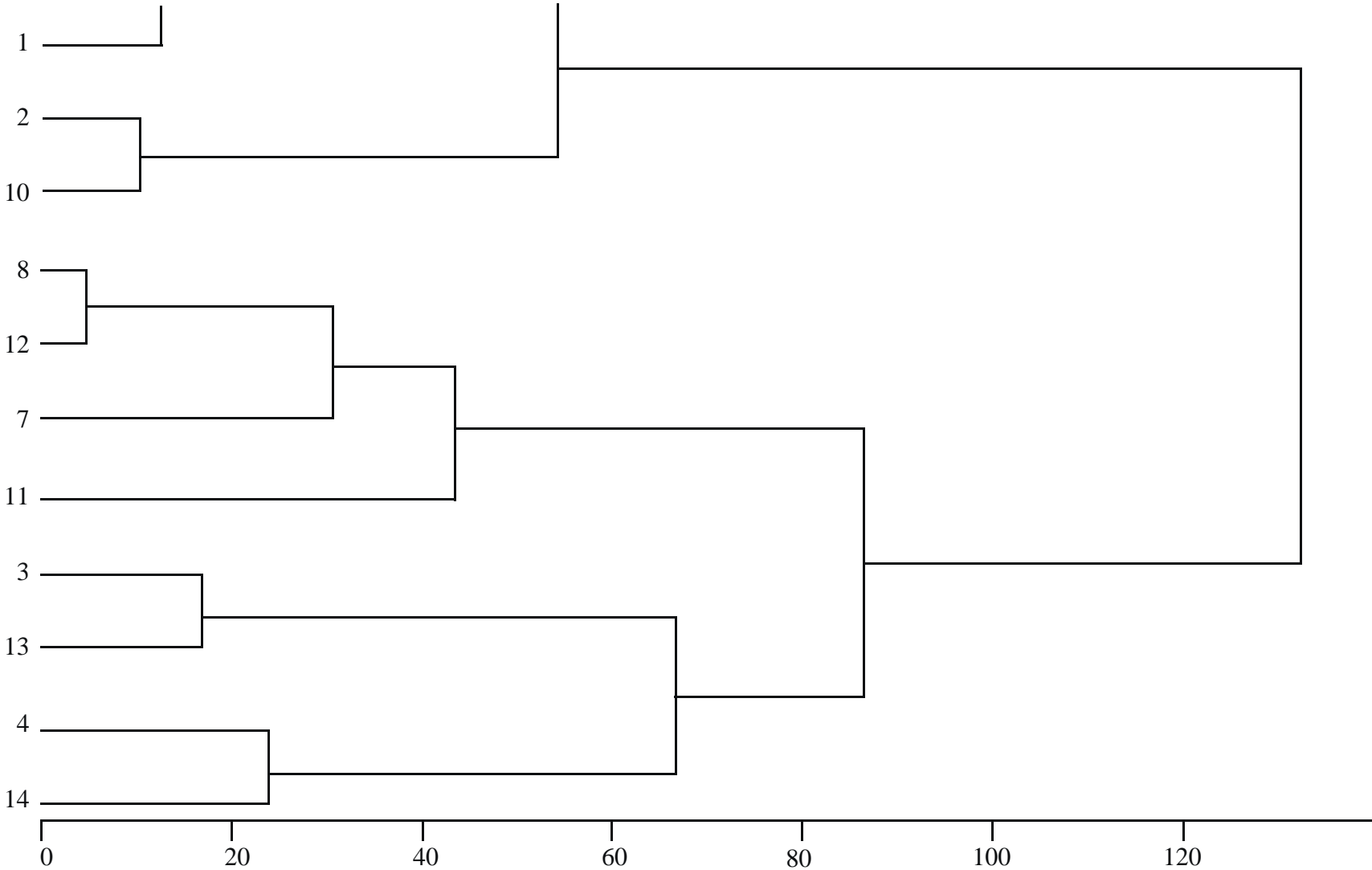
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