

Do corporate financial patterns in European countries

Converge and testify for disintermediation ?

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## **Abstract**

In this paper, an empirical study is carried out in order to identify the corporate financial patterns of non-financial firms in seven Continental European countries for the period 1991-2001. We depart from the usual binary distinction between market-based and bank-based systems and propose an original theoretical framework in order to explain diversity. Using the BACH database, principal component and cluster analyses are carried out. When the sample is limited to the manufacturing sector, we get interesting outcomes for a comparative analysis. We test econometrically the thesis of a common trend toward disintermediation and find that cross-country differences in the use of short-term bank debt have been reduced whilst differences in the use of medium- and long-term bank debt have remained unchanged. In Continental Europe, banks tend to become more reluctant to finance the day-to-day business of non-financial firms. This evidence suggests that changes have been pushed by banks rather than pulled by markets.

**JEL classification codes : G 20, G 21**

**Keywords : corporate financial structure, national financial systems, principal component analysis, BACH database, European convergence, financial intermediation**

## **1. Introduction**

Do corporate financial patterns in European countries converge and testify for disintermediation ? This is the issue raised by this paper. For European countries, the most obvious reasons for convergence and disintermediation come from the overall globalisation process taking place in financial markets at the world level, and the process of European integration.

The corporate financial pattern being considered as one pillar of financial systems, this research highlights the questions whether the national financial systems can still be observed and whether they are becoming more similar, by providing a quantitative comparison of the corporate financing patterns for seven European countries during the period 1991-2001.

The classical framework governing empirical studies contrasts corporate financial patterns, according to the opposition between ‘market-oriented’ versus ‘bank-oriented’ countries, and the abundant literature on national financial systems discusses the issue of convergence with regard to the respective advantages of each system. Levine’s title “Bank-based or market-based financial system: which is better?” summarizes the ultimate goal of most of the papers on national financial systems (Levine, 2002). Our empirical analysis allows to put into question the existence of one financial model for European firms.

However our analytical framework departs strongly from the mainstream literature. Our hypothesis is that the capital structure is influenced by the asset structure and, to be more accurate, by the distinction between risky and uncertain uses of funds. Our taxonomy is more complex than the conventional binary one, as we consider that long-term and short-term sources of funds have to be analysed separately.

This paper is structured as follows. A critical overview of the main empirical comparative studies of corporate financing patterns is provided in section 2. The theoretical and empirical

analytical frameworks are displayed in section 3. In sections 4-6, we address three questions. Do we find significant differences in the source of corporate funds across national financial systems; is this notion still relevant in the early years of the XXI<sup>st</sup> century (section 4)? Can we find a benchmark model for European financial integration (Section 5)? Does empirical evidence testify in favour of the assumption that national financial systems are converging (Section 6)? Conclusions are drawn in section 7.

## **2. A critical overview of the literature**

### 2.1 An overview of empirical studies

Table 1 provides an overview of the main empirical researches on national financial systems in Europe that compare the corporate sources of funds (studies starting in 1991 or later). Evidence does not lead to conclusive outcomes as regards the rate of indebtedness. Indeed, the assessment of leverage is highly sensitive to the selected ratio and sample. For instance, leverage is higher (smaller) for German firms than French ones when the numerator includes (excludes) provisions (Rajan and Zingales, 1994). As large public firms and small unquoted ones do not share the same financial pattern, especially in the case of Germany, international comparison is highly influenced by the weight of large firms in the sample; the mean value that reflects the behaviour of the largest firms and the median that is influenced by the smallest ones lead to distinct results (Delbreil *et al.*, 1997).

As regards the joint hypothesis of convergence and disintermediation, outcomes of empirical findings also remain rather inconclusive (Schaberg, 1999, Gallizo and Salvador, 2002)<sup>1</sup>.

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<sup>1</sup> Schaberg does not find evidence of convergence of the group as a whole. Gallizo and Salvador use a set of economic and financial criteria and non-linear Principal Component Analysis to assess the convergence of productive and financial structures. The most discriminatory factors, called leverage and profitability, provide evidence of common trend, whilst labour productivity and debt structure provide evidence of structural

Table 1 is limited to studies that focus on the capital structure of European non-financial firms. Corporate financial patterns being a sub-set of financial systems, an overall analysis involves all institutional sectoral patterns<sup>2</sup>. Among the larger scope studies, the research conducted by Schmidt deserves attention. Using ratios of intermediation and securitization<sup>3</sup>, the authors do not find a general trend toward disintermediation in the three countries (France, Germany, United Kingdom) during the period (1981-1995) under review (Schmidt *et al.*, 1999).

As a whole, corporate financial patterns are not easy to depict at the national level and empirical results are not conclusive. The common belief in a general process of convergence, consisting of disintermediation and securitization, where financial markets play a more important role as suppliers of corporate funds, remains debatable. In the surveyed empirical studies, sources of data, selected criteria and countries, and analytical framework are distinct, hence logically findings differ. Yet the difficulties of quantitative comparative studies have other causes. There are several sources of external funds : bank debt, bonds, equity, trade credit, commercial paper. Hence it is not easy to typify national financial patterns of firms. A

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differences. However, they do not distinguish clearly between a process of convergence and a common cyclical trend of variables.

<sup>2</sup> In this paper, the terms “financial patterns” and “financial systems” are employed in an indiscriminating manner.

<sup>3</sup> Intermediation ratios indicate what portion of total assets (liabilities) of non-financial sectors is channelled to (from) financial intermediaries as opposed to claims on (from) other non-financial sectors. Securitization ratios indicate the portion of a given class of assets and liabilities that are securitized.

survey of international comparisons invites us to recognize that diversity among financial corporate patterns is larger than expected by the literature that focuses on the opposition between bank and market.

**Table 1: Overview of the main empirical cross-country studies of financing patterns of European non-financial firms<sup>4</sup>**

Authors	Databases and countries	Period and scope	Indicators	Results
R.G. RAJAN and L. ZINGALES (1994)	<u>Countries:</u> US, Japan, Germany, France, Italy, UK, Canada. <u>Source:</u> Global Vantage Data	<u>Period:</u> 1991 <u>Scope:</u> a sample including only publicly traded corporations.	a) (Debt + provisions) / Total assets b) Debt / Total assets c) Debt / Net total assets d) Debt / (Debt + Net equity)	According to (a), leverage highest in Germany, Italy and France very similar. According to (b) (c) and (d), Italian firms are more leveraged than French ones and German firms less than French ones. A positive correlation between size and leverage with the exception of Germany.
J.T. KNEESHAW (1995)	<u>Countries:</u> Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, UK, US. <u>Source:</u> National sources and OECD	<u>Period:</u> 1992 <u>Scope:</u> all non-financial companies	a) Financial debt <sup>5</sup> / Total assets; b) Financial debt + Provisions / GDP c) Financial debt / GDP d) Net equity / GDP	According to (a), leverage higher in Germany than in France. According to the other indicators, Italian firms are the least leverage and German ones the most. Financial autonomy is greatest in France.
L. NAYMAN (1996)	<u>Countries:</u> Germany, France, Italy, UK. <u>Source:</u> OECD and BACH	<u>Period:</u> 1987-1993; <u>Scope:</u> non-financial companies	a) Credit / GDP; b) Balance Sheet structure c) Profitability	Share of external finance is higher for German and British firms lower for French ones.
M. DELBREIL <i>et al.</i> (1997)	<u>Countries:</u> Germany, Austria, Spain, France, Italy. <u>Source :</u> Balance Sheet Offices	<u>Period:</u> 1990-1993 ; <u>Scope:</u> manufacturing companies	a) Net equity / Financial resources b) Provisions / Financial Debts c) Loans from group and associates / Total debt	German firms are more leveraged on median value, less on average value than the overall sample. French firms are less leveraged and Italian firms more.
M. SCHABERG (1999)	<u>Countries:</u> US, Sweden, UK, France, Germany, Japan. <u>Source:</u> OECD, Economic Planning Agency of Japan, Office of National Statistics, Federal Reserve Board.	<u>Period:</u> 1970-1995 <u>Scope:</u> non-financial corporate sector	a) Internal funds / Total liabilities b) Bank debt / Total liabilities b) Uses of funds (non-financial versus financial investment)	No evidence of a convergence of the group as a whole. On the sources of funds side, the French and Japan systems are converging toward the 'exit-model' characterized by loose ties between banks and firms.

<sup>4</sup> For similar summaries of previous studies of international comparison, see Delbreil (1997) and Rivaud-Danset *et al.* (2001).

<sup>5</sup> Financial debt is supplied by financial institutions and markets.

D. RIVAUD-DANSET <i>et al.</i> (2001)	<u>Countries</u> : Austria, Belgium, Germany, Italy, Portugal, Spain, Japan, US. <u>Source</u> : BACH	<u>Period</u> : 1990-1996 <u>Scope</u> : manufacturing companies	A set of 21 indicators of financial pattern and profitability.	Financial patterns differ according to the countries especially in the case of SMEs. The indicators of profitability do not correlate with any financial pattern.
A. DEMIRGÜC-KUNT and M. VOJISLAV (2002)	<u>Countries</u> : 40 <u>Source</u> : Worldscope	<u>Period</u> : 1989-1996 <u>Scope</u> : largest public traded manufacturing companies	a) Turnover b) Total assets of the deposit money bank / GDP c) Dummy for bank-based or market-based	Development of a country's legal system predicts access to external finance. Stock market and the banking system affect access to external finance differently.
J. L. GALLIZO. and M. SALVADOR (2002)	<u>Countries</u> : Germany, Austria, Spain, Finland, France, Italy, the Netherlands, Portugal, Sweden. <u>Source</u> : BACH	<u>Period</u> : 1990-1999 <u>Scope</u> : manufacturing companies	A set of 15 ratios indicating the productive and financial structures	Leverage and profitability ratios provide evidence of joint evolution by country. Belgian, Spanish and Portuguese companies converge toward the group of least leverage companies (Dutch, Swedish, and Danish firms).
A. COBHAM (2004)	<u>Countries</u> : France, Germany, Italy, Spain <u>Source</u> : BACH	<u>Period</u> : 1988-2001 <u>Scope</u> : non-financial corporate sector	Net sources of finance (trade credit, short-term credit,...) <sup>6</sup>	Wide variation of firms across different sizes.

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6 Stock variables from BACH balance-sheet structure are used to generate flow variables.

## 2.2 The traps on the road from observed corporate financial patterns to governance issues

The belief in a causal effect of the financial pattern on the way firms behave, on corporate performances and growth, via corporate governance model and investment funding, explains the interest in comparing corporate capital structures. There has been extensive qualitative and quantitative comparisons of the performance of different financial systems, most of the studies focusing in particular on the UK and the US as opposed to Germany and Japan. Differences in the long-term patterns of investment financing are seen as a key determinant of macro-economic performances and the mix of equity and debt is supposed to indicate whether the financial pattern is market- or bank-based (see Schaberg, 1999, for a survey).

It is widely admitted that this binary division overlaps the opposition between two models of corporate governance: the Anglo-Saxon shareholder model also called ‘exit’ model versus the German-Japanese insider model or ‘voice’ model. Academics aim to demonstrate what corporate financial and governance pattern should yield higher firm and macro economic performances (Mayer, 2001), however many of them admit that both models have their costs and benefits. In market-based countries, shareholders are thought to be outsider, creating an agency problem, but arm’s length financing, associated with the transparency of institutions, is supposed to discipline management and to deliver superior results when innovation becomes radical. Banks are thought to have been insider, actively involved in corporate activity; while early studies pointed the advantages of the relationship-based system, more recent ones have underscored their defects in restructuring incumbent firms and promoting radical innovation (Rajan and Zingales, 2003).

This standard distinction is becoming widely controversial, ‘neither particularly robust nor insightful’ (Carlin and Mayer, 2000), and the data suggest a reality more complex than the model ( Byrne and Davis, 2002). Indeed, commonly believed patterns are not easy to discern and the conventional view ignores the many empirical traps on the road which starts with the

quantitative study of the financial pattern of non-financial firms, as a way to depict a national financing system, and arrives at the corporate governance issue. The most important traps are the fourfold:

1) a high ratio of equity is not a good indicator of a 'market-based' national financial system. Indeed, equity has two sources, internal by retaining earnings and external by issuing shares on the market. For this reason a high ratio of equity does not entail a market-based system. Flow of funds data, that are available only at a highly aggregated level (institutional sectors in National Accounts), allow us to distinguish between these two sources, but balance-sheet data do not break equity down into retained earnings and issued securities;

2) issuing shares do not always imply a public offering. Indeed, for firms being unquoted, such transactions are over-the-counter. In Continental Europe, the number of public firms being small, this unorganised market is significant<sup>7</sup>. This feature has important implications for corporate governance, as it makes market-based monitoring more difficult;

3) the Anglo-Saxon model of corporate governance is not well indicated by the source of funds. The role of shares issued on financial markets as a major source of corporate funds in Anglo-Saxon countries is a stereotype. For many public firms in the two countries exemplary of the market-based system - the UK and the US -, this external source of funds has been minor in the last decades, compared with other external sources : bank debt for the British firms, commercial paper and bonds for the American ones<sup>8</sup>. The influence of financial markets has constantly grown during the last two decades whilst their instability has given

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<sup>7</sup> For instance, in the Euro zone, during the period 1997-1999, 42 % of the total amount of net issued shares by non-financial firms were offered by firms that had not gone public (*European Central Bank Monthly Bulletin*, 2001).

<sup>8</sup> During the period from 1970 to 1994, when the process of globalisation was still at the beginning, in the USA and the UK, non-financial firms relied upon equity as an external source of fund, respectively, for 8.2 % and 9.5 % of their total gross sources of finance. This contribution was much higher than in other countries (France,

new grounds for the pecking order hypothesis, i.e. the preference for internal funding, debt being the second best (Myers and Majluf, 1984). Yet other features characterize the Anglo-Saxon corporate governance model: the number of firms listed in the financial market, the number of mergers and acquisitions of public firms, the guiding role of financial criteria like the return on equity ratio, the spreading of accounting standards ...;

4) bank financing does not necessarily entail an insider power over firms. Banks that are not shareholders have a very small power over large multinational firms. Customer-supplier relationships based either on customer reputation or on multi-banking practices strongly reduce the power of banks over SMEs. The capacity of banks as lenders to monitor firms cannot be analysed regardless of national regulations; the governance power of banks as lenders is more frequently observed in countries with German law than elsewhere, this feature being explained by the bankruptcy law (Sauvé and Scheuer, 1999).

The impact of financial patterns on corporate governance models is not easy to determine, as suggested by traps 3 and 4 and the quality of indicators is good only if accurate information is provided, as illustrated by traps 1 and 2. Indicators do not have a high explanatory power *per se*. Like in any inquiry, an indicator can orientate researchers towards a wrong track, therefore complementary information is required to check its robustness. In a quantitative study, using a set of indicators is always better than using a single criterion and empirical investigations must explore alternative patterns of explanation.

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Germany, Japan) but equity was quantitatively less important than bonds and commercial papers in the case of American firms and than bank debt in the case of British firms (Schaberg, 1999, p. 22).

### **3. The theoretical and empirical analytical frameworks**

#### 3.1 The theoretical analytical framework

Our analytical framework relies on Knight's distinction between risk and uncertainty (Knight, 1921). From the viewpoint of non-financial firms, a corporate financing pattern is seen as a specific way of dealing with risk and uncertainty. We admit that corporate managers have to decide on risky investments and deal with unexpected day-to-day events. It is assumed that financial patterns are better analysed when two capacities are taken into account: the ability to finance risky investment projects and the fitness to be flexible, i.e. to react to contingent events that can be good or bad for the future of the firm (table 2). So the effect that the capital structure may have on corporate dynamism takes into account not only the long-term pattern of financing but also the short-term one. To put it another way, two dimensions matter: how investment projects and how the day-to-day business are funded. Stable resources, also called permanent funds, are a part of total resources and have several sources: i) equity, ii) long-term<sup>9</sup> financial debt, that comes either from financial institutions, mostly banks, or markets, and iii) provisions. Stable resources are required to finance investment and are sometimes used for funding current expenses; in the extreme case of non-profitable enterprises backed by venture capital, wage expenses are covered by permanent funds. Sources of short-term funds can be either internal or external. Cash is exemplary of internal resources kept for unexpected events resulting in a need for additional capital. Overdraft granted by banks to firms is exemplary of external resources, which can be made available quickly and at a reasonable cost when there is an explicit or sometimes implicit agreement with bankers. Banks and markets perform two distinct functions: they provide stable resources to finance risky and planned investment and a certain liquidity insurance that helps firms to face uncertain

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<sup>9</sup> In this paper, the term 'long-term debt' is employed instead of 'medium- and long-term debt'.

business events. This liquidity promise depends on private information (bank) and on public information (market) about firms.

**Table 2: The analytical framework**

Uses of funds	Sources of funds	Sources of funds using the BACH database	Selected ratios (ratio label)
<p><b><i>Fixed capital</i></b>                      Long-term investment is risky</p>	<ul style="list-style-type: none"> <li>□ Internal (retained earnings)</li> <li>□ External                             <ul style="list-style-type: none"> <li>• issued equity</li> <li>• long-term debt                                     <ul style="list-style-type: none"> <li>▪ market debt</li> <li>▪ bank debt</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>} Equity</li> <li>} Long-term debt</li> </ul>	<p>Equity ratio (<i>equity</i>)</p> <p>Long-term debt ratio (<i>leverage</i>)</p>
<p><b><i>Working capital</i></b>                      Uncertainty is small (high) when the level of current assets is regular (irregular)</p>	<ul style="list-style-type: none"> <li>□ Stable resources                             <ul style="list-style-type: none"> <li>▪ equity</li> <li>▪ long-term debt</li> </ul> </li> <li>□ Short-term debt                             <ul style="list-style-type: none"> <li>▪ market debt</li> <li>▪ bank debt</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>} Stable resources</li> <li>} Short-term debt</li> </ul>	<p>Stable resources ratio (<i>autonomy</i>)</p> <p>Short-term financial debt ratio (<i>overdraft</i>)</p>

Using financial statements, we try to observe how firms are able to secure long-term financing for investment projects and other planned expenses and short-term financing for unexpected events. As we consider that long-term and short-term sources of funds have to be analysed separately, two pairs of key criteria are selected : the long-term debt ratio *versus* equity ratio and the short-term financial debt ratio *versus* the stable resources ratio.

If the long-term financing patterns and the short-term ones are independent, then four corporate financial patterns can be distinguished instead of using the common binary categorization (table 3). In those countries where long- and short-term debt are major sources of financing, the national financial pattern can be depicted as *debt-based* and in those countries where firms rely on equity and are able to secure a high degree of permanent funds for current activity, the national financial pattern is depicted as *autonomy- and equity-based*. This typology includes two other cases: in countries where firms on the average have a rather low long-term debt ratio but a high rate of net short-term financial debt, the financial pattern is *overdraft-based*; in countries, where firms rely on a high long-term debt ratio and obtain a high degree of permanent funds for current activity, that correlates with a low short-term bank debt, the financial pattern is *autonomy-based*. Autonomy-based firms have a higher internal capacity than their counterparts to finance current activity and to be flexible.

**Table 3: Four corporate financial patterns**

		Net short-term financial debt ratio	
		+	-
Long-term debt ratio	+	<i>Debt-based</i>	<i>Autonomy-based</i>
	-	<i>Overdraft-based</i>	<i>Autonomy- and equity-based</i>

### 3.2 The selected database

The selected database strongly influences empirical findings. The difficulty of testing theories of corporate financing by using national aggregate data has been discussed before (Corbett and Jenkinson, 1996). Datasets developed on the basis of corporate financial statements are more appropriate as they can be broken down by the size of firms. SMEs matter because they are often more typical as their scope of sources of funds is more limited. If one only looks at the country effect and ignores the size effect, then average values are determined by the largest firms; this bias is amplified by using databases including only firms which have gone public or only national accounts flow of funds data. In cross-country studies the degree of comparability of national databases also matters. Being limited to the available databases forces some compromises : financial statements data are issued from the BACH database, which is, by far, the most harmonized database with a rather good coverage rate, even if imperfections remain<sup>10</sup>, however, it is a dataset of semi-aggregate data, that allows access to averages by country, year, sector and size, but does not provide access to firm level balance sheets.

The Bank for the Accounts of Companies Harmonised (BACH) is the result of a close cooperation between both the European Commission and the European Committee of Central Balance-sheet, which is responsible for the aggregation of financial data of non-financial firms. For members of the European Union this information has been harmonised (see appendix 1). Other studies of the financial structure of European firms also use this database (Rivaud-Danset *et al.*, 2001, Gallizo and Salvador, 2002, Paulet, 2003, and Cobham, 2004). The BACH database contains information by year, country, size and sector. Data contained in the database for the manufacturing sector have a higher quality than data for other sectors, and our investigation focuses on this industrial sector. This study, in order to control for

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<sup>10</sup> The coverage of the sample firms of the BACH database is assessed by Cobham (2004).

comparability, is based on seven European countries only. Austria, Belgium, France, Germany, Italy, Spain and Sweden are the seven countries for which complete or nearly complete data are available for all the sectors<sup>11</sup>.

### 3.3 The data analysis method

To address the question of convergence, two suitable statistical methods are performed: the Principal Component Analysis (PCA) and the Cluster Analysis (CA)<sup>12</sup>.

Principal component analysis is helpful when several criteria are used to discriminate between data and when the sample is large. The data analysis covers an eleven year period, data being broken down by size (three sizes) and sectors: three sub-sectors when only the manufacturing industries are selected (651 observations), eleven sectors and sub-sectors when all the sectors are taken into account (2387 observations). PCA provides global images of the main dataset features. To each individual data or 'observation' ( $i$ ) is associated a set of ( $K$ ) numeric variables which can be displayed by a scatter of points,  $N_i$ , in a space  $R^K$  with  $K$  dimensions. PCA looks for the best orientations of  $R^K$  and reduces the number of selected variables – called 'active variables' – to a few independent and hence orthogonal components, also called factorial axes. The best factorial axis has the highest capacity for explaining the diversity between basic data, measured by the variance. Two factorial axes shape a figure on which  $N_i$  can be plotted. Hence, projections on this two-dimensional space allow us to visualize the grouping of observations, making the results more explicit. Each data has a code, for instance 91 SW 1 21 means Swedish (SW) small firms (1), producing intermediary manufacturing goods (21) in 1991. The most representative (atypical) firms of the sample are

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11 The small Austrian firms are not in the sample, due to missing data in BACH. Data are not available for German firms after 2000.

12 For more details about these methods, see Volle (1997).

located near (far from) the intersection of the factorial axes. Visualizing the pair of factorial axes is however only a limited step of the analysis, while looking at the statistical evidence is by far the most important step.

Cluster analysis is also important and is often used as a companion of PCA. It sorts the output dataset according to each of the large components and permits the grouping of data that are most similar (a standard iterated algorithm is used to minimize the sum of squared distances from the cluster means). Cluster analysis makes sure that scatters of points that are grouped are close to each other in the space  $R^K$  and not only in a two-components space.

Table 4 gives the list of selected variables that enter into the data analysis, and their definition according to the BACH conventions (these are ratios of means since the BACH database only contains aggregate data). It is assumed in this paper that the same level of economic profitability can be achieved following different financial patterns. In order to test this assumption, the ratios which characterize the sources of funds are distinguished from the ratios used to identify economic and financial performances: the set of balance-sheet ratios are treated by the PCA as active variables and the set of performance ratios are treated as supplementary variables<sup>13</sup>. Active variables have been selected so that firms can be distinguished :

- according to the way of financing total employed capital, the distinction being between firms with a high level of equity and those with a high level of long-term financial indebtedness,
- according to the way of financing the operating cycle, the distinction being between the autonomous pattern, characterized by a high rate of permanent funds, and the overdraft one, with firms relying on short-term financial debt.

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<sup>13</sup> Supplementary variables contribute neither to the definition of factorial axes nor to the grouping of data.

This set of ratios has been used in a previous study to compare the financial structures of SMEs and large enterprises within the EU (Rivaud-Danset *et al.*, 2001). It is partly distinct from the set of ratios selected as indicators of the evolution of corporate financial patterns by other studies using the BACH database (*European Economy*, supplement A, various issues; Gallizo and Salvador, 2002 <sup>14</sup>).

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14 Gallizo and Salvador (2002) use a widely different set of active variables as it includes, along with financial indicators, indicators of the productive pattern and economic performances.

**Table 4 : Selected variables of the data analysis**

Active variables

‘Equity’ = Capital and reserves / Total balance-sheet

‘Leverage’ = Provisions and medium- and long-term liabilities / (Capital and reserves + provisions and medium and long-term liabilities)

‘ReserveRate’ = Reserves / Capital and reserves

‘Fidebtstruct’ = Financial debt / Medium- and long-term liabilities

‘Overdraft’ = [Short-term financial debt - (current investment + cash at bank and in hand)] / Total liabilities

‘Autonomy’ = [(Capital and reserves + provisions and medium- and long-term liabilities) – (fixed assets + working capital requirement)] / Turnover

‘Nonfidebrate’ = [Trade credits + payments received on accounts of orders] / Short-term liabilities

Supplementary variables

‘CashFlowCap’ = Cash flow / Turnover

‘ROE’ = Return on equity = Cash flow / Capital and reserves

‘GrosProfita’ = Gross operating profit / (Fixed assets + working capital requirement)

‘Markup’ = Gross operating profit / Turnover

‘Fixasset’ = Fixed assets / Turnover

‘WorkingK’ = Working capital requirement / Turnover

‘Financialcharges’ = Interests and similar charges / Turnover

‘Solvency’ = Cash flow / Financial debt

‘Appint’ = Apparent interest rate = Interests and similar charges / Financial debt

#### 4. Do national financial systems still exist?

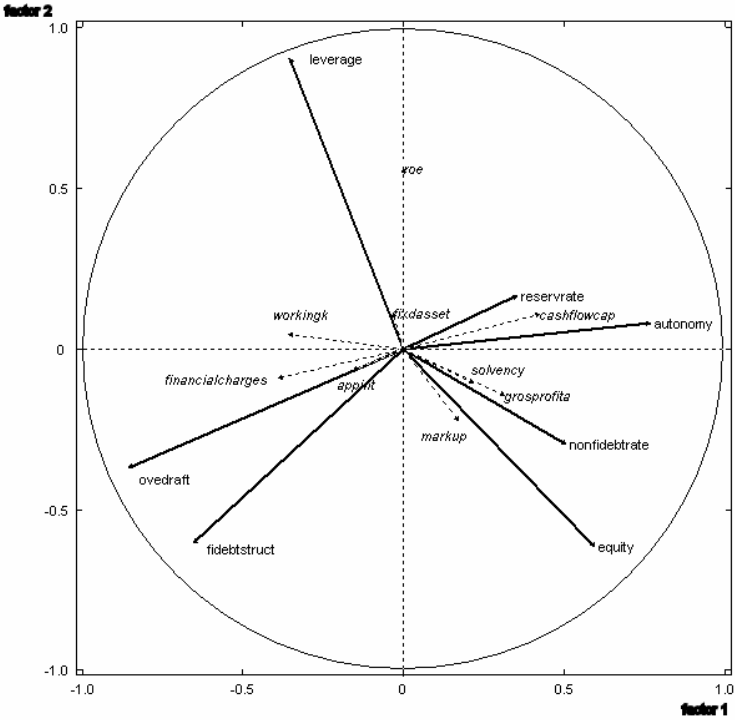
At a first step we use the largest database, that includes **all sectors** over the period 1991-2001. When the data of this sample are projected on the figure shaped by the first pair of factorial axes of the PCA, similarities or differences across countries or across size and industry cannot be showed clearly. The metaphor of the bicycle race allows us to describe the lack of evidence from the PCA. Runners can be divided into two asymmetrical groups: the bulk of not-easily identified runners and a very small number of identified runners. If the leaders do not share any common features, as they cannot be grouped either by nationality or by team, commentators would regard them only as individuals. We have a similar case here. The individual data the coordinates of which have the biggest weight in the definition of the factorial axes are similar to leaders in a bicycle race. In our case, leaders do not share any common feature. The bulk is constituted by data the coordinates of which have the smallest weight in the definition of the axes; it is concentrated near the barycentre, i.e. the intersection of the first pair of factorial axes. When all the sectors are taken into account, the diversity among the 'leaders' is high, while the number of firms near the barycentre is too large and the PCA does not provide some of the insights that one could expect.

Cluster analysis outcomes suggest a diversity among the Continental European Union economies and do not testify to a standardization of corporate financial patterns across countries. Data are grouped in three clusters. Firms of the one country are not equally found in each of the three clusters. As an extreme example, cluster 1 does not include any French firm. A few sectors have a higher frequency in one cluster than in others, but we observe neither an overall 'sector effect' nor an overall 'country effect'. Because of the strong diversity of sectors, it is not easy to get more clear-cut results and we cannot answer the

question addressed in this section. The sample needs to be more homogeneous as regards the sector. Yet in the following subsections the database only includes manufacturing sectors.

When the database is limited to **manufacturing industries only** (fig. 1-3), then similarities and differences among the financial patterns can easily be observed. Statistical outcomes are displayed in Appendix 2. Overall results of the PCA are the following. The first pair of factorial axes provide a good summary of the data as they explain 63 % of the total variance, while the first three factorial axes explain 80 % of the variance. A good quality of the data analysis is to be expected, because the number of active variables is small and some of them correlate negatively, by definition. The coordinates of the first factorial axe indicate that firms with a high ratio of permanent funds (autonomy) contrast with those with a high ratio of net short-term financial debt (overdraft) (fig. 1). The second axe depicts a contrast between firms with a high ratio of long-term debt (leverage) and those with a high ratio of own funds (equity). These oppositions are not surprising. The most striking feature is the independence of the two pairs of variables: ‘autonomy versus overdraft’ and ‘leverage versus equity’. By plotting the first and second factorial axes, this independence is visualized on figure 1. These four variables are the most discriminating, along with the financial debt structure ratio (fidebtstruct), that by definition positively correlates with overdraft.

**Figure 1: Active and supplementary variables\* plotted on the first pair of factorial axes  
 manufacturing firms, 1991-2001**



\*supplementary variables are in italics. Source : own calculations

Figure 1 indicates that firms with a higher rate of own funds (equity) than other firms of the sample as well as firms with a higher rate of long-term debt (leverage) finance the operating cycle in an undetermined manner : the two modes, keeping cash and current financial assets (autonomy), and borrowing from markets and banks (overdraft) are possible. A higher level of net short-term financial debt (overdraft) does not entail a higher level of long-term indebtedness (leverage), as indicated by the lack of correlation between these two variables (correlation equals 0.01). Independency of these two sets of criteria is a sound result. The same evidence has been produced when all sectors were taken into account (supra) and in previous studies (Rivaud-Danset *et al.* 2001). It validates the view that national financial

**Figure 2: Projection of individual data, the first pair of factorial axes,  
manufacturing firms, 1991-2001**

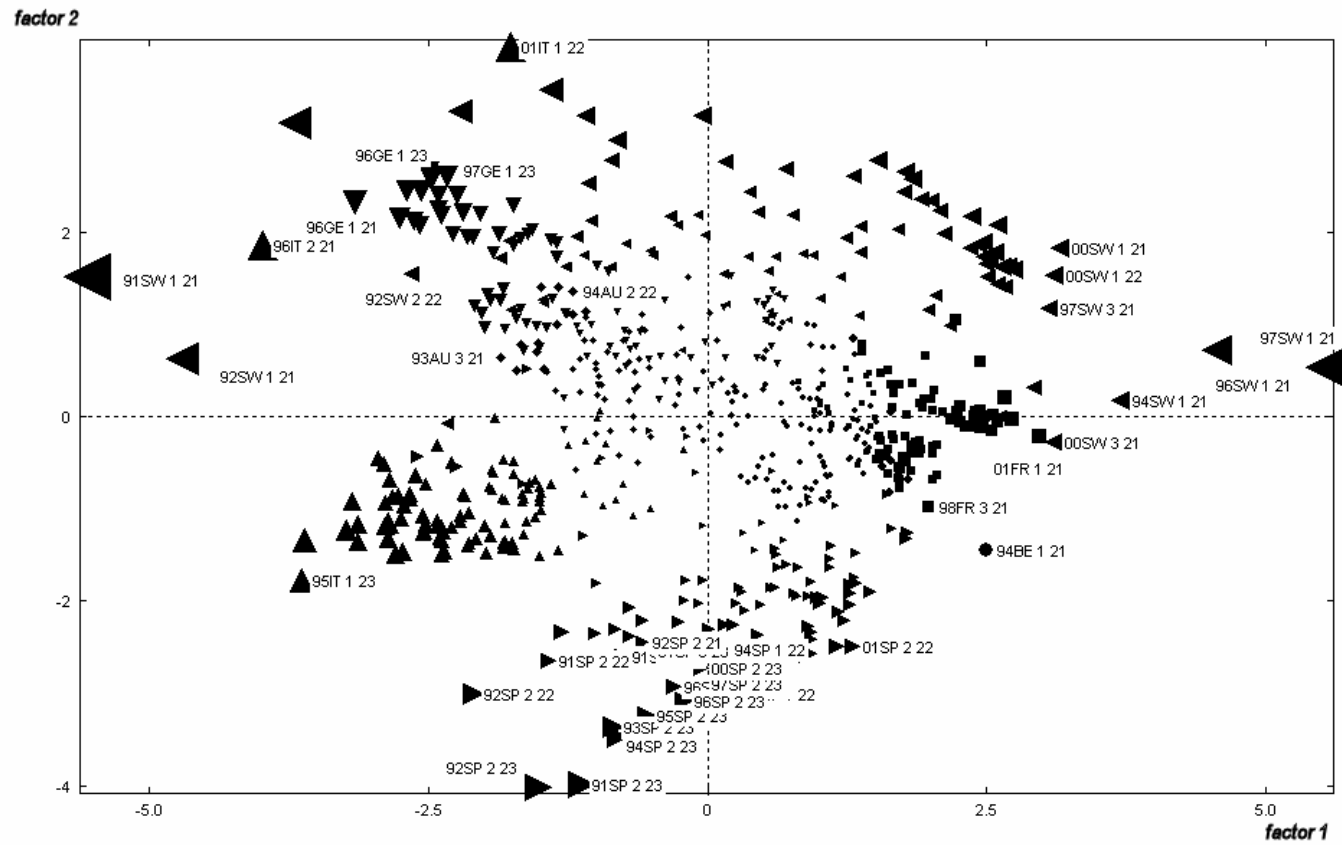
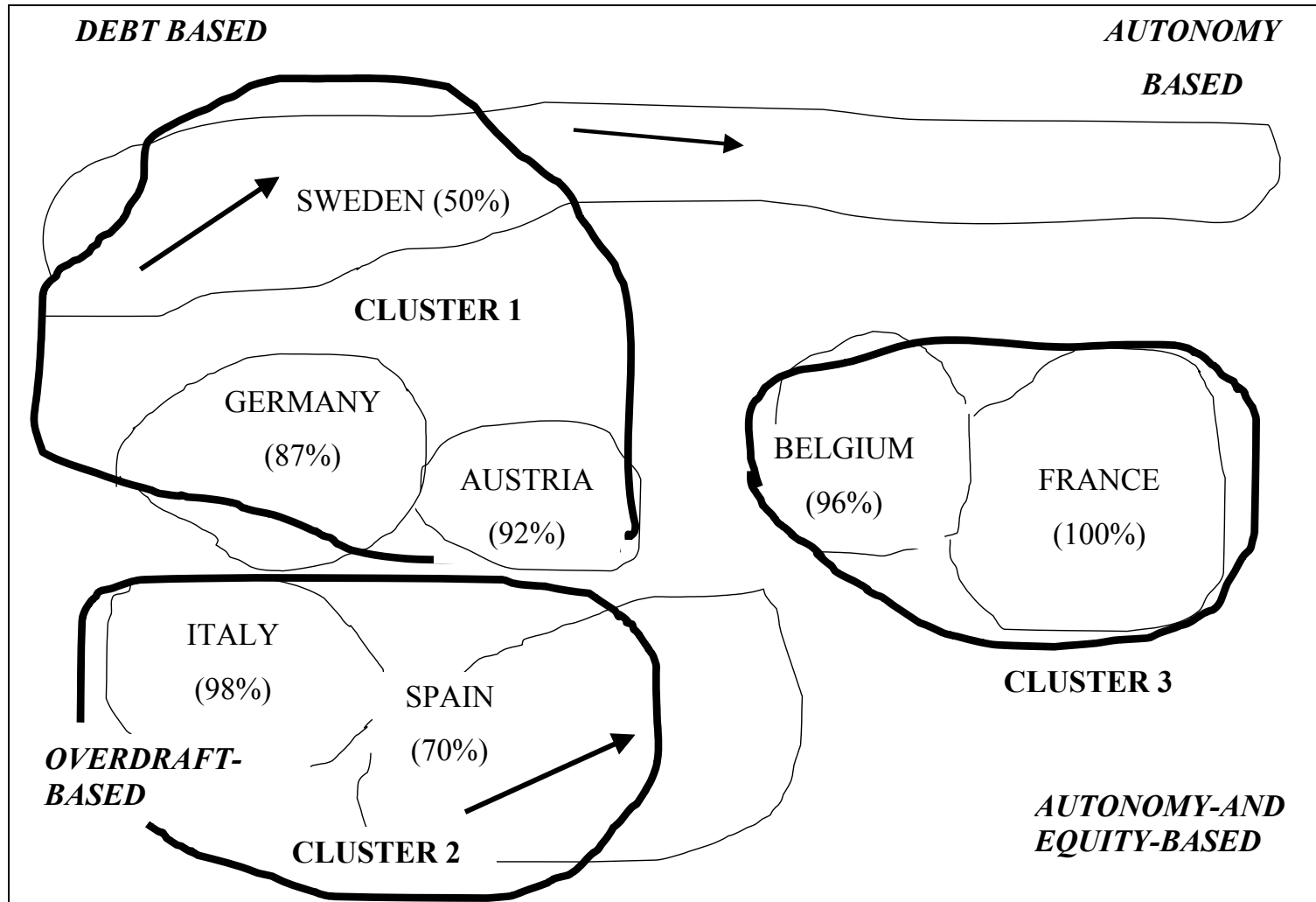


Figure 3: Simplified representation of figure 2 and clusters (manufacturing firms, 1991-2001)



systems are better characterized by using these two pairs of criteria than by using only one pair. It also validates our theoretical analytical framework : the financial pattern of long-term investment projects and the financial pattern of day-to-day business are not similar. When the database only includes manufacturing, we get a more homogeneous sample that allows us to see the grouping of individual data by country. Figures 2 and 3 testify in favour of the notion of a national financial system, as illustrated by the following example: the average small German firm producing consumer goods is more similar to the average large German firms producing investment goods, whatever the year, than to its French counterpart. When the database is limited to manufacturing industries, then we can answer positively to the first question. Significant country differences can be observed permanently from the PCA.

#### **5. Is there any model to be followed by European firms?**

The results of the PCA and the cluster analysis provide arguments to discuss the widely held belief in a single corporate model that would favour economic growth. In this section limited to manufacturing firms, we take into account profitability indicators that are classified as supplementary variables in the PCA (see table 4). Figure 1 shows that gross profitability and mark-up ratios are located not far from the barycentre, suggesting a rather loose correlation between a given financial pattern and economic profitability. This outcome testifies in favour of the idea that different financial patterns constitute different ways of achieving similar performances, performances being estimated, here, only by indicators of economic profitability. Differences in corporate financial patterns among firms do not necessarily imply the superiority of one type of system over others. This view is shared with researchers who follow a systemic perspective and reject the agency theory view of an optimal corporate governance system (Aoki, 2001, Schmidt and Tyrell, 2004).

The cluster analysis provides additional evidence. It indicates that there are distinct modes of financing which are more or less sustainable. Observations are grouped into three clusters. The hand made figure 3 has been introduced as a pedagogical device. The framework summarized by table 3 is a good guide to comment figures 2 and 3. Outcomes are displayed in appendix 3.

Cluster 1 groups firms that belong to a *debt-based* pattern. Short-term and long-term bank debt is the preferred source of funds. A high percentage of the German and Austrian firms belong to this cluster. Cluster 1 also includes half of the Swedish firms and, more accurately, the Swedish firms at the beginning of the 1990s. The set of variables with values significantly higher or lower than the average of the sample is the following: the rate of long-term liabilities (leverage) and the rate of short-term financial debt (overdraft) are higher, the rate of trade credit (non-financial debt rate) is lower; in spite of slightly lower economic performances, as indicated by lower gross profitability and mark-up ratios, return on equity (ROE) is higher because of the leverage effect. It is necessary to recall that the ratio called 'leverage' includes all stable resources that are not equity, and in particular it includes provisions. The rate of provisions is structurally very high in Austria and Germany because of the pension funds internally managed by firms for their employees. Cluster 1 looks like a classical case study, as it illustrates the positive effect of debt on the return on equity ratio, but its impact on economic growth is not defined.

Cluster 2 illustrates an *overdraft-based* pattern. It groups nearly all the Italian firms and 70 % of the Spanish firms of the sample. The ratio called overdraft is much higher than the average, while leverage is lower. The set of variables, which characterizes this cluster, does not testify to a classical corporate model. Firms rely on short-term debt. The apparent rate of interest and the financial charges ratio are higher, and ROE is clearly lower. Clearly, this atypical complex

set of variables is not an optimal one. Nevertheless, Italian firms have followed this pattern over the whole period, and this fact suggests that it has also some advantages for them.

Cluster 3 illustrates an '*autonomy- and equity-based*' pattern. All the French firms and nearly all the Belgian ones belong to this cluster. The indicator called 'autonomy' has negative values in all the clusters, because stable resources never entirely cover fixed assets and the working capital requirement. However, the negative value of this ratio is lower in cluster 3 than in clusters 1 and 2. Leverage is lower than the average while the rate of equity is higher. Overdraft has a negative value and is lower than on average while the rate of trade credit (non-financial debt rate) is higher. The cash-flow capacity ratio and the gross profitability ratio are slightly, although significantly, higher in cluster 3 than on the average.

Is cluster 3 the model to be followed? Economic profitability being slightly higher, can we predict that firms belonging to this cluster have a bigger capacity to expand than other firms of the sample?

If we consider that firms have a large choice of sources of funds, internal and external, and that the deregulation of financial markets made possible the development of alternative instruments to bank debt, then the question has little value. In the Modigliani-Miller world, it has no value because all profitable projects would be funded, whatever the characteristics of the firms are. Following the pecking order approach of Myers and Majluf (1984), who demonstrated why corporate managers prefer to finance investment with internal funds, because of the asymmetry of information problem, the answer is ambiguous. In a Myers and Majluf world, which is closer to the real world than the Modigliani-Miller one, the choice is hierarchical: retained earnings is preferred to external sources of funds and profitability allows firms to use retained earnings rather than debt and equity to finance investment. However, the impact of profitability on economic growth depends on how we analyse the debt to equity ratio.

If we consider that the debt to equity ratio is a mere outcome, or to put it in another way if we assume that this ratio is only observed *ex post* and does not influence the investment decision, then firms grouped in cluster 3 that are more profitable and less indebted than firms of other clusters would have a higher capacity to expand. If this capacity is not used due to a lack of profitable projects, then firms that are more profitable would be less indebted than firms of other clusters with similar growth rates. A low debt to equity ratio correlated with higher profitability would characterize the model to be followed in a Myers and Majluf world.

If we consider that the debt to equity ratio is a constraint, in other words, if the mix of retained earnings and debt is analysed as a standard to be followed or a target fixed *ex ante*, before investment is decided, then the growth predictions are quite different. Preference for self-financing entails that investment becomes highly sensitive to the levels of cash flow and retained earnings and, in certain cases, it entails that new profitable projects will not be funded. If this second hypothesis is not rejected, firms grouped in this cluster may be self-rationed. To finance a given amount of investment, firms constrained by this ratio would require a higher level of retained earnings than firms that do not face financial constraints. An additional constraint comes from the autonomy pattern. A given percentage of stable resources has to remain liquid, in the case of an unexpected event resulting in the need for additional liquidity. With such hypotheses, we cannot predict that the capacity to expand is higher for firms belonging to this cluster than for the others and we cannot analyse the cluster three as a model to be followed.

Summarizing the first results, differences across countries can be observed and we can conclude that the notion of national financial systems remains relevant. We have put into question the thesis of the best financial pattern correlated with the best corporate performances. We do not find one model to be followed but two ways of achieving financial profitability, either by leverage (Germany) or by higher economic profitability (France), we

also find an atypical cluster, the ‘Italian’ complex set of variables. Relationships between growth and financial variables are complex and evidence does not allow us to conclude in favour of one pattern over another one when corporate growth matters.

## **6. Changes in the national financial systems: hypotheses and empirical results**

Having addressed the question of whether or not financial systems have converged, in this section, we explore the thesis of a joint evolution by countries that would lead to disintermediation, with banks losing importance to the markets. Tests carried out to investigate this issue are presented in this section.

***Hypothesis 1: Financial systems have been converging toward a common corporate financial pattern.***

This hypothesis can be tested with PCA and cluster analysis. Figures 2 and 3 show that during the whole period under review, 1991-2001, there is a general tendency for keeping the same financial pattern in each country. In five countries out of seven, manufacturing firms of the same country are permanently projected in the same quadrant shaped by the first pair of factorial axes. This evidence testifies to the permanency of differences across national financial systems. In two countries firms experienced significant changes: Spain and Sweden. In this latter case, changes are easily noticeable on figures 2 and 3; Swedish firms were classified as debt-based in 1991 (North-West quadrant) and as autonomy-based in 2001 (North-East quadrant). We have performed supplementary data analyses that bear out the lack of evidence in favour of the convergence hypothesis. Individual data broken down by sub-periods were plotted on the figures obtained by projecting the first pair of factorial axes<sup>15</sup>. In

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<sup>15</sup> These figures are not displayed in this paper, given space limitation.

the case of a dramatic process of convergence, at the beginning of the period (1991-1993) individual data would be highly spread out whilst at the end of the period (1999-2001)<sup>16</sup> individual data would be concentrated around the barycentre. Evidence do not testify to hypothesis 1. PCA data are always spread out, there is no tendency toward grouping around a common financial pattern.

***Hypothesis 2: There is a general tendency across countries toward less bank financing***

We also aim to assess the belief in a process of disintermediation. Do data provide evidence of this process? If any, is it more obvious in bank-based countries than in market-based ones? In order to judge whether the role of banks may have changed during the last decade of the XX<sup>th</sup> century, we employ a graphical method as a first step and carry out an econometrical test as a second step. Hypothesis 2 is tested with two intermediation ratios: long-term bank debt over total balance-sheet<sup>17</sup> and short-term bank debt over total balance-sheet. As we admit that corporate size matters, these two ratios are calculated for each size of firm.

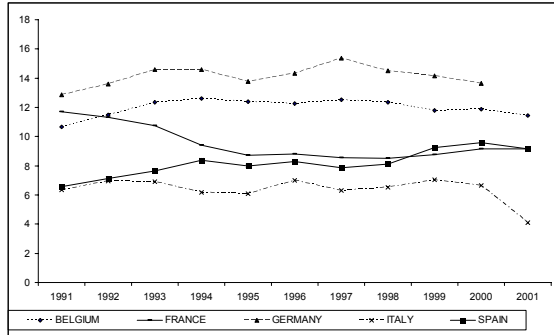
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16 These three years sub-periods have been selected to reduce the impact of the business cycle on corporate financing pattern.

17 Small Austrian firms are not in the sample. Data are not available for German firms after 2000, the long-term bank debt ratio is not available for Swedish firms, and the short-term bank debt ratio is not available for Swedish firms after 1996.

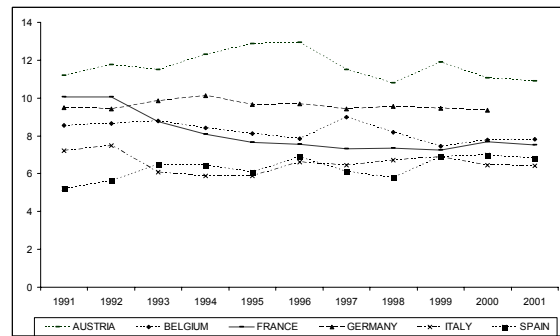
**Fig. 4.1:**

**Long-term bank debt rate,  
small manufacturing firms**



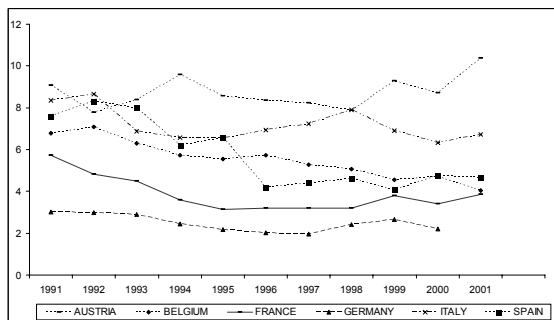
**Fig. 4.2 :**

**Long-term bank debt rate,  
medium size manufacturing firms**



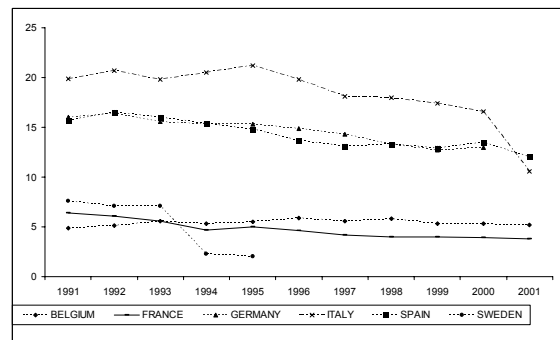
**Fig. 4.3:**

**Long-term bank debt rate,  
large manufacturing firms**



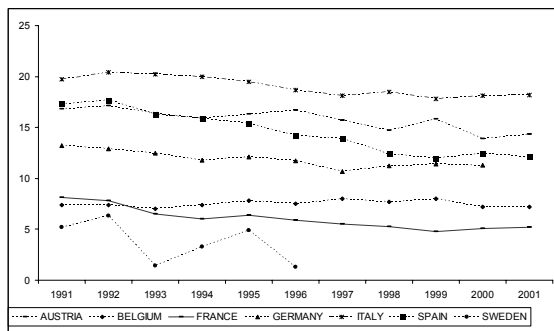
**Fig. 5.1:**

**Short-term bank debt rate,  
small manufacturing firms**



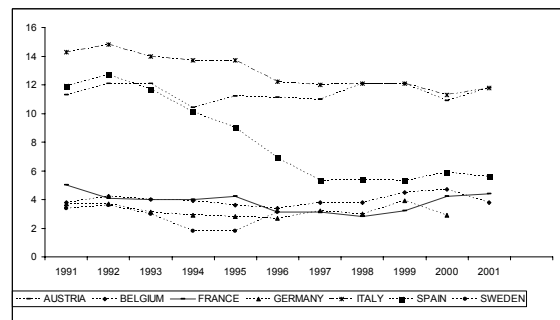
**Fig. 5.2:**

**Short-term bank debt rate,  
medium-sized manufacturing firms**



**Fig. 5.3:**

**Short-term bank debt rate,  
large manufacturing firms**



Figures 4.1, 4.2 and 4.3 indicate how the rate of long-term bank debt has evolved over eleven years (manufacturing industries only). They show that this intermediation ratio is almost constant in many cases. Yet in the case of large Austrian, French, and Spanish firms a decline can be observed at the mid-period or at the beginning of the 1990s, but this trend was reversed during the recovery of 1999-2000 in Austria and France. Figures 5.1 to 5.3 indicate how the rate of short-term bank debt has evolved. They show that this intermediation ratio has fallen in a few cases. The decline is quite noticeable in the case of small Italian firms and large Spanish firms, two countries where firms used to rely heavily on this source of funding. The decrease of this second intermediation ratio in Italy and Spain indicates that the overdraft pattern is declining. Figures 4 and 5 suggest that the hypothesis 2 should be reformulated in the following way: there is no common tendency toward less bank financing but there is a certain general tendency to reduce the use of short-term bank debt.

Now, we can come back to the assumption of convergence. According to this hypothesis, we can expect that the decreasing role of banks should have been higher in the 1990s in those countries where firms were more indebted at the beginning of the decade so that the standard deviation of intermediation ratios between countries should have been reduced during the period.

In order to test for the presence of a trend in the standard deviation series, we have carried out a regression against time trend on the following form:

$$s_t^i = aT + C$$

where  $s_t^i$  is the standard deviation of intermediation ratio  $i$  on year  $t$  for the group of countries,  $T$  is a time variable,  $C$  is a constant term. A negative coefficient would indicate a tightening dispersion of the ratio and would testify in favour of convergence for the group. Results of these regressions are reported in table 5.1 and table 5.2 for manufacturing and all sectors respectively.

**Table 5.1 : Time trend regression – standard deviation of long-term bank debt rate  
(six countries, manufacturing and all sectors)**

**Manufacturing industry only**

Size	a	C
Large size	0.03 PR> t  =0.03	-63.22 PR> t  =0.003

**All sectors**

Size	a	C
Small size	0.35 PR> t  <0.0156	-701.02 PR> t  =0.016
Large size	-0.21 PR> t  <0.0001	423.65 PR> t  <0.0001

**Table 5.2 : Time trend regression – standard deviation of short-term bank debt rate  
(six countries, manufacturing and all sectors)**

**Manufacturing industry only**

Size	a	C
All sizes	-0.13 PR> t  <0.0001	259.21 PR> t  <0.0001
Small size	-0.22 PR> t  =0.0011	445.3 PR> t  =0.001
Medium size	-0.05 PR> t  =0.05	113.68 PR> t  =0.04
Large size	-0.12 PR> t  =0.0007	234.10 PR> t  =0.0006

**All sectors**

Size	a	C
All sizes	-0.14 PR> t  <0.0001	288.96 PR> t  <0.0001
Small size	-0.22 PR> t  <0.0001	443.19 PR> t  <0.0001
Medium size	-0.08 PR> t  =0.0008	170.51 PR> t  =0.0006
Large size	-0.12 PR> t  =0.0019	251.56 PR> t  =0.0017

The standard deviation of long-term bank debt rate shows no significant trend (at the 5 percent level) for all sectors, for manufacturing industries only and all sizes. The significant results<sup>18</sup> are reported in table 5.1. It is only for large firms, in the case of all sectors as a whole, that dispersion has been reduced (the value of the coefficient is negative). But table 5.1 shows that in two other cases, the standard deviation ratio has a positive coefficient, which indicates a higher dispersion of this intermediation ratio. At this stage of empirical analysis, hypothesis 2 is clearly not valid.

However, the standard deviation of short-term bank debt rate shows a strongly significant trend and a negative coefficient for all sectors as a whole and for manufacturing industries only, whatever the size. Econometrical tests testify to the presence of a trend with regard to this second ratio.

Standard deviation tests carried out with these two ratios support the view that the observed countries have experienced a specific process of convergence toward less bank financing: cross-country differences in the use of short-term bank debt became less important whilst differences in the use of long-term bank debt remained unchanged.

Figures and econometrical tests indicate that the banking function of allocating liquidity for day-to-day business and providing a certain liquidity insurance to their clients is declining. In the case of SMEs, a decrease of short-term bank debt cannot be explained by a higher use of the market debt. Indeed, short-term market debt is in its infancy in Continental European countries and is an effective alternative source of funds only for a very limited number of large multinational companies<sup>19</sup>. Evidence suggests that changes have been pushed by banks rather than pulled by markets. In the EU observed countries, the current trend, if any, is more

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18 Results are significant when  $PR > |t|$  is equal to or minor than 0.05.

toward stable resources and self-financing than toward financial markets, as suppliers of funds. The widely spread belief in a common move away from banks toward financial markets has no empirical basis, as regards corporate financial patterns.

New reasons for changes in corporate financial patterns have to be taken into account, in order to explain these outcomes. The evolution of relationships between firms and banks in each country becomes an important factor of evolution, along with the process of globalisation of financial markets and the European financial integration. Banks are moving away from the traditional function of providing capital, for several reasons. The steady stream of bank mergers in European countries throughout the 1990s may have destabilised customers-suppliers relationships. In some European countries, firms are changing their behaviour, destabilising bank relationships. Financial managers demand funds to several banks, choosing the best offer, regardless of the importance of maintaining relationships with a particular bank. These changes may have undermined the informational advantage of banks and corporate managers' confidence in the liquidity promise given by banks. Lending tends to become standardized and detailed knowledge of borrowers activity is partly lost (Bartzolas, 2004). Furthermore, Basel I, which makes credit to non-financial firms less attractive for banks, has favoured a decrease of the role of banks as lenders; the implementation of Basel II is likely to reinforce this strategic behaviour. Yet there is little evidence of credit rationing even for SMEs, as this behaviour cannot easily be demonstrated (Wagenvoort, 2003). Our empirical analysis does not give evidence of a common trend of disintermediation, when banks act as long-term lenders. In France, a financial system that is no more largely bank-based, during the boom of the new economy (1998-2000), the role of banks as long-term lenders has increased for larger firms, that have the biggest capacity to choose among

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<sup>19</sup> In Germany, Spain, and Italy short-term market debt is marginal (less than 1.5 % of total financial debt in 2001), while it is only significant in France (5.0 % of total financial debt in 2001) (Pansard, 2003).

different sources of funds. Hence, we can predict that in the beginning of the XXI<sup>st</sup> century, changes would affect particularly short-term bank debt, as banks are moving away from their specific function of providing working capital.

Coming back to our analytical framework, we suggest that the financial pattern which characterizes the overdraft pattern (cluster 2) is not sustainable if the customer-supplier relationship is destabilised. On the opposite, the pattern called autonomy-based should not be analysed as an atypical case but as a new one, although there is no corresponding cluster; in an autonomy-based pattern, short-term bank debt is no more regarded as an important source of funds and stable resources are preferred.

Little attention has been given to banks as short-term lenders in the literature. Only long-term debt is seen as being important, because of its contribution to the funding of investment and hence growth. However the funding of working capital matters. It matters mostly for SMEs, because of their difficulties in issuing debt on European financial markets. It matters especially for young and innovative SMEs, because the working capital is highly irregular. Financially sound firms with profitable projects of investment and employment may go bankrupt because they cannot finance an unexpected increase of the working capital triggered by a sudden rise in demand.

## **7. Conclusion**

This paper aims to address the question of convergence of the national financial systems in the EU countries. Although we focus on corporate financial patterns to test this assumption, our framework of analysis is not the classical binary opposition between market- and bank-based systems. Our typology is based on a distinction between the long-term and the short-term uses of funds. Indeed, we consider that financial patterns are better analysed when two

corporate abilities are taken into account: the capacity to finance risky investment projects and the fitness to be flexible, i.e. to react to unexpected events that can be good or bad for the future of the firm. To achieve the first ability, corporate funding can rely either on equity or long-term debt. As regards the second ability, financing comes from stable resources or short-term external debt mainly supplied by banks. As our classification is governed by two pairs of alternative sources of funds, we get four virtual financial patterns.

Our PCA analysis validates this theoretical framework. Nevertheless, when all sectors are taken into account, heterogeneity is too large to allow us to classify data of the seven observed countries, and financial patterns do not provide evidence of national financial systems. So our PCA and cluster analysis focus on manufacturing industry. The PCA corroborates the explanatory power of the two pairs of variables. The cluster analysis provides evidence of differences across countries. We find that countries can be grouped into three clusters called by referring to our taxonomy of financial patterns: debt-based, overdraft-based, and autonomy- and equity-based. The pattern called autonomy cannot be observed by the cluster analysis, however this pattern characterized by a low rate of short-term bank debt is sustainable and may be followed by a growing number of European firms in the foreseeable future.

Because of the complex relationship between growth and financial variables, we cannot single out one model for European firms and accept the idea that distinct financial models may coexist in the foreseeable future in Continental Europe.

We address the question of changes during the period 1991-2001. For most of the observed countries, the main features of each national mode of funding non-financial firms have not dramatically changed during the period under review. We do not find a process of convergence toward a single financial pattern. As regards the commonly held assumption of a trend toward disintermediation, econometrical tests lead to a strong and original conclusion.

On the average European firms have not decreased their reliance on long-term bank financing, and firms have increased their rate of stable resources as they tend to rely less on short-term bank debt. A simple shift from banks to capital markets is not the essence of changes in the observed countries, although there is a general tendency on the part of non-financial firms to reduce the role of banks as short-term lenders. Changes in corporate financial patterns have been pushed by banks rather than pulled by financial markets. Evidence testifies to the decline of one of the most traditional functions provided by banks. For centuries banks have been the financial companion of economic exchanges, allocating short-term loans for current business and providing a certain liquidity insurance to their clients, in case of contingencies. The recent development of financial markets and several other factors have oriented banks to move away from this classical function toward new patterns of intermediation and new functions. We predict that the relationships between financial institutions and firms will become more long-term and more 'arm's length'.

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## **Appendix 1: Presentation of the Bach database**

**Bank for the Accounts of Companies Harmonised** (BACH) is a database containing harmonised annual accounts statistics of non-financial enterprises for 11 European countries, Japan and the United States. The database was set up in 1987.

### **Harmonization**

Accounts are "harmonised" through a common layout for balance sheets, profit and loss accounts, statements of investments and statements of depreciation. They are based on the Fourth Commission Directive (78/660/EEC of July 1978). This directive does not aim to achieve complete standardization of accounting rules; indeed several options remain open for individual Member States. Nevertheless, the main goal of the harmonization work of the Directorate General for Economic and Financial Affairs and the European Committee of Central Balance-sheet (ECCB) has been to achieve a relatively comparable framework for the statistical presentation of company accounts. The specific nature of national accounting methods and the difficulty of drawing up accounting documents *a posteriori* using a common layout thus restrict the degree of data harmonization. Harmonization is therefore still incomplete at the international level and even at the European level. Nevertheless, BACH is the most advanced publicly available database for comparisons between the financial structures and performances of SMEs and those of large companies.

### **Representativeness**

The national bodies responsible for centralizing balance-sheet data supply the Commission with aggregate information. The Commission assumes that the samples used are representative as the data is published and analysed by those bodies.

### **Countries**

The BACH database covers 13 countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Portugal, Spain, Sweden and the United States. The present analysis takes into account 7 countries: Austria, Belgium, France, Germany, Italy, Spain and Sweden. The other countries have been excluded

for different reasons: Finland and Denmark owing to missing data, the Netherlands owing to consolidated data, Portugal owing to the lack of data broken down according to the common size criterion between 1991 and 1995. Data from the United States, and Japan were not available.

### **Size**

A distinction is made between three categories of firms :

- Small companies with a turnover of less than 7 millions euros ;
- Medium-sized companies with a turnover between 7 millions and 40 millions euros ;
- Large companies with a turnover in excess of 40 millions euros.

### **Sectors**

Data have been grouped together in an aggregate common nomenclature comprising 23 sectors or sub-sectors.

Sector 1 = ENERGY AND WATER (including refining industry); Sector 2 = MANUFACTURING INDUSTRY; Sector 3 = BUILDING AND CIVIL ENGINEERING; Sector 4 = TRADE; Sector 5 = TRANSPORT AND COMMUNICATION; Sector 6 = OTHER SERVICES.

Manufacturing industry is broken down into three sub-sectors: Intermediate products (21), Investment goods and consumer durables (22), Non-durable consumption goods (23). Trade is broken down into four sub-sectors : wholesale trade, recovery services (41), sales of motor vehicles, wholesale and retail trade (42), retail trade (43), hotels-restaurants (44). The largest sample includes sectors 1, 3, 5, and 6, and the sub-sectors 21, 22, 23, 41, 42, 43, and 44. The smallest includes only the three sub-sectors of manufacturing industry.

### **Accounting Data**

The BACH accounting layout comprises a balance sheet and a profit and loss account. Assets and liabilities are given as a percentage of the total balance sheet. Profit and loss account items and statements of investment and depreciation are presented as a percentage of the turnover. In addition, the total balance sheet, the value added and the turnover are given in national currency units. The financial statements are not consolidated for the seven selected countries.

### **Principal Component Analysis**

PCA is used mainly to sort out individual data. However, the corporate data available from BACH is group data and not microdata, i.e there is only one average figure for each country\*year\*size\* sector category and balance-sheet item. Hence it is implicitly assumed that all enterprises in one category behave like the average within a given category. To put it in another way, the average firm is assumed to be a representative one.

## Appendix 2 : PCA (Manufacturing Industry, only 1991-2001)

### CORRELATION MATRIX

	EQUI	LEVE	RESE	FIDE	OVER	AUTO	NONF
EQUITY	1.00						
LEVERAGE	-0.80	1.00					
RESERVE	0.20	-0.01	1.00				
FIDEBTSTRUCT	-0.14	-0.26	-0.20	1.00			
OVERDRAFT	-0.30	0.01	-0.28	0.79	1.00		
AUTONOMY	0.26	-0.09	0.16	-0.37	-0.58	1.00	
NONFIDEBTRATE	0.11	-0.36	-0.10	-0.04	-0.26	0.52	1.00

### CHART OF THE FIRST SEVEN EIGEN VALUES

NUMBER	EIGEN VALUE	PERCENTAGE	CUMULATED	
1	2.6047	37.21	37.21	*****
2	1.8170	25.96	63.17	*****
3	1.2094	17.28	80.44	*****
4	0.7643	10.92	91.36	*****
5	0.3953	5.65	97.01	*****
6	0.1638	2.34	99.35	*****
7	0.0456	0.65	100.00	**

### POSITION OF INTERVALS

1	.....*
2	.....*.....*
3	.....*.....*
4	.....*.....*
5	*+*.....*

### COORDINATES ON COMPONENTS 1 AND 2

ACTIVE VARIABLES	COORDINATES		CORRELATIONS	
	1	2	1	2
EQUI - equity	0.59	-0.61	0.59	-0.61
LEVE - leverage	-0.35	0.90	-0.35	0.90
RESE - reservrate	0.35	0.17	0.35	0.17
FIDE - fidebtstruct	-0.65	-0.60	-0.65	-0.60
OVER - overdraft	-0.85	-0.37	-0.85	-0.37
AUTO - autonomy	0.77	0.08	0.77	0.08
NONF - nonfidebtrate	0.50	-0.30	0.50	-0.30

SUPPLEMENTARY VARIABLES	COORDINATES		CORRELATIONS	
	1	2	1	2
CASH - cashflowcap	0.43	0.11	0.43	0.11
ROE - roe	0.00	0.56	0.00	0.56
GROS - grosprofita	0.32	-0.14	0.32	-0.14
MARK - markup	0.17	-0.22	0.17	-0.22
FIXA - fixdasset	-0.03	0.11	-0.03	0.11
WORK - workingk	-0.36	0.05	-0.36	0.05
FINA - financialcharges	-0.39	-0.09	-0.39	-0.09
SOLV - solvency	0.22	-0.10	0.22	-0.10
APPI - appint	-0.15	-0.07	-0.15	-0.07

### Appendix 3: Cluster Analysis (Manufacturing Industry only, 1991-2001)

DESCRIPTION OF PARTITION

DESCRIPTION FROM THE CUT 'a' OF THE TREE IN 3 CLUSTERS

CLUSTER 1 / 3

V.TEST	PROBA	MEAN		STANDARD DEVIATION		VARIABLES	IDEN
		CLUSTER	SAMPLE	CLUSTER	SAMPLE		
CLUSTER 1 / 3 (WEIGHT = 190.00)							aa1a
16.42	0.000	54.92	42.10	9.23	12.81	6.leverage	LEVE
10.03	0.000	32.19	25.33	13.88	11.22	13.roe	ROE
4.70	0.000	3.40	1.33	5.67	7.23	9.ovedraft	OVER
4.53	0.000	31.50	28.19	18.70	11.99	17.workingk	WORK
3.65	0.000	55.74	51.78	21.46	17.78	7.reservrate	RESE
3.30	0.000	45.39	40.45	33.17	24.60	16.fixdasset	FIXA
-2.55	0.005	13.27	14.82	9.51	9.95	20.appint	APPI
-2.90	0.002	9.08	9.46	2.40	2.17	15.markup	MARK
-5.10	0.000	13.80	15.11	4.68	4.22	14.grosprofita	GROS
-7.11	0.000	-17.58	-13.40	10.53	9.65	10.autonomy	AUTO
-10.87	0.000	28.10	33.61	7.80	8.32	5.equity	EQUI
-18.68	0.000	29.47	44.11	8.17	12.86	11.nonfidebrate	NONF

CLUSTER 1 / 3

V.TEST	PROBA	CLUSTER (%)	SAMPLE (%)		
12.21	0.000	86.67	14.02	GERMANY	country
11.32	0.000	92.42	10.28	AUSTRIA	country
4.30	0.000	50.00	14.02	SWEDEN	country
2.33	0.010	35.56	35.05	SIZE = 2	size

CLUSTER 2 / 3

V.TEST	PROBA	MEAN		STANDARD DEVIATION		VARIABLES	IDEN
		CLUSTER	SAMPLE	CLUSTER	SAMPLE		
CLUSTER 2 / 3 (WEIGHT = 167.00)							aa2a
19.67	0.000	139.76	69.85	39.67	53.35	8.fidebtstruct	FIDE
15.80	0.000	8.94	1.33	3.93	7.23	9.ovedraft	OVER
8.54	0.000	4.80	3.25	3.36	2.73	18.financialcharges	FINA
5.23	0.000	32.37	28.19	5.01	11.99	17.workingk	WORK
4.50	0.000	17.80	14.82	11.19	9.95	20.appint	APPI
2.86	0.002	46.56	44.11	5.28	12.86	11.nonfidebrate	NONF
-2.46	0.007	14.42	15.11	3.22	4.22	14.grosprofita	GROS
-5.48	0.000	45.30	51.78	14.33	17.78	7.reservrate	RESE
-6.76	0.000	5.64	7.19	2.24	3.45	12.cashflowcap	CASH
-9.64	0.000	-19.60	-13.40	5.78	9.65	10.autonomy	AUTO
-10.13	0.000	33.46	42.10	9.68	12.81	6.leverage	LEVE
-10.44	0.000	17.53	25.33	6.72	11.22	13.roe	ROE

CLUSTER 2 / 3

V.TEST	PROBA	CLUSTER (%)	SAMPLE (%)		
17.12	0.000	97.98	15.42	ITALY	country
10.21	0.000	70.71	15.42	SPAIN	country

CLUSTER 3 / 3

V.TEST	PROBA	MEAN		STANDARD DEVIATION		VARIABLES		IDEN
		CLUSTER	SAMPLE	CLUSTER	SAMPLE			
		CLUSTER 3 / 3		(WEIGHT = 285.00)				aa3a
15.06	0.000	-6.96	-13.40	6.38	9.65	10.autonomy		AUTO
14.63	0.000	52.43	44.11	9.81	12.86	11.nonfidebrate		NONF
9.68	0.000	37.16	33.61	6.51	8.32	5.equity		EQUI
6.87	0.000	16.40	15.11	4.05	4.22	14.grosprofita		GROS
6.01	0.000	8.11	7.19	3.99	3.45	12.cashflowcap		CASH
3.21	0.001	0.65	0.60	0.44	0.36	19.solvency		SOLV
-6.14	0.000	38.63	42.10	9.62	12.81	6.leverage		LEVE
-6.83	0.000	2.43	3.25	1.15	2.73	18.financialcharges		FINA
-8.79	0.000	23.52	28.19	6.04	11.99	17.workingk		WORK
-15.45	0.000	33.41	69.85	26.19	53.35	8.fidebtstruct		FIDE
-18.27	0.000	-4.51	1.33	4.04	7.23	9.ovedraft		OVER

CLUSTER 3 / 3							
V.TEST	PROBA	CLUSTER (%)	SAMPLE (%)				
13.30	0.000	100	15.42	FRANCE	country		
11.90	0.000	95.96	15.42	BELGIUM	country		