

Clustering of European SMEs According to Their Financial Behaviour

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Abstract

This study carries out a holistic cluster analysis of the financing structure of 13 103 SMEs in 27 EU Member States, Iceland, Liechtenstein, and Norway, and 9 343 SMEs in the euro area Member States countries based on a dataset provided by the European Central Bank from the Survey on the Access to Finance of Enterprises (SAFE) in the 27th and 28th rounds, respectively. The study approaches the topic through a 2015 EIF research while developing it further in several manners. It defines five distinct types of financing: Self-financed SMEs, Credit-financed and subsidised SMEs, Flexibly financed SMEs, Supplier-financed SMEs and Lease-financed SMEs. Our results revealed different patterns and attitudes towards financing, based on variables such as country, sector, and size, which may support policymakers in finding appropriate measures to deal with the various types of SMEs.

Keywords: SME, financial behaviour, attitude

JEL codes: M210

Introduction

Small and medium-sized enterprises (SMEs) are all companies with fewer than 250 employees and an annual turnover of less than 50 million euros. In the European Union, these companies are dominated by the industrial, construction, and distribution sectors, which are also the most capital-intensive sectors; therefore, maintaining their financial viability is of paramount importance not only for their growth and operations but also for the economy as a whole. Given the high proportion of SMEs among the more highly leveraged firms, the strong correlation between these sectors (e.g. construction) and changes in GDP, and the significant impact of consumption trends (retail and wholesale trade), the form of their financing is a key issue (Baranyi & Horváth, 2021; Mikesy, 2015a).

In the EU, SMEs raise 80-85 per cent of their funds through bank loans. This contrasts with the practice observed in the United States (US), where similar companies raise 80-85 per cent of their funds from the capital markets (WSBI-ESBG, 2015). The main forms of capital raised are corporate bonds, private equity funds, venture capital funds, crowdfunding or hybrid solutions. Corporate bond issuance has declined significantly in both the EU and the US compared to the mid-2000s. According to the European Central Bank, 50 billion euros of corporate bonds had been issued by non-financial institutions by September 2017. By comparison, in the US, 1,100 billion dollars of securities (corporate bonds) were floated in the US markets in the same time frame (European Commission, 2017).

SMEs play a major role in the development of the EU economy, accounting for 60 per cent of the continent's GDP and employing around 90-100 million people, or around 70 per cent of the workforce. They create 85 per cent of new jobs and account for 99 per cent of new business. There are currently 25 million small and medium-sized enterprises in the EU (European Commission, 2022a). If these companies do not have access to the right amount and structure of resources, this can lead to a reduction in investment, a slowdown in acquisitions and a decline in innovation (Bodnár et al., 2014). If the business cycle fizzles out, it may lead to a reduction in business activity, lower profits, and thus an increase in unemployment and a decline in consumption. As it can become a spiral process, intervention and smoothing the volatility of the cycles is of paramount importance. Economic recessions and difficulties in accessing credit and resources tend to follow or even reinforce each other. However, this is precisely the time when counter-cyclical measures are needed to cushion the impact of the downturn and remedy it as soon as possible. Monetary easing and zero interest rate policies have served this purpose in the aftermath of the 2007-2008 crisis, although they have had different effects in different countries depending on the market development. As bank credit is much more prevalent in the European Union, measures to boost lending in a recessionary period could have a positive impact on the economic situation across the continent. (Banai & Kolozsi, 2018)

Entrepreneurs are an important source of innovation, growth, as well as jobs. The recent crisis, characterized by tighter credit constraints, has undoubtedly hindered the creation of new businesses and hampered the growth and survival of existing start-ups. The significant increase in business closures in recent years, especially for micro and small enterprises, is evidence: that particular attention must be paid to ensure that the right monetary policy tightening does not result in too great a sacrifice for the SME sector.

Banking products are the main solution to the financing needs of SMEs in the EU. These include bank short- or long-term loans, factoring, and leasing, which can cover 80-85 per cent of the total financing needs (WSBI-ESBG, 2015).

The European Central Bank's SAFE analysis identifies eight factors that have a major impact on the demand and supply of credit. According to the SMEs surveyed, the economic environment and outlook only became more favourable in the first half of 2017, following the 2008 crisis, but at that time, the availability of credit guarantees remained negatively perceived and has not changed significantly since 2015. A big improvement was visible in 2017 in the individual, firm-specific outlook and in the willingness of banks, commercial partners, and external investors to provide financing. The businesses surveyed do not yet perceive a tightening of financing opportunities, but they expect this to happen given the economic outlook (European Commission, 2017; European Commission, 2022a).

One of the problems of financing is that the firms would have to claim more costs as investments, which would mean their bankability would be more favourable due to the higher asset value (Corrado et al., 2022) since the value of these companies is difficult and costly to estimate. Another problem is that it is harder to disentangle from the entrepreneur. Many banks are reluctant to lend to some SMEs, even when the economy is otherwise thriving. This is because obtaining information on the creditworthiness of mostly young companies is expensive or almost impossible due to a lack of relevant data. In this case, regional banks, as they are more knowledgeable of regional companies, can, to some extent, be a solution (Lang et al., 2016).

According to the SME financing gap, information asymmetry is the reason for the lack of efficient external financing. This asymmetry can also lead to inappropriate borrower selection, where the bank cannot distinguish between good and bad projects, or the bank, lacking sufficient quantity and quality of information about the SME, sets a higher lending rate (Pozzolo, 2004; Stiglitz & Weiss, 1981). Stiglitz and Weiss (1981) also argue that low transparency and inadequate coverage of SMEs increased information asymmetry and the resulting risks (moral hazard).

In our research, we investigated the attitudes of European SMEs towards different financing techniques and assessed which form of financing they prefer. The research aims to contribute to a more harmonious cooperation between the financing institutions and SMEs and to provide an analysis of the financing attitudes and patterns of the SME sector at the European level. The research will also help to develop a targeted SME policy at the EU level.

1. The database

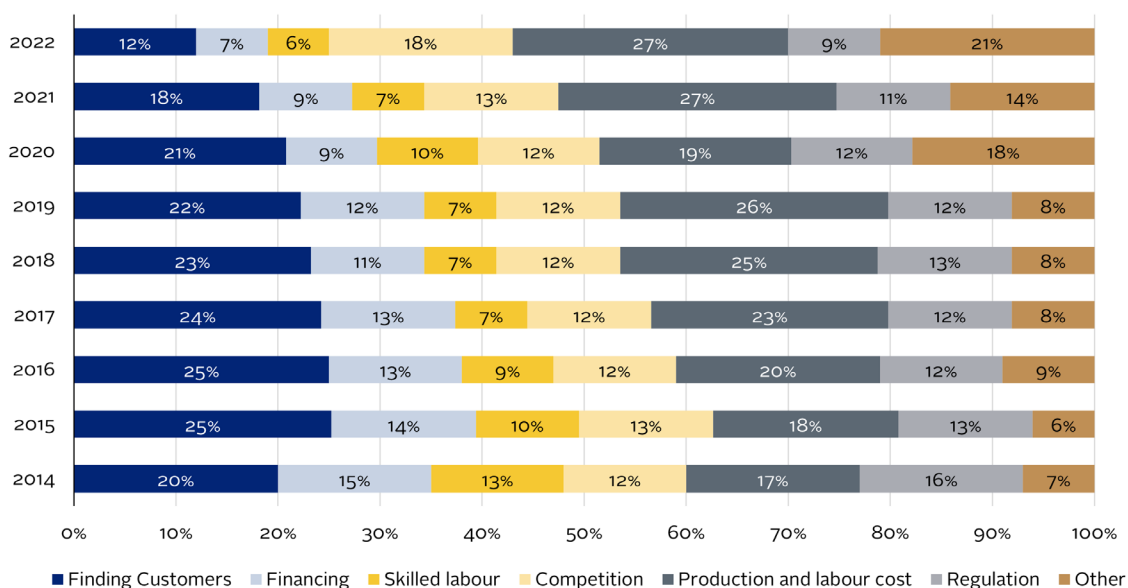
Since 2009, the European Central Bank has carried out its „Survey on the Access to Finance of Enterprises” (SAFE) twice a year, with the European Commission joining every second round (until 2013, only every two years). Consequently, in the latter cases, the survey covers all EU Member States (and even some European countries), and in the other cases, only the euro area Member States. However, not only do the two surveys differ in the countries involved, but the questions are also slightly different, given that the ECB’s objectives are related to monetary policy and financial stability. At the same time, the European Commission has a responsibility, therefore an interest, to research deeper structural issues in the EU economy. The data collection is anonymous, and the metadata is also available anonymously.

As in previous surveys, the 27th survey asked businesses four main questions:

1. the economic situation and challenges of the enterprise,
2. business financing,
3. availability of finance and its market conditions, and
4. future growth of the business and constraints to growth.

The questionnaire primarily focuses on the financing issues of enterprises but situates this within the broader context of their most pressing challenges. Specifically, it examines how financing is prioritized among the difficulties faced by enterprises. As illustrated in Figure 1, the availability of adequate labour has been a steadily increasing problem over the past decade, while production costs have also become a significant issue in the last three years due to the coronavirus pandemic (Székely, 2020), the Russian-Ukrainian war, and the inflation crisis.

Figure 1. The most important problems for businesses participating in the 27th SAFE survey, by percentage.



Source: Edited by the authors based on European Commission (2022b, p. 118)

The 28th survey, which is only for the ECB on the euro area countries, has fewer questions but a similar theme, structure, and methodology, so only the 27th round of data collection is described in more detail below.

The 27th round of SAFE was carried out between September 7 and October 14, 2022, and covered the period from April to September 2022. The sample consisted of 15,625 firms, of which 13,103, or 83.6 per cent, were SMEs (enterprises with fewer than 250 employees and a turnover of less than €50 million). The sample was selected randomly, counting the diversity of the enterprises by country, sector, and size, according to the most recent data. The survey covers the 27 EU Member States, Iceland, Liechtenstein, and Norway. The surveyed enterprises are broken down by size (number of employees) into the following categories: micro (1–9), small (10–49), medium (50–249) and large (250 or more).

This only partially corresponds to the EU definition of small and medium-sized enterprises; the numerical criteria set by the European Commission are shown in Table 1. It should also be noted that for these calculations, data from related enterprises should generally be aggregated. Consequently, the claims made in the SAFE surveys for the SME sector are not fully applicable to the SME sector according to the EU definition.

Table 1. Criteria set for SMEs

Size	Employees (and)	Turnover (or)	Balance (or)
Micro	< 10	< 2 million euros	< 2 million euros
Small	< 50	< 10 million euros	< 10 million euros
Middle-sized	< 250	< 50 million euros	< 43 million euros

Source: Edited by the authors based on European Commission (n.d.)

In our analysis, the SME stock was also narrowed down using the criteria seen above.

Enterprises were divided into four main aggregate industries in the survey. The classifications are based on the first character of the European NACE classification:

1. Industry: Mining and quarrying (B), manufacturing (C), electricity, gas, steam and air conditioning (D), water supply, sewerage, waste management and remediation activities (E)
2. Construction: construction (F)
3. Trade and commerce: wholesale and retail trade and repair of motor vehicles, motorcycles, and personal and household goods (G)
4. Services: transport and storage (H), accommodation and food service activities (I), information and communication (J), real estate activities (L), professional, scientific, and technical activities (M), administrative and support service activities (N), arts, entertainment and recreation (R), and other service activities (S)

The following activities are excluded from the survey: agriculture, forestry, and fishing (A), financial and insurance activities (K), public administration, defence and compulsory social security (O), education (P), human health and social work activities (Q), activities of households as employers; own-account producer of goods and services (T), activities of extraterritorial organisations (U), activities of holding companies (NACE 64.20) and activities of private non-profit institutions.

2. The EIF research and its findings

The research team commissioned by the European Investment Fund (EIF) and the University of Trier analysed the question regarding the financing structure of the SAFE survey carried out between April and September 2013 for 28 EU Member States and 9 other countries (hereafter: “EIF Study”) (European Commission, 2013; Moritz et al., 2015). The research aimed to gain a deeper understanding of the financing patterns of the SME sector, given their prominent role in the European economy and their financing difficulties after the crisis. Based on previous research, the EIF Study considered the following assumptions regarding the financing of the SME sector:

- Certain entrepreneurial attitudes, such as self-determination and the desire to maintain control, can influence cost sensitivity.
- Social, behavioural, and financial factors also influence the decision.
- Funding is constrained by strong information asymmetries, the principal-agent problem, insufficient margins and small volumes, i.e. low levels of economies of scale.
- The size of the business, its age, ownership structure and willingness to innovate matter.
- Sectoral differences in financing patterns can also be observed.
- It is also influenced by the macroeconomic and legal environment.

What is new in the EIF Study is the grouping of SME sector financing instruments by a deeper breakdown and the linking of these groups by firm-, product-, industry- and country-specific factors. Categorising enterprises in this way is useful, since it provides a new perspective on certain factors that can have a significant impact on financing. We know that the resource structure not only varies from country to country and sector to sector, but is also determined by firm-specific characteristics such as firm age, size, profitability, and leverage (Mikesy, 2015b; Beck et al., 2006; Baral, 2004; Zhao et al., 2006) For instance, Mersch has shown that in a risk-averse environment, credit institutions increasingly prefer larger firms, as smaller firms carry much higher risk and losses are much harder to hedge. At the same time, it was and is still under investigation whether different factors might be observed simultaneously, in a pattern-like way (Mersch, 2014).

This is what the EIF Study has attempted to do. Using data from the SAFE questions on finance, the study conducted a cluster analysis using the ward method and identified six clusters, which, according to the study, define the SME sector in the European Union. These clusters were analysed according to passive variables, which were: Enterprise-specific variables: the size of the enterprise, age, ownership structure, growth, and profitability; a product-specific variable, the existence or absence of newly launched products and/or services; industry-specific variables: industry, construction, services and trade; and a country-specific variable: 27 EU Member States (Malta excluded) and Norway.

By analysing the six clusters based on passive variables, the EIF Study found the following clustering characteristics for the six groups:

1. Enterprises with Mixed financing use a wide range of financing and constitute the second largest group (16.7 per cent of the total stock). They also use loans from friends and family, profit and loss reserves and credit for financing. This model is most characteristic of the construction industry, its innovation is higher than average. Such companies are mainly found in the northern regions.
2. Only 7.2 per cent of the total SMEs are state-subsidised. These small and medium-sized firms, usually family-owned, are prevalent in the southern regions and tend to be more dominant in industry.
3. Debt-financed SMEs rely almost exclusively on bank loans. Low growth and low innovation characterise this group, which covers 16.1 per cent of the total sector. Short-term loans and working capital loans are typical. They are predominant in the Southern region.
4. Flexible-debt-financed enterprises represent 13.2 per cent of the sector and tend to utilise commercial credit and overdrafts. They tend to be micro-enterprises with one owner and are prevalent in the western regions. They are of average growth and generally have low turnover.
5. Trade-financed SMEs cover 15.3 per cent of the sector. These are, generally, small firms with family ownership, low growth, and commercial sector exposure.
6. Internally financed SMEs, which are most prevalent in the Eastern region and post-communist countries. They usually use internal financing to solve liquidity problems (e.g.: profit and loss reserve). This is the largest group, constituting 31.4 per cent of the total. This group is made up of young, usually family-owned firms, which are most active in the services sector.

Table 2. EIF study clusters

Financing instruments	Mixed-financed SMEs	State-subsidised SMEs	Debt-financed SMEs	Flexible-debt-financed SMEs	Trade-financed SMEs	Internally-financed SMEs
Retained earnings or sale of assets	27.9%	22.7%	20.6%	14.7%	25.5%	14.0%
Grants or subsidised bank loans	14.9%	100%	1.6%	0.0%	1.9%	0.0%
Bank overdrafts, credit lines or credit card overdrafts	45.0%	54.0%	56.2%	100%	6.3%	0.0%
Bank loans (new or renewal)	36.3%	55.2%	95.2%	0.0%	0.0%	0.0%
Trade credit	41.3%	32.1%	41.4%	20.8%	70.7%	0.0%
Other loans	72.5%	1.2%	0.0%	0.0%	0.0%	0.0%
Leasing, hire-purchase or factoring	27.9%	24.4%	30.4%	20.4%	41.2%	0.0%
Equity	24.1%	3.6%	0.0%	0.0%	0.0%	0.0%
Other	17.1%	0.0%	0.0%	0.0%	0.0%	0.0%
No external finance	0.0%	0.0%	0.0%	0.0%	0.0%	100%
N	2,060	887	1,981	1,627	1,888	3,869
Percentage of firms	16.7%	7.2%	16.1%	13.2%	15.3%	31.4%

Source: Moritz et al. (2015, p. 20)

As Table 2 shows, there is an overlap between the clusters in terms of funding, they are not sharply separated. This is evident looking at the row regarding overdrafts but is also clearly visible for supplier and bank loans. Most companies use at least four of the nine forms of financing outlined (except for internally financed SMEs).

In Eastern Europe, internally financed SMEs are predominant at 45.8 per cent, while Northern Europe is more balanced, with the former group accounting for 27.4 per cent. This is followed by the group of mixed-financed SMEs at 23.7 per cent and then by trade-financed companies at 22.6 per cent. South, the share of state-subsidised companies is relatively high, while Western Europe is characterised by internally financed and debt-financed SMEs (Moritz et al., 2015).

Several things can be deducted from this distribution. For example, the banking system is more developed in the West and the North, therefore stronger credit financing and weaker state presence can be found. The high proportion of companies with mixed financing is an indication of a developed capital market in the region, i.e. companies can raise funds in the form of both equity and corporate bonds.

Another unique feature is the higher-than-average public involvement in the South. Italy, Spain, Greece, and Portugal have not always been able to settle bad debts with banks since the crisis, so the state's involvement is more significant.

In Eastern Europe, the high level of internal financing is a consequence of the underdeveloped banking sector and capital markets. In such a situation, it is harder to obtain external financing, so many companies rely on family, friends, or previously generated profits.

The countries severely affected by the crisis also show a different picture. There was a sizeable downturn in the South after 2008, with banks reducing their risky assets, a significant deterioration in firms' access to credit and an increase in operating costs. Consequently, firms in these regions have relied more on commercial loans and state support. State involvement has a positive impact on SMEs' access to finance. In the case of the UK, SMEs that were unsuccessful in accessing public funding found it more difficult to obtain external funding on a market basis (Murray & Lott, 1995). The same finding holds for the US SME sector (Mina et al., 2013). State-subsidised firms have easier access to institutional funding, even when their financial situation is not ideal. It should also be mentioned that, when credit tightens, firms increasingly turn to other forms of financing, such as factoring or leasing, to replace the declining credit supply.

3. Methodology

The methodology used in the EIF research has been further developed in this paper. Our analysis was carried out using partial data from the 27th and 28th SAFE surveys of the European Central Bank (2022, 2023a, 2023b). The ECB has undertaken the 27th survey in collaboration with the European Commission (European Commission, 2022b). In this paper, the fourth question (Q4) of the 27th and 28th SAFE surveys is analysed according to the different characteristics of firms (questions D1, D3, D4, D5, D6, Q1, Q2/e and Q2/i in the 27th survey, no question on innovation in the 28th survey).

Question Q4 (European Commission, 2022b) asks whether certain forms of finance would be relevant to the business, whether it has used them in the past or plans to use them in the future. The question therefore asks primarily about the attitude of the entrepreneur or the company towards certain forms of financing, not about the details of the specific use. To examine that, Q4 had two rounds of questions, the first asking whether the financial instrument was relevant to their financing, and the second asking whether they had used the instrument in the last six months. This paper focuses on the second round of questions, as the infrastructure used by companies is the central issue, relevance is less important here, while institutional linkage has more emphasis.

The forms of funding that the questionnaire asks about are retained earnings or sale of assets, grants or subsidised bank loans, overdrafts, card loans or short-term credit lines, bank loans, supplier credit, other credit (e.g. from owner, family, friends), leasing, factoring, corporate bond, other (e.g. subordinated debt, preferred equity, convertible bond, P2P loan, crowdfunding) or equity.

Question D1 refers to the number of employees, with categories 1-9, 10-49, and 50-249. Question D3 asks about the scope of activity, the four categories, as listed before, are industry, construction, trade, and services. Question D4 relates to the annual turnover of the enterprise, with bands of 0.5-1, 1-2, 2-5, 5-10, and 10-50 million euros. Question D5 measures the age of the company, with four bands, measured in years, 0-2, 2-5, 5-10, and 10 years or more. Question D6 concerns majority ownership, with six categories: single owner, family ownership or private entrepreneur owners, ownership by another business, stock market ownership, venture capital or angel investor, and „other”. Question Q1 asks whether the enterprise has introduced in the last 12 months one of the four categories:

1. new or significantly improved product or service in the last 12 months,
2. new or significantly improved production process or technical technology,
3. new management or control system, or
4. new marketing channel for the product or service.

In contrast to the EIF Study, which only examined whether the firm had introduced anything, our research examines all four subcategories separately.

Question Q2/E measures the change in profit in three categories (increased, stagnated, decreased) and question Q2/I measures the change in headcount in three categories (increased, stagnated, decreased).

Enterprises that answered DK (don't know) to all financial instruments were excluded from the calculation. Many smaller enterprises were thus excluded from the sample. For those enterprises that answered other than DK, DK was rewritten, and the paper continues with the answer NO instead. In comparison to the EIB Study, this paper performs one more filtering step, which meets the EU statutory SME criteria one notch better, and filters out companies with a turnover of more than €50 million in addition to companies with more than 250 employees.

Similar to the EIF Study, this paper will carry out a cluster analysis. Cluster analysis is an appropriate method to achieve the research objective, since it organizes the observed data into hierarchical classes, thus allowing comparisons between different groups according to passive variables. The input for the cluster analysis is the table of answers to question Q4. A value of 1 is assigned if the respondents have picked it, and 0 if they have not. The cluster analysis is thus performed on a logical vector (true or false), in R programming language, using the well-known “ward.D2” method, as in the original study. To determine the distance between each logic vector, the EIF Study uses a squared Euclidean (“SE”) distance. This is a common method that defines the values 1 and 0 as quantitative variables, but since the institutional system and infrastructure can be approached as a qualitative issue and our data are also in the true/false (taken up / not taken up) space, another method, the Jaccard index or Jaccard distance, is used in this paper. The Jaccard index is a set-theoretic method that defines the distance between two logic vectors as the quotient of the intersection and union of the vectors (Meila et al., 2015; Hair et al., 2016)

Since the union is in the denominator of the distance-defining quotient, it is not the matching of the whole logical set (the whole set), only the local values (funding forms) covered by the sets that matter. That is, the distance between 1100 and 0100 and between 11 and 01 is the same: 0.5, a quasi 50 per cent match. Where both values are 0, there is no calculation, because if neither of the two firms has taken up one of the two forms of financing, it is not considered similar, whereas if both have taken up one of the two forms of financing, it is. Of course, if one of them has taken it up and the other has not, the model takes that into account.

Both rounds of data were subjected to cluster analysis using the Jaccard distance method, while the data from the 28th SAFE survey were only subjected to quadratic Euclidean analysis for control purposes. Overall, we can say that the clusters measured by Jaccard distance „pull” more strongly, as most of the forms of financing are not used by firms, meaning that the table contains mostly zeros, and as mentioned, if both values are zeros (no financing), it does not alter the solution.

Once the clusters have been established, the clusters are analysed along the enterprise-specific variables, product-specific variables, industry-specific variables: industry, construction, services and trade and country-specific variables (D1, D3, D4, D5, D6, Q1, Q2/e. and Q2/i. questions).

4. Results

In the following, the design of the clusters for the two databases is presented. A total of 13,103 SMEs from the 27th SAFE database and a total of 9,343 SMEs from the 28th SAFE database were included in the analysis; the remaining enterprises were filtered out according to the methodology presented. Although the representation of larger firms (who have passed the SME criteria) is higher than in the EIF Study, due to a different methodology, as in this paper, many smaller firms were excluded.

There is no clear methodology for determining the optimal number of clusters, much depends on the subjective judgement of the researcher. For example, the EIF Study methodology does not even address this question. However, there are visualisation tools available to assist in the decision. With the help of the elbow method and the dendrograms of the dataset (Szüle, 2019), and by using coherence as a criterion for the study, we decided to run our analyses with 5 clusters:

- 1. Self-financed SMEs:** These enterprises do not use external financing. This is the largest group, accounting for almost half of all enterprises according to all methods, which is remarkable, given that only 31.4% of enterprises in the EIF Study belonged to this category. This may suggest that the crisis has led a significant proportion of firms to withdraw from financial institutions, which may raise problems of growth and efficiency. This could also explain the increase in distrust in banks and financial institutions after the crisis.

2. **Credit-financed and subsidised SMEs:** This is the second-largest cluster in the 28th SAFE survey and the penultimate cluster of the 27th. Enterprises in this group have a diversified range of financing, especially according to the 28th survey, but credit and subsidies (or subsidised credit) stand out. They also use a relatively high proportion of leasing arrangements, and, according to Survey 28, factoring and vendors. This is the group most affected by the behaviour and regulation of commercial banks.
3. **Flexible financed SMEs:** The third largest cluster. It is characterised by using short-term credit facilities and self-financing, but also by a relatively high proportion of supplier credit, leasing, and bank financing. This group uses the most financing instruments according to both surveys. Flexibly financed SMEs are perhaps the most advanced cluster in terms of financial literacy, and the most conscious in terms of their use of financial instruments.
4. **Supplier-financed SMEs:** The second largest cluster in the 27th questionnaire surveyed across several countries, while only the fourth largest in the 28th. In the first survey, they are more active users of other financing instruments, in particular leasing, factoring, and other loans. In the second survey, leasing and bank loans are more likely to complete the financing mix. The asymmetry with Cluster number two suggests that this type of network-based financing is stronger in non-euro area countries, indicating less punctual payments and lower financial culture.
5. **Lease-financed SMEs:** Lease-financed enterprises are a clear and simple group for both surveys. Enterprises in this group opted exclusively for lease financing. In both cases, this is the smallest group in the survey, with 7-8 per cent.

The clustering of the 27th and 28th SAFE datasets using the Jaccard index resulted in similar clusters, as shown in Tables 3 and 4.

Table 3. Cluster results on data from the 27th SAFE survey (Jaccard method)

Financing	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs
Bank overdrafts, credit cards	0.0%	0.0%	100.0%	0.1%	0.0%
Grants or subsidised bank loans	0.0%	49.6%	16.2%	14.7%	0.0%
Bank loans	0.0%	69.3%	22.8%	22.2%	0.0%
Trade credit	0.0%	0.0%	29.2%	62.7%	0.0%
Other loans	0.0%	0.5%	11.2%	24.9%	0.0%
Leasing	0.0%	27.6%	30.4%	30.5%	100.0%
Debt securities	0.0%	0.0%	0.7%	3.4%	0.0%
Equity	0.0%	0.0%	2.7%	5.2%	0.0%
Factoring	0.0%	0.0%	9.5%	22.5%	0.0%

Table 3 continued

Financing	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs
Retained earnings or sales	0.0%	0.0%	100.0%	0.1%	0.0%
Other	0.0%	0.2%	0.9%	2.3%	0.0%
No external financing	100.0%	0.0%	0.0%	0.0%	0.0%
Sum (pc.)	5993	1328	1977	2751	1054
Sum (%)	45.7%	10.1%	15.1%	21.0%	8.0%

Source: Edited by the authors

Table 4. Cluster results on data from the 28th SAFE survey (Jaccard method)

Financing	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs
Bank overdrafts, credit cards	0.0%	0.0%	100.0%	0.0%	0.0%
Grants or subsidised bank loans	0.0%	32.6%	16.6%	14.3%	0.0%
Bank loans	0.0%	48.3%	24.0%	22.1%	0.0%
Trade credit	0.0%	12.8%	31.4%	92.3%	0.0%
Other loans	0.0%	25.0%	11.0%	0.9%	0.0%
Leasing	0.0%	29.7%	27.8%	22.1%	100.0%
Debt securities	0.0%	0.3%	0.9%	7.9%	0.0%
Equity	0.0%	0.2%	1.9%	4.9%	0.0%
Factoring	0.0%	24.8%	8.7%	1.2%	0.0%
Retained earnings or sales	0.0%	0.0%	100.0%	0.0%	0.0%
Other	0.0%	1.8%	0.7%	0.2%	0.0%
No external financing	100.0%	0.0%	0.0%	0.0%	0.0%
Sum (pc.)	4230	1869	1489	1067	688
Sum (%)	45.3%	20.0%	15.9%	11.4%	7.4%

Source: Edited by the authors

Clusters are analysed by specific business and product characteristics, and by country of establishment for both cluster mappings. The comparisons are presented in Tables 5 and 6, which show the proportion of clusters in each category. The table contains a very large number of comparison options, which would stretch the scope of this paper. For this reason, our research focuses only on growth factors and innovativeness.

Table 5. Cluster comparison (Jaccard method, 27th wave)

Variables	Categories	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs	Sum (pc.)	Sum categories (%)
Size (employees)	1-9	57.9%	8.4%	10.2%	18.1%	5.5%	5362	40.9%
	10-49	43.4%	11.4%	15.4%	20.0%	9.8%	4208	32.1%
	50-249	30.1%	11.3%	22.2%	26.6%	9.8%	3533	27.0%
Size (turnover in EUR)	< 0.5m	60.6%	8.4%	9.0%	16.7%	5.3%	3931	30.0%
	0.5m - 1m	52.9%	9.7%	11.0%	19.0%	7.5%	1833	14.0%
	1m-2m	45.3%	11.3%	14.8%	19.9%	8.7%	1834	14.0%
	2m-10m	36.7%	12.1%	18.6%	22.6%	10.0%	3334	25.4%
	10m-50m	27.1%	9.6%	24.5%	28.9%	9.9%	2171	16.6%
Age	> = 10 ys	45.2%	10.4%	15.5%	20.8%	8.2%	11297	86.3%
	5-10 ys	47.1%	8.5%	13.8%	22.6%	7.9%	1100	8.4%
	2-5 ys	53.8%	9.0%	10.9%	21.5%	4.8%	578	4.4%
	2 ys >	46.3%	7.4%	9.9%	24.8%	11.6%	121	0.9%
Ownership	Stock exchange	42.3%	7.1%	14.1%	25.3%	11.2%	241	1.8%
	Family	43.1%	9.9%	17.9%	21.8%	7.3%	5032	38.5%
	Company	40.4%	9.5%	16.6%	23.3%	10.2%	1782	13.6%
	Venture capital	31.1%	5.4%	21.6%	32.4%	9.5%	74	0.6%
	Private individual	50.4%	10.6%	11.9%	19.3%	7.9%	5511	42.1%
	Other	42.5%	12.3%	16.9%	19.9%	8.4%	438	3.3%
Growth (profit)	Increased	43.6%	9.0%	17.2%	21.3%	8.9%	3009	23.7%
	Decreased	50.3%	10.4%	12.9%	18.2%	8.1%	4036	31.8%
	Remained	43.0%	10.7%	15.6%	23.1%	7.6%	5647	44.5%
Growth (employees)	Increased	38.0%	11.9%	18.4%	22.8%	8.9%	2833	21.7%
	Decreased	49.1%	9.4%	13.8%	19.8%	7.9%	8172	62.5%
	Remained	42.9%	10.6%	15.7%	23.3%	7.5%	2077	15.9%
Innovation	New product or service	37.5%	11.4%	18.3%	25.8%	7.0%	3220	28.4%
	New production process or technology	37.3%	12.1%	18.7%	24.6%	7.3%	2555	22.5%
	New management, governance system	37.1%	11.9%	18.2%	25.3%	7.5%	3083	27.2%
	New sales channel	40.3%	11.8%	15.9%	25.3%	6.6%	2490	21.9%

Table 5 continued

Variables	Categories	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs	Sum (pc.)	Sum categories (%)
Industry	Industry	36.0%	11.0%	19.5%	26.2%	7.4%	2960	22.6%
	Construction	42.0%	9.8%	14.8%	22.0%	11.4%	1762	13.4%
	Trade	45.2%	9.3%	14.6%	25.5%	5.4%	2920	22.3%
	Service	52.5%	10.2%	13.1%	15.4%	8.8%	5461	41.7%
Sum (pc.)		5993	1328	1977	2751	1054	13103	
Sum (%)		45.7%	10.1%	15.1%	21.0%	8.0%	100.0%	

Source: Edited by the authors

Table 6. Cluster comparison (Jaccard method, 28th wave)

Variables	Categories	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs	Sum (pc.)	Sum categories (%)
Size (employees)	1-9	58.5%	14.6%	11.0%	10.8%	5.1%	4126	44.2%
	10-49	40.8%	21.5%	17.6%	11.6%	8.6%	3023	32.4%
	50-249	26.6%	28.1%	22.9%	12.4%	9.9%	2194	23.5%
Size (turnover in EUR)	< 0.5m	63.8%	14.5%	8.5%	9.1%	4.0%	2429	26.0%
	0.5m - 1m	52.7%	16.0%	13.0%	11.4%	7.0%	1354	14.5%
	1m-2m	46.8%	20.7%	14.3%	10.0%	8.2%	1374	14.7%
	2m-10m	35.8%	22.7%	19.3%	13.3%	8.9%	2401	25.7%
	10m-50m	26.1%	26.4%	25.0%	13.1%	9.5%	1785	19.1%
Age	> = 10 ys	44.9%	19.9%	16.2%	11.6%	7.5%	8301	88.9%
	5-10 ys	46.6%	21.4%	14.8%	10.5%	6.7%	702	7.5%
	2-5 ys	52.7%	19.9%	12.6%	9.0%	5.8%	277	3.0%
	2 ys >	46.4%	21.4%	12.5%	10.7%	8.9%	56	0.6%

Table 6 continued

Variables	Categories	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs	Sum (pc.)	Sum categories (%)
Ownership	Stock exchange	35.8%	28.3%	11.3%	11.3%	13.2%	106	1.1%
	Family	42.6%	19.0%	18.8%	13.2%	6.4%	4248	45.6%
	Company	39.9%	23.9%	16.1%	11.9%	8.2%	1089	11.7%
	Venture capital	29.4%	35.3%	11.8%	14.7%	8.8%	68	0.7%
	Private individual	50.4%	19.6%	12.8%	9.2%	7.9%	3586	38.5%
	Other	48.0%	16.7%	15.9%	9.3%	10.1%	227	2.4%
Growth (profit)	Increased	42.9%	18.6%	18.5%	11.0%	9.0%	2213	24.2%
	Decreased	49.7%	17.5%	14.2%	11.0%	7.7%	3103	34.0%
	Remained	42.4%	22.9%	16.4%	12.0%	6.3%	3814	41.8%
Growth (employees)	Increased	36.4%	23.1%	19.3%	12.7%	8.5%	2154	23.1%
	Decreased	49.1%	18.3%	14.5%	11.1%	7.0%	5809	62.3%
	Remained	42.4%	22.5%	16.7%	11.2%	7.2%	1354	14.5%
Industry	Industry	34.5%	25.2%	20.7%	12.2%	7.3%	2060	22.0%
	Construction	43.3%	18.2%	16.8%	12.7%	9.2%	1146	12.3%
	Trade	45.6%	18.2%	14.6%	16.2%	5.4%	2245	24.0%
	Service	51.4%	18.8%	13.9%	7.9%	8.0%	3892	41.7%
Sum (pc.)		4230	1869	1489	1067	688	9343	
Sum (%)		45.3%	20.0%	15.9%	11.4%	7.4%	100.0%	

Source: Edited by the authors

Apart from questions on the size of the business and the industry, the database is incomplete, and some questions may not have been answered or have been answered, but not clearly. This is true for both databases.

Information on innovation is only included in Table 5, which pertains exclusively to the euro area. The survey, conducted primarily for monetary policy purposes, did not include a specific question on this topic. Innovation was carried out by 86.6 per cent of the enterprises, mainly in the self-financed and supplier-financed clusters. The innovation categories are relatively balanced across the total stock of entrepreneurs, with only product or service development rising by a few per cent and the sales route falling by a few per cent. Nor is there a striking difference between the share of the types of innovations within each cluster.

Based on the results, we have carried out two types of analysis. Firstly, based on the distribution of firms across clusters, we have managed to analyse three sets of questions, in terms of the age of the firm, the ownership structure of the firm and the direction of innovation. Secondly, based on the distribution of firms within the cluster, we were able to analyse the ability to grow and the sectoral structure.

Based on the age of the firm, it can be said that firms in the leasing cluster are typically young, recently established firms, which may be due to several factors, such as the spread of the sharing economy, where typically the firm leases the products, but it is also possible that younger construction firms are providing higher value machinery and equipment in this way. Another implication of the age classification is that flexibly financed SMEs are older than average, i.e. more mature firms are likely to have a more diversified financial portfolio, more deeply embedded in the financial institutional system.

The distribution of the ownership structure shows that start-ups, owned by a venture capitalist, form a well-defined segment of the entrepreneurial community.

Another interesting phenomenon is that family businesses are more financially aware and rely more on financial institutions for financing, while self-financing is the decisive factor for private businesses. This may lead to the conclusion that financial policy incentives for family businesses should include encouraging private entrepreneurs to rely on family members to strengthen the fragmentation and effectiveness of the financial institutional system.

The most exciting conclusion is the distribution of innovation activity across clusters. It shows that leasing firms are not innovating, which suggests that leasing firms are exploiting a financing gap but cannot be considered drivers of the economy, and cannot be relied on for economic policy in the long term.

The situation is different in the case of Supplier-financed SMEs, as these firms have a higher share of innovation in all innovation segments. This could lead to the conclusion that these are firms that rely on each other, form a kind of network, and that this network innovates together. The financial manifestation of this may be that they are temporarily indebted to each other. It is not possible to tell from the questionnaire whether this form of financing is forced, i.e. whether it is an abuse of a dominant position by the entrepreneur, or whether it is voluntary. Likely both cases occur, and only further research can decide the ratio between the two. However, it is safe to conclude that networking is beneficial from an innovation point of view and should be encouraged by financial means. This is also important due to the fact that the start-up model that has been the focus of attention over the last ten years has been primarily involved in one type of innovation, the introduction of new products. They fall into the category of those with flexible funding, as seen earlier, but they are not building a new sales channel, i.e. they have no need for networking either.

Regarding the sectoral distribution within clusters, the highest proportion of self-financed enterprises is in the service sector, i.e. most of the enterprises are probably small catering or other service enterprises. The share of industrial enterprises is higher among the debt-financed firms, but the share of industry is highest

among the flexibly financed enterprises, i.e. they are more integrated into the financial institutional system. A similarly high industry share is also found for suppliers, suggesting that networking in the industry is high, which is not so surprising, given the B2B context.

In terms of profit growth, flexible financing leads, perhaps because they can take advantage of the financial opportunities. To add, the most profitable firms were those with the highest growth in the number of employees. The lowest profit growth was achieved by the debt-financed sector. These companies have typically stagnated, which is confirmed by the headcount data as well. The largest number of firms with declining profits is found in supplier-based firms, which may indicate a downturn in the industry and could also result in the innovation pressures we saw earlier. Interestingly, self-funded firms are average in terms of growth, which either shows their ability to survive or that economic policy programs have been successful in saving them.

Both Tables 5 and 6 show that larger SMEs are more likely to belong to clusters with more complex financing structures, while smaller SMEs are more likely to be self-financed.

The J27 analysis shows that supplier funding is more significant, while the comparison table for survey 28 shows that debt-funded and subsidised are significantly stronger. Digging deeper into the data, one can see that large industrial companies are the main cause of the difference, with many of them relatively young and with diverse ownership backgrounds.

The country-specific comparison, i.e. the distribution of country groups across clusters, was only carried out on the 27th SAFE database, given that the 28th round includes euro area Member States only, meaning a narrower and more homogeneous sample.

Table 7. Comparing clusters by country-specific characteristics

	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Supplier-financed SMEs	Lease-financed SMEs	Sum (pc.)	Sum categories (%)
Regions							
East	42.8%	9.1%	16.2%	22.7%	9.1%	3020	23.0%
West	51.0%	11.6%	13.2%	14.2%	10.0%	3861	29.5%
South	45.6%	11.7%	15.8%	22.5%	4.4%	3962	30.2%
North	41.0%	6.2%	15.5%	27.7%	9.6%	2260	17.2%
EU membership							
„Old”	47.3%	10.8%	13.9%	20.1%	7.9%	8684	66.3%
„New”	42.0%	9.0%	17.8%	22.6%	8.6%	4161	31.8%
Other	54.7%	5.8%	10.5%	25.2%	3.9%	258	2.0%

Table 7 continued

	Self-financed SMEs	Credit-financed and subsidised SMEs	Flexible financed SMEs	Lease-financed SMEs	Lease-financed SMEs	Sum (pc.)	Sum categories (%)
GDP per capita							
Above EU average	47.5%	10.0%	13.8%	18.5%	10.3%	5421	42.2%
Under EU average	44.2%	10.4%	16.2%	22.7%	6.6%	7424	57.8%
EIF 2021 ESAF Index							
Increased	1775	382	740	960	458	4315	33.6%
Declined	1425	340	435	741	195	3136	24.4%
Stayed	2652	591	775	985	391	5394	42%
Sum (pc.)	5993	1328	1977	2751	1054	13103	
Sum (%)	45.7%	10.1%	15.1%	21.0%	8.0%	100.0%	

Source: Edited by the authors

Based on the analysis, an interesting pattern emerges. Western companies typically fit into a permanent, long-term financing structure and have mature networking, which significantly increases the effectiveness of the financial institution system. At the same time, the number of self-financing service companies is relatively high. On the other hand, those operating in the East are more connected to flexible financing and take advantage of short-term financial advantages, which reduces the advisory and supporting role of banks and financial institutions. It is also worth mentioning that the proportion of companies financed by suppliers is higher in northern companies, which has shown us the high level of networking in this region and the success of the often-mentioned Northern model.

Another interesting connection is that the development indicator (GDP/capita) does not show a relationship with the clusters. This could indicate that the form of financing has no connection with development but that there could be fault lines within the individual clusters, too. This question requires further research.

The evolution of the ESAF index in the individual clusters shows that the situation of those financed by suppliers has worsened, i.e. for the companies built on networking, the improvement of financial access has not caused any change. This again shows that the financial institution system could not significantly improve networking in Europe.

Conclusions

This study, having a very similar approach to the 2015 EIF research, reveals not only the underlying structures through the cluster analysis of the 27th and 28th round data of the Survey on the Access to Finance of Enterprises (SAFE) but also shows recent trends and market developments of the past 8 years since the original study. Our results confirmed the hypothesis that the financing structure of SMEs is related to country, sector, and cluster-specific variables, as well as the size of the firm. In many respects, clusters showed the presence of certain common entrepreneurial attitudes, which cannot be explained by other exogenous characteristics, whether industry, size, or otherwise. Accordingly, the association of resource structure with entrepreneurial attitudes was also confirmed. The hypothesis that there is a link between investment in intangible assets and resource structure was also confirmed, as shown by the financing characteristics of innovative firms. The macroeconomic level correlations were shown by the typical cluster composition of countries and, in this context, by the country-specific financing composition at the macroeconomic level. Our findings indicate varying attitudes towards financing patterns that depend on factors like country, sector, and size, which information may assist policymakers in identifying suitable strategies for addressing the diverse needs of SMEs.

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