

»»» Financing of digitalisation and capital expenditure in SMEs – a comparison

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Author: Dr Volker Zimmermann, phone +49 69 7431-3725, volker.zimmermann@kfw.de

Do digitalisation projects have specific characteristics that conflict with external financing? In order to answer this question, the present study compares the financing structures of digitalisation and capital expenditure projects.

The key finding of the analysis is that SMEs finance digitalisation in very different ways from capital expenditure – even between enterprises with almost identical size, age, creditworthiness and project volume characteristics. The share of internal funds they employ for digitalisation projects is 16 percentage points higher while the proportion of bank loans is 14 percentage points lower.

This finding is consistent with theoretical considerations that specific characteristics of digitalisation projects are, above all, a barrier to external financing with bank loans. These specific characteristics are: uncertainty about success, difficulties for external providers of capital in assessing these projects and a low share of material investments that could be eligible as loan collateral. This is a structural problem in the financing of digitalisation.

One specific finding is that, in particular, young enterprises, small enterprises with fewer than 50 employees, firms that do not have a very good credit rating and companies with extensive digitalisation projects cannot access bank loans to the desired extent.

As a consequence, enterprises are not spending enough on digitalisation or refrain from undertaking such projects altogether. Financing difficulties cause the digitalisation potential of small and medium-sized enterprises to remain untapped.

In the past years, the digital transformation of society and business has increasingly moved into the public spotlight.ⁱ As general-purpose technology¹, digitalisation can be expected to contribute to improving competitiveness across broad sections of the business community and, thus, to higher growth. A number of scientific studies confirm the positive macroeconomic and microeconomic effects of digitalisation.² But it is difficult to predict the success of digitalisation projects. In the following, we examine whether the financing of such projects faces particular challenges.

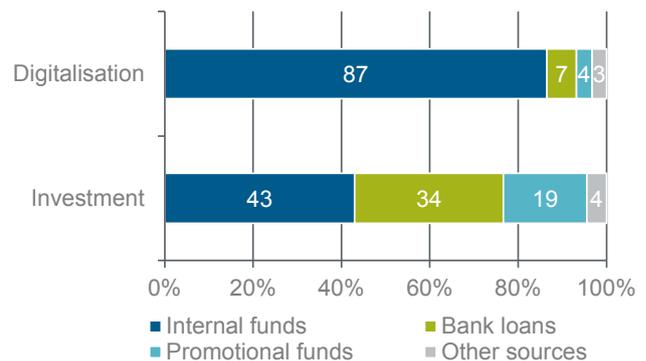
So far, there are few studies on this topic. Existing analyses of obstacles to digitalisation in enterprises have concluded

ⁱ This study was conducted in a partnership between Creditreform Rating AG, Neuss, and the economics department of KfW Group.

that financing difficulties are not among the digitalisation barriers most often mentioned.³ Enterprises that conduct loan negotiations on digitalisation projects, however, are significantly more likely to report difficulties in accessing credit than enterprises negotiating loans for capital expenditure, for example.⁴ This finding may point to a failure of the market to provide external funding for digitalisation projects, which may be due to the particular characteristics of digitalisation projects that set them apart from capital expenditure projects, for example.

Figure 1: How SMEs fund their digitalisation projects and capital expenditure

Proportions of funding sources in the relevant expenditure category in per cent



Note: Extrapolated with the number of employees; capital expenditure: only enterprises without digitalisation expenditure.

Source: KfW SME Panel 2019, own calculation

Figure 1 shows that SMEs' digitalisation projects are financed in very different ways from capital expenditure. Internal funds such as current cash flow, reserves and cash reserves are clearly the main source of funding for digitalisation projects, at 87%. Bank loans only account for 7%. By contrast, SMEs finance 43% of their capital expenditure from internal resources and a further 34% with bank loans. Promotional funds also play a more important role for capital expenditure (19%) than for digitalisation projects (4%). Other funding sources play a minor role for SMEs' capital expenditure and digitalisation projects, at 3 and 4%, respectively. The funding instruments summarised in the category of 'other sources' include private equity, mezzanine capital (silent participations) and crowdfunding arrangements.

In the following, we will examine whether this finding is an expression of any particular funding challenges for digitalisation projects. A special focus will be on how SMEs use internal funds and bank loans for digitalisation projects in comparison with capital expenditure.

Uncertainty about project success, ...

What observations may indicate difficulties in obtaining external funding for digitalisation projects? Funding problems may be caused by uncertainty as to whether the planned project will be implemented successfully and achieve its intended goals. At the root of uncertainty surrounding digitalisation projects may be their technical feasibility or commercial success (market acceptance, response of competitors). Another reason digitalisation investments in particular may fail is that it is often unclear what standards will prevail in the market.⁵

... difficulties in their assessment ...

What is decisive here is that it is much more difficult for external providers of capital to assess the likelihood of success of a digitalisation project than it is for the business carrying out the project. This often applies to digitalisation projects because many of them contain company-specific problem solutions and aim to create expertise and improve organisational performance.⁶ Because of the information asymmetry between businesses and potential providers of capital, these are less willing to finance such projects.⁷ The economic literature refers to this as a failure of the market to finance such projects. The result is that external providers of capital either demand excessive returns (including an ‘uncertainty premium’) for providing funds or that they provide only some of the finance required for digitalisation projects or none at all.

This rationale is particularly common in loan financing. This is because although the lender bears the uncertainty surrounding the success, it cannot participate in potentially high profits in the event of success because the interest rate is not tied to the outcome. This makes it more difficult for it to offset defaults against successful exposures and limits the average risk which it can assume in a loan portfolio.⁸

... and lack of loan collateral deter external providers of capital

Another barrier is that, like innovation projects, digitalisation projects consist of only a small portion of material investments. Investment in software and hardware thus makes up only around half of digitalisation projects.⁹ Digitalisation projects therefore generate only few assets that could be used as collateral for bank loans.

Analysis based on matching method used in evaluation research

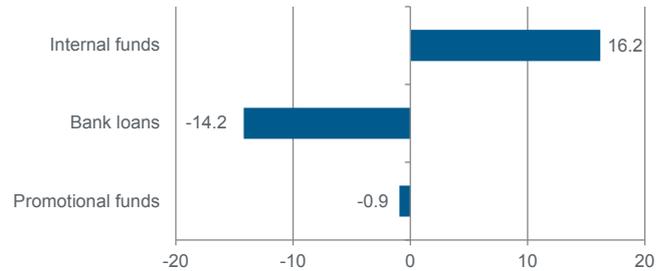
These particular characteristics indicate that digitalisation projects are more likely to meet with difficulties in obtaining external funding than capital expenditure projects. But other factors such as the size, age or financial situation of the business can additionally influence the financing of projects.

In the following we therefore examine the financing of digitalisation and capital expenditure projects using Mahalanobis matching, a special statistical method used in evaluation research. We compare the financing of digitalisation projects with the financing of capital expenditure in a comparison group of enterprises (without digitalisation projects). The comparison group of enterprises is compiled in such a way

that their size, age, project size and credit rating match those of the digital transformers (see box ‘Dataset and methodology’ at the end).

Figure 2: Differences in the financing structure of digitalisation and capital expenditure projects

Difference in financing shares In percentage points



Note: Capital expenditure: Control group of investing enterprises not spending on digitalisation but with identical project size, company size, company age and credit rating.

Source: KfW SME Panel 2019, own calculation.

Digitalisation projects: high share of internal resources but low use of bank loans

Figure 2 illustrates the key finding of this analysis: In line with the considerations set out above, the share of digitalisation expenditure financed by an SME from internal funds is 16 percentage points higher on average than in the comparison group of enterprises investing in their business – which have nearly identical characteristics in terms of project size, company size, age and credit rating. The share of digitalisation expenditure funded from bank loans, by contrast, is 14 percentage points lower. Taking into account the characteristics mentioned above, the use of promotional funds hardly differs between the two types of project.

The financing structure of digitalisation projects is therefore very distinct to the financing of capital expenditure, even in enterprises with similar finance-relevant characteristics. The fact that digitalisation projects are financed more from internal resources and less with bank loans in this comparison is consistent with the considerations initially mentioned on the failure of the market to finance digitalisation expenditure. In order to examine this finding in greater detail, we repeat the same analysis for specific subgroups below.¹⁰

Significant differences in the financing structure of SMEs of all size classes

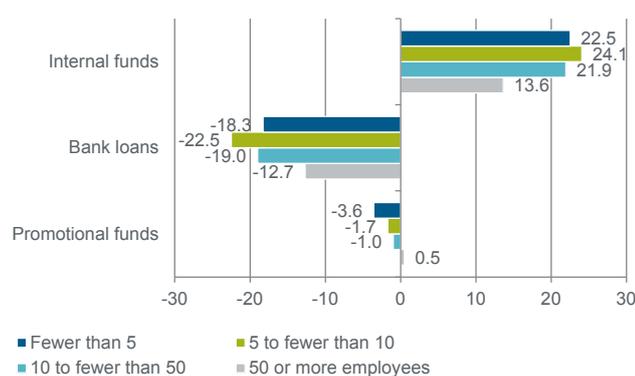
Businesses of all size classes can be seen to use elevated shares of internal funds for digitalisation projects (Figure 3). In enterprises that are in the size classes with fewer than 50 employees, internal funds employed for digitalisation projects exceed those used for capital expenditure at roughly the same rate, with differences between 21.9 and 24.1 percentage points. Accordingly, the shares of bank loans in enterprises in these size classes are 18.3 to 22.5 percentage points lower.

Only in enterprises with 50 or more employees are the financing structures of digitalisation and capital expenditure projects more similar. This shows that even in projects with uncertain outcomes, debt capital tends to be easier to obtain for larger SMEs than for smaller businesses. But even in this enterprise size class, the financing structure is still very dissimilar between digitalisation and capital expenditure projects, with a 13.6 percentage points higher share of internal funds and, in turn, a 12.7 percentage points lower share of bank loans. Smaller SMEs with fewer than 50 employees thus face particularly significant challenges in obtaining external funding for their digitalisation projects.

Small businesses use a slightly lower volume of promotional funds for digitalisation than for capital expenditure projects. This difference is quite minor, however, at less than four percentage points.

Figure 3: Differences in the financing structure of digitalisation and capital expenditure projects by company size

Difference in financing shares In percentage points



Note: Capital expenditure: Control group of investing enterprises not spending on digitalisation but with identical project size, company size, company age and credit rating characteristics.

Source: KfW SME Panel 2019, own calculation.

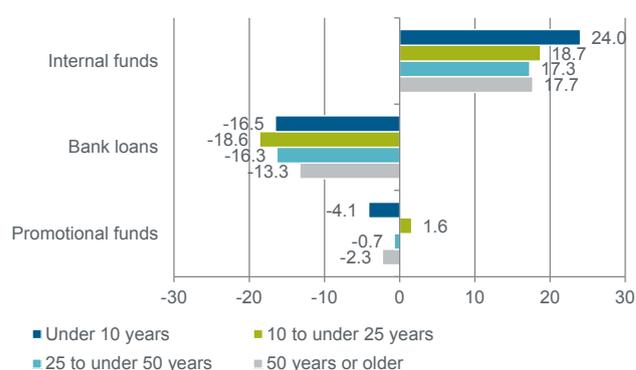
Young enterprises use a particularly high share of internal resources to fund digitalisation

The evaluation by age bracket shows that young enterprises that have been in business for less than ten years, in particular, use own funds for digitalisation projects. The share of internal funds used for digitalisation projects is 24 percentage points higher than in the comparison group of enterprises with capital expenditure projects (Figure 4). Among older enterprises from the age of ten years and above, this share hovers on a lower level of 17.3 to 18.7 percentage points.

Businesses of all ages use bank loans less for digitalisation than for capital expenditure projects. Companies that have been in business for 25 or more years use slightly more similar proportions of bank loans for digitalisation and capital expenditure projects. This shows that older businesses have fewer difficulties financing digitalisation projects. Young enterprises less than ten years old also use promotional funds to a slightly lesser extent for digitalisation than for capital expenditure projects.

Figure 4: Differences in the financing structure of digitalisation and capital expenditure projects by company age

Difference in financing shares in percentage points



Note: Capital expenditure: Control group of investing enterprises not spending on digitalisation but with identical project size, company size, company age and credit rating.

Source: KfW SME Panel 2019, own calculation.

Companies use a lower proportion of external funds for digitalisation projects regardless of credit rating

Importantly, a company's ability to finance digitalisation and capital expenditure depends on its financial situation. Positive key financial indicators mean high internal funding capacity. At the same time, the financial situation determines whether and on what terms it can use bank loans.¹¹

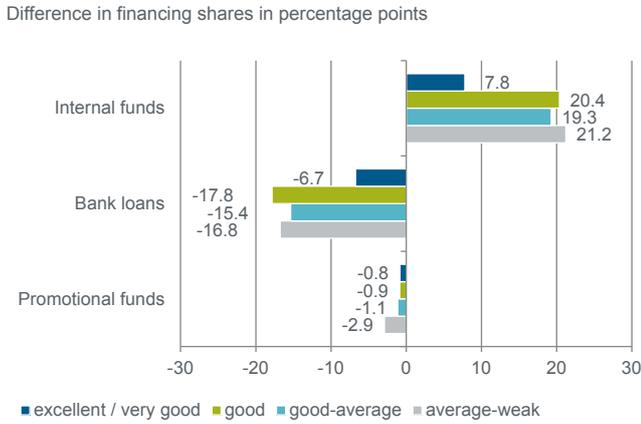
A broad-based cooperation with Vereine Creditreform e. V. enabled us to include the businesses' creditworthiness in the analysis. The creditworthiness rating issued by Vereine Creditreform is based on a total of 15 criteria that cover financial status and liquidity (information reported in the annual statements), structural risks (sector, size and age of enterprise, productivity) and soft factors (payment history, volume of existing orders, order intake, management quality).¹² For the analysis, the enterprises were divided into four groups of roughly equal size.

Even when we compare enterprises with similar credit ratings, significant differences between digitalisation and capital expenditure financing become apparent (Figure 5). The bulk of enterprises, i.e. those with a good to weak credit rating, use more resources of their own for digitalisation projects – between 19.3 and 21.2 percentage points – than for capital expenditure projects. Conversely, the shares of bank loans used by these enterprises are significantly lower, with values between -15.4 and -17.8 percentage points.

The financing of digitalisation and capital expenditure projects also differs among enterprises with excellent or very good credit ratings. However, these differences are less pronounced among enterprises that have a top credit rating, where the share of internal funding is 7.8 percentage points higher and the proportion of bank loans is -6.7 percentage points lower. It is particularly the funding differences within the comparison of enterprises with a similar credit rating that suggest it is the different project characteristics that account

for the discrepancy between digitalisation and capital expenditure financing.

Figure 5: Differences in the financing structure of digitalisation and capital expenditure projects by company credit rating



Note: Capital expenditure: Control group of investing enterprises not spending on digitalisation but with identical project size, company size, company age and credit rating characteristics.

Source: KfW SME Panel 2019, own calculation.

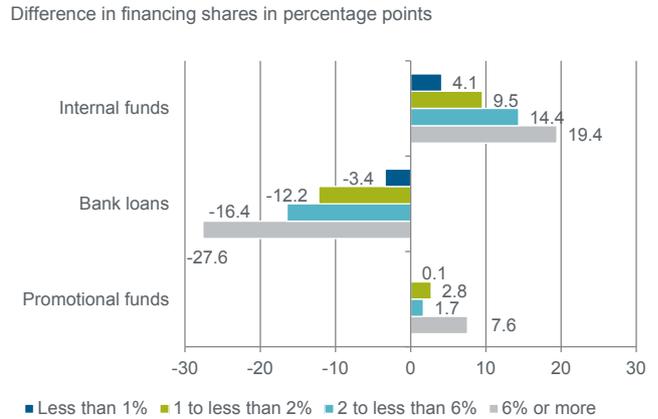
Differences in financing structure increase with project size

Finally, differences in the financing structure between digitalisation and capital investment projects become more pronounced with increasing (relative) project size. For this analysis, expenditure for relevant projects was set in relation to the relevant enterprise’s annual turnover.

Businesses that have small projects in relation to their size (expenditure intensity below 1%) finance digitalisation and capital expenditure in similar ways (Figure 6). In digitalisation projects, the share of internal funding is a mere 4.1 percentage points higher and the share of bank loans only -3.4 percentage points lower than in the control group of enterprises with capital expenditure projects. These differences increase to 19.4 percentage points for internal funds and -27.6 percentage points for bank loans in the group of enterprises with larger projects on which they spend 6% and more of annual turnover.

This increase is attributable to the fact that the larger capital expenditure projects are, the more likely they are financed with loans and less from internal funds. The share of loan financing for capital expenditure projects thus grows from 8 to 38%, while the proportion of internal funds drops from 89 to 49%. For digitalisation projects the loan-financed share rises only from 5 to 11%. Accordingly, the shares for which internal funds are used remain high in digitalisation projects. That share decreases only from 93 to 69%.

Figure 6: Differences in the financing structure of digitalisation and capital expenditure projects by scope of relevant project (in relation to annual turnover)



Note: Capital expenditure: Control group of investing enterprises not spending on digitalisation but with identical project size, company size, company age and credit rating characteristics.

Source: KfW SME Panel 2019, own calculation.

Extensive digitalisation projects in particular (with an expenditure intensity of 6% and higher) tend to be financed more with the aid of promotional funds as well. Overall, however, extensive digitalisation projects remain closely linked to the relevant enterprise’s internal funding capacity.

On the one hand, this analysis supports the argument that external funds are used only when internal resources are insufficient. On the other hand, the differences in the financing structure between digitalisation and capital expenditure projects demonstrate that, for extensive projects, the particular features of digitalisation projects are often a barrier to bank finance – as set out above – and that financing offers – if available at all – can be obtained only at disproportionately high costs.

Conclusion

SMEs fund their digitalisation projects to a much lesser extent from external sources than capital expenditure and more from internal resources. The present analysis examined whether this can be attributed to particular characteristics of digitalisation projects. To find out, we compared the financing structure of digitalisation projects with the financing structure of capital expenditure projects with the aid of a special statistical method in which the control group is composed in such a way that it is nearly identical in terms of company size and age, credit rating and project size.

Even in the comparison with this specific control group with nearly identical financing-relevant characteristics, significant differences remain between the financing structures of digitalisation and capital expenditure projects. The share of internal funds employed for digitalisation projects is 16 percentage points higher and the proportion of bank loans is 14 percentage points lower than for capital expenditure projects of similar scope undertaken by comparable enterprises.

This finding is consistent with theoretical considerations that specific characteristics of digitalisation projects, such as uncertainty about their success, difficulties in assessing them and lack of collateral, are above all a barrier to external financing with bank loans. The detailed analysis also demonstrates that it is particularly young enterprises, small businesses with fewer than 50 employees, firms that do not have a very good credit rating and companies with extensive digitalisation projects that cannot access bank loans to the desired extent.

As a result of this limitation, digitalisation activities of SMEs depend heavily on the availability of internal resources. This has serious disadvantages: Because of their limited internal funds, enterprises invest less in their digital transformation than would be desirable from an economic perspective. In specific terms, that means digitalisation projects are either not started, reduced, delayed or discontinued. As internal funds often mean volatile cash flow, another consequence is probably that long-term digitalisation projects in particular are

addressed less often, as opposed to projects that can be realised in the short term.

In summary, small and medium-sized enterprises are not exhausting their digitalisation potential because of market imperfections. Addressing this situation is an important, permanent task of economic policy.

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Box: Dataset and methodology

The analysis is based on the 17th survey wave of the KfW SME Panel, whose data refer to the year 2018. This survey requested details on the financing structure of digitalisation and capital expenditure projects. The analysis includes 2,756 enterprises with digitalisation projects and 2,126 enterprises with capital expenditure projects.

The analysis used a method applied in evaluation research (Mahalanobis matching). This method compares the enterprises that undertake digitalisation projects with a control group of enterprises that have capital expenditure projects but have not implemented any digitalisation projects. This control group is composed in such a way that the enterprises in it are identical in important respects to the group of enterprises with digitalisation projects. To achieve this, the enterprises in the control group are weighted in such a way as to reach the highest possible alignment with the group of enterprises that conduct digitalisation projects. Sufficient alignment is regarded as having been achieved when the (standardised) deviations of the mean values of the included characteristics in both groups are less than 3% to 5% and the ratio between the variances is between 0.5 and 2. (See Table A-1 in the Annex for alignment between the two groups).

Digitalisation projects are defined as projects and measures implemented with the aim of renewing the IT structure, making use of new digital applications or digitalising products (including services) or interaction with customers and suppliers. They also include measures designed to build knowledge or reorganise workflows (in connection with digitalisation) or introduce new digital marketing/sales strategies. Capital expenditure projects include all investments in material assets such as machinery, vehicles or properties.

Table A-1: Matching results

	Companies with digitalisation projects (treated) Avg.	Control group of companies with capital expenditure projects Avg		Deviation of standardised mean values in per cent	Quotient of variances between digital transformers and control group After matching
		Before matching	After matching		
Number of employees (in FTEs)	37.1	27.8	35.5	3.5	1.13
Age of company (in years)	37.4	36.2	36.7	2.4	1.06
Company's credit rating (in points)	231.6	234.3	232.2	-1.2	1.07
Scope of project (in EUR)	44,571	309,663	66,206	-4.2	0.74

Source: KfW SME Panel, own calculation.

¹ Cf. Bresnahan, T. F. and Trajtenberg, M. (1995): General purpose technologies 'Engines of growth'? *Journal of Econometrics* 65(1), p. 83–108.

² Cf. Gal, P., Nicoletti, G.; Renault, T.; Sorbe, S. and Timilotis, C. (2019): Digitalisation and productivity: In search of the holy grail - Firm-level empirical evidence from EU countries; OECD Economics Department Working Papers No. 1533; Niebel, T., Rasel, F. and Viète, S. (2019), BIG Data – BIG gains? Understanding the link between Big Data Analytics and Innovation, *Economics of Innovation and New Technology* Volume 28(3), p. 296–316; Cardona, M.; Kretschmer, T. and Strobel, T. (2013): ICT and productivity: conclusions from the empirical literature, *Information Economics and Policy* 25, p. 109–125, or Bertschek, I.; Cerquera, D. and Klein, G. J. (2013), More Bits – More Bucks? Measuring the Impact of Broadband Internet on Firm Performance, *Information Economics and Policy* 25(3), p. 190–203.

³ Cf. Zimmermann, V. (2019), **Business Survey 2019. More and more businesses have firm plans for digitalisation, hurdles also more widely acknowledged**, KfW Research and Zimmermann, V. (2017), **Business Survey 2017. Digital transformation of industries: broad basis, multiple barriers**, KfW Research.

⁴ Cf. Zimmermann, V. (2018), **Business Survey 2018. Digitalisation is gaining momentum**, KfW Research and Zimmermann, V. (2016), **Access to credit varies considerably depending on the purpose**, *Focus on Economics* No. 148, KfW Research.

⁵ Cf. Illner, B. (2017): Finanzierung der Digitalisierung im Maschinen- und Anlagenbau – Wandel durch Industrie 4.0 (*Financing digitalisation in mechanical engineering – Transformation through Industry 4.0* – our title translation, in German only), *Zeitschrift für das gesamte Kreditwesen* 22/2017, p. 1131–1134.

⁶ Cf. Saam, M., Viète, S. and Schiel, S. (2016): Digitalisierung im Mittelstand: Status Quo, aktuelle Entwicklungen und Herausforderungen ('*Digitalisation in SMEs: status quo, current trends and challenges*' – our title translation, in German only). Research project on behalf of KfW Group, Centre for European Economic Research.

⁷ Cf. Financing innovation, *Annual Review of Financial Economics*, p. 445–462 or Czarnitzki, D. and Hottenrott, H. (2010): Financing constraints for industrial innovation: What do we know?, *Review of Business and Economics*, p. 346–363.

⁸ Cf. Himmelberg, C. P. and Petersen, B. C. (1994): R&D and internal finance: A panel study of small firms in high-tech industries, *Review of economics and statistics* 76, p. 38–51.

⁹ Cf. Saam, M., Viète, S. and Schiel, S. (2016): Digitalisierung im Mittelstand: Status Quo, aktuelle Entwicklungen und Herausforderungen ('*Digitalisation in SMEs: status quo, current trends and challenges*' – our title translation, in German only). Research project on behalf of KfW Group, Centre for European Economic Research.

¹⁰ Even within these subgroups, the comparison enterprises are compared against the group of enterprises with digitalisation projects with regard to the characteristics mentioned.

¹¹ In order to rule out impacts from a company's current financing behaviour on key financial indicators, the analysis used the creditworthiness value from the time preceding the survey period.

¹² Creditworthiness is indicated on a scale of 100 to 600, with 100 representing the best achievable creditworthiness score, 500 a massive default in payment and 600 the suspension of payments. In order to exclude enterprises that were already experiencing massive payment difficulties, the analysis included only enterprises with a credit rating not worse than 400.