

How to set listing criteria for small and medium-sized enterprises in Hungary?*

Ádám Banai – Szilárd Erhart – Nikolett Vágó – Péter Varga

Since the onset of the crisis, several studies have demonstrated that the positive effect of bank lending on economic growth is limited. After a certain level, financial deepening has no positive effect on the real economy, and moreover the financial sector may actually have a negative effect on growth. Therefore, providing more diversified financing opportunities for the corporate sector is of key importance, especially for small and medium-sized enterprises (SMEs). The Budapest Stock Exchange (BSE) is taking a step in this direction now, by establishing a new stock exchange strategy for the next five years, i.e. it intends to actively open towards the SME segment as well. The objective of the study is to create a scoring system that may assist in finding those companies – primarily in the SME sector – for which it may be worth considering going public. We develop and test a quantitative scoring and ranking method on a database containing Hungarian corporate balance sheet and profit and loss account data. We present that there are companies in the SME sector for which it may be worth considering going public; moreover, the group of the top companies based on the ranking had better performance in the past than the companies currently appearing in the T and standard categories of the BSE.

Journal of Economic Literature (JEL) codes: G19, G24

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1. Introduction and motivation

Development of the Budapest Stock Exchange (BSE) came into focus again after the central bank of Hungary obtained a majority stake in this institution. The special purpose of this step was to create a capital market, by developing the Hungarian stock exchange, that provides a realistic financing alternative for a much wider group of enterprises than is currently the case. From 2016, the central bank of Hungary will gradually phase out its programmes to stimulate the economy, and it is likely that from 2020 the EU financing opportunities will narrow as well. Consequently,

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the availability of funding sources is increasingly important for the corporate sector to satisfy their financing requirements.

The literature also suggests that availability of diversified funding sources is crucial for the corporate sector. *Cournede and Denk (2015)* prepared three different estimates, for different periods. The periods started from 1961, 1971 and 1989, respectively, and lasted until the end of 2011. The sample includes all OECD and G20 countries, i.e. all the developed countries appear in it. In the course of the panel estimates, per capita GDP growth appeared as the dependent variable, whereas the explanatory variables included key variables characterising the financial sector and factors generally describing growth (for example investment ratio, population growth, level of education, etc.). One of their most important findings is that the financial sector may even have a negative effect on growth, which is true whether the role of the sector is measured with the outstanding portfolio of loans to the private sector or with the value added of the financial sector. Hence, after a certain level lending may be counter-productive. By contrast, they found a positive correlation with growth in the case of market capitalisation. Although Hungary is far from the level where the effect of lending on growth is negative (loan/GDP level of 100–150 per cent), research indicates that stock exchange development may assist in avoiding this kind of problem.

Several studies have come to a similar conclusion since the start of the crisis. Hence, the effect of financial deepening on growth is restricted, and the relative growth in lending may actually have an adverse effect above a certain level. *Sahay et al. (2015)* found (analysing the period of the crisis as well) that while the relative contribution of the financial markets (equity market, bond market, etc.) to growth is more or less independent of the level of development, the growth of financial institutions (banks, insurance companies, pension funds, etc.) results in a decreasing yield. The study of *Langfield and Pagano (2015)* also shows that bank dominance is detrimental and leads to lower growth, especially in crisis situations when real estate prices decrease significantly. Although the details of the above studies are different, they all show that the excessive dominance of bank lending is not efficient. The role of the capital markets and the banking sector must be balanced.

The research of *Cecchetti and Kharroubi (2015)* provides an answer to what factors may be behind the phenomenon presented above. In their analysis, they showed that bank lending does not support the really productive and innovative industries in many cases. This is because from the viewpoint of the banks it is important that borrowers should provide appropriate coverage for the loans, and thus, in general, they prefer companies where the ratio of tangible assets is high. However, the productivity of these companies is typically lower than the more innovative companies. Accordingly, all in all, bank financing de-emphasises R+D intensive companies that accumulate less tangible assets, which on the whole lowers productivity. A more active capital market may mitigate this problem as well.

The above studies also make it clear that the development of the Hungarian capital market is necessary. The stock exchange strategy created for the next 5 years (*BÉT 2016*) clearly focuses on such development. The main priorities of this strategy include that there should be new, successful IPOs (Initial Public Offering) on the stock exchange and that the bond market should also be strengthened, in addition to the equity market. For this to occur, it is necessary to strengthen the investor base. The appearance of marketable companies is also essential, since they can be sold to a wide range of investors as success stories. Thus, it is important to find corporate participants which may be ready for listing.

The objective of our present study is to create a scoring system that may help in finding those companies, primarily in the SME sector, for which it may be worth considering entering the stock exchange. We identify the scoring criteria on the basis of the literature and use it to develop a selection system, or so-called 'scoring', which further restricts the set of potentially marketable companies. We test this method on an anonymous database including corporate balance sheet and profit and loss account data and present the characteristics of the group of companies that may be listed on the basis of the methodology presented. The second section contains criteria for scoring and the literature supporting it. In the third section, we present the set of indicators actually used. The fourth section analyses the properties of the filtered groups of enterprises. The fifth section summarises our study.

2. Methodology of selecting marketable companies in the literature and in our study

Corporate factors determining the success of an IPO are examined widely in the literature. Although it can be seen that there is no single recipe for success, we can obtain a detailed picture of the variables and properties worth examining. Based on the study of *Macey and O'Hara (2002)*, stock exchanges must change the criteria dynamically, and qualitative criteria (e.g. management structure, business plans, accounting practices) are also important, in addition to quantitative ones. An overview of the quantitative criteria is provided by *Pagano et al. (1998)*, and *Mata and Portugal (1994)* (see in more detail in *Section 2.1*), whereas *Jain and Kini (1999)* discuss the qualitative criteria. Moreover, according to *Hensler et al. (1997)*, the examination of risk factors also deserves special attention.

Our literature review suggests that both quantitative and qualitative information need to be taken into account for the selection of listed companies. Furthermore, we consider it important to separately rate companies according to their risk profile. We recommend performing due diligence according to a procedure consisting of four steps. The widest set of companies would undergo a quantitative filtering and ranking that can be performed at lower cost, and then the set of companies filtered

out for qualitative and attitude examination would undergo the most resource-intensive pre-IPO due diligence. Our study focuses on the methodology of selecting SMEs. Although the targets of IPOs are often large enterprises, it is much less solvable and necessary to find a standardised solution for selecting them, since this group of companies is much smaller. The four steps we recommend are as follows:

As *Step 1*, selection of the widest set of companies relevant (in the analysis: group of “analysed SMEs”) using a set of quantitative indicators, in terms of the examination of marketability. The selection of indicators is based on the theoretical framework to be introduced in the following section.

As *Step 2*, on the basis of quantitative criteria, it is worth performing pre-filtering and then ranking the enterprises, while also applying some kind of risk filtering in their case (in the analysis: “pre-filtered companies” and “top 50 companies”). Thus, as a result of the scoring, we can find a group of companies which is already worth dealing with for the BSE.

As *Step 3*, in the course of the negotiations with the selected companies, the BSE should focus on the qualitative criteria of marketability as well, mentioning the attitude of the company management to financing and going public. In the course of the qualitative filtering, it is worth emphasising the factors presented in *Table 1*.

As *Step 4*, the BSE should start the classic pre-IPO phase, during which the most marketable companies and the companies with the strongest intentions to go public would undergo due diligence, with the involvement of external partners.

Table 1 Most important non-financial factors for successful IPO from the viewpoint of investors	
Management credibility and experience	90%
Quality of corporate strategy and its execution	73%
Brand strength and market position	59%
Operational effectiveness	54%
Corporate governance practices	44%
Research and innovation	35%
Financial reporting and accounting control environment	30%
CEO leadership style	25%
Ability to recruit and retain talented people	14%
IFRS/US GAAP accounting tracking record	13%
Quality of investor relations	8%
<i>Note: Values in the table represent the percentage of institutional investors that had the particular factor as one of their top five choices in 2009.</i> <i>Source: Ernst and Young (2014)</i>	

Our study deals with the first two steps. In what follows, we thus consider in more detail which quantitative factors are worth taking into account.

2.1 Compiling a set of quantitative indicators

Based on the study of *Hensler et al. (1997)*, the size and age of the company, the size of the IPO and the ownership structure (the ratio of stocks owned by “insiders”) may favourably influence the likelihood of survival after the IPO (i.e. a higher value is coupled with a greater likelihood of survival). However, an increase in the number of risk factors listed in the prospectus may decrease the chance of survival. According to the analysis of *Mata and Portugal (1994)*, focusing on Portuguese companies, the chance of survival may be influenced by the initial company size, the number of plants and the growth of the industry. Analysing American IPOs, *Jain and Kini (1999)* found that pre-IPO operating results and the prestige of the investment bankers increase the chance of survival after the IPO, while industry barriers and concentration decrease the odds.

Analysing Thai IPOs between 2001 and 2007, *Chorruk and Worthington (2010)* concluded that younger enterprises, with higher gearing and lower interest costs, are more likely to enter the stock exchange. In their study, they emphasised that part of the results may be surprising and stem from the structure of the Thai corporate sector. Moreover, it is important that IPOs were the focus of their analysis, as opposed to successful performance on the stock exchange.

The scoring presented in the study covers the first and second steps of the evaluation process consisting of the four steps presented above. We determined the indicators applied for the quantitative filtering and the ranking on the basis of the recommendations in the literature and the practices of international stock exchanges. In the course of scoring, we paid attention to compiling a set of indicators that are important for the SME sector. This may be different for large enterprises or state companies upon entering the stock exchange. In the case of the latter, the number of institutions that may be relevant for the stock exchange is much smaller. In their case, the individual background information, the recommendations of market participants, etc. may be much more important already during pre-filtering, in addition to some quantitative criteria (such as age, size, staff number, sales revenue). Moreover, it is important to point out to the fact that the methodology itself has a non-negligible uncertainty as well. One important lesson from the international literature is that the criteria of marketability can change in time and space, and the selection of the methodology is inevitably partly retrospective, as it depends on past data and observations, while selection requires a forward-looking decision. It is practical to develop the quantitative filtering with a precisely fixed procedure, but the framework needs to be handled flexibly, taking into account the uncertainty of the methodology.

The indicators that can be used for filtering and ranking SMEs focus partly on past business performance, influencing the future growth opportunities (increase in profitability and turnover, etc.), and partly on the business and demographic characteristics of the company (sales revenue, staff number, age, financial performance, market size, exports, etc.). Taking into account investor protection and reputation risks, filtering the risk factors is also justified for SMEs, since in their case the possibilities of investor protection (capacity of analysts, accounting control, media attention, etc.) are more limited and it is more likely that the ratio of less sophisticated small investors is higher.

2.1.1. Criteria related to size

The criteria related to size (sales revenue, balance sheet total, staff number, etc.) are of key importance in order to achieve appropriate competitiveness and economies of scale, and according to the research these significantly influence the likelihood of going public and the survival on the stock exchange by enterprises. Moreover, sufficiently large size may mean a guarantee for appropriate market liquidity after the IPO, which is of key importance for institutional investors, and thus supports appropriate demand for the stock. *Pagano et al. (1998)* also emphasised the importance of size. Moreover, they found that the size of enterprises listed on the American stock exchanges is on average greater than on the stock exchanges in Europe. The study of *Hensler et al. (1997)* also found that company size is, *inter alia*, one of the most important factors that increases the likelihood of survival after the IPO. The analysis of *Mata and Portugal (1994)* related to Portuguese companies also supports this statement.

In the case of SMEs, the size of the companies listed on SME stock exchanges may be indicative for our analysis. Based on the survey of *Harwood – Konidaris (2015)*, market capitalisation of HUF 2.5-10 billion is typical on average on the emerging SME stock exchanges, and most listed companies are SMEs. The average market capitalisation on the New Connect platform in Warsaw is HUF 1.5 billion (2015), and there is even a company with capitalisation of HUF 10 million. The required minimum market capitalisation on the AERO platform in Bucharest is EUR 250,000.

2.1.2. Criteria related to growth and profitability

In order to stimulate demand for stock exchange securities, the requirements of investors must be taken into account. According to the surveys (*Ernst and Young 2015*), most investors ranked various indicators of profitability and sales revenue among the most important financial factors in terms of admission to the stock exchanges:

- growth in profit per share,
- growth in sales,
- return on equity,
- growth in profitability,
- growth in EBITDA.

In addition to the surveys, the empirical literature also found that one of the most important factors that may make going public a success is growth. Based on IPO data of 243 fast growing Chinese companies, *Long and Zhang (2014)* found that the likelihood of IPO is positively affected by the value of the quantity of admission, net profit and net assets.

However, when determining the weights of growth criteria, it must also be taken into account that fast growth in the past does not necessarily mean a trend of fast growth in the future, and furthermore, the development of excessive expectations is dangerous because this may lead to overvalued stock prices. Therefore, it is worth focusing on longer-term results.

2.1.3. Other company characteristics

Three audited years are typically required on the international stock exchanges, but the median age for American IPO enterprises is higher than this, ranging from 8 to 10 years on average. Based on the empirical analysis of *Garza (2008)*, companies aged less than 9 years are more likely to underperform and to be delisted from the stock exchanges later on. *Ritter (1991)* also found evidence for the explanatory power of the age of enterprises in the performance of IPOs examining the yields of investments in the first 3 years after the IPO.

Based on Hungarian research, the likelihood of bankruptcy is mainly high in the first years in the case of SMEs: Only 40 per cent of the companies survived to see the fifth anniversary of their foundation (*Tóth 2014*). The study of *Bauer and Endrész (2016)* arrived at a similar result, and according to this research the likelihood of bankruptcy is the highest among companies aged between 3 and 6 years, after which it decreases quickly until the 10th year after foundation.

Moreover, in connection with the selection process, we must take into account the fact that the companies on a growth path since the 1990s have matured into stable medium-sized enterprises, typically with limited, family ownership. These companies may belong to the potential target group for admission to the stock exchanges, because of the ageing and retirement of the company founders and the change of generation as well. Furthermore, enterprises financed from venture capital are traditionally important targets of stock exchange acquisitions. Therefore, during the selection of the companies, it is worth involving the profession in separately screening the enterprises in the portfolio of Hungarian venture capital companies.

According to the research of *Békés and Muraközy (2011)*, the proportion of “gazelles” (enterprises with fast growth) is the highest among companies with a better financing situation, which employ a young, qualified workforce and have grown faster in the past as well. Moreover, the authors also warn that in the United

States the enterprises in the fast growth phase, especially in the case of company value between USD 5-100 million, are primarily financed from venture capital, not from bank loans. According to the analysis of *Bhabra and Pettway (2003)*, the chance of long-term survival is also influenced by the size of the company, the offered quantity and the research spending of the company.

Finally, the risk filtering of the companies is also important. This should take into account the financial stability of the companies and the variables influencing the likelihood of bankruptcy (e.g. *Hensler et al. 1997*). The types of risk models such as those presented by *Banai et al. (2016)* may be capable of such filtering. Moreover, the widely used Altman Z-score (*Altman 1968*) can also perform a similar function, and several market service providers also have similar risk indices.

3. Scoring in practice

3.1. Data used

For the enterprise scoring model, we use the National Tax and Customs Administration (“NAV”) database which can be accessed at the central bank of Hungary and is available for the period from 1992 to 2014. In the course of our current analysis, we rely on the period between 2008–2014, since we are essentially interested in the latest trends. The anonymous database includes the detailed balance sheet and profit and loss account data of all companies operating in Hungary and submitting simplified or complete tax returns, and some other supplementary data as well (e.g. staff number, registered office, corporate form, etc.). We formed the criteria presented in the analysis on the basis of these. Finally, in the case of comparisons with the companies listed on the stock exchange, we used the publicly accessible databases of the Budapest Stock Exchange.

3.2. Pre-filtering

The previously presented summary of the literature provided a considerable basis for the quantitative filtering performed in the course of determining the marketable companies. Since the identification of marketable enterprises from among various types of companies (state enterprises, large private businesses, and SMEs) may require a different selection process and often a consideration of different corporate characteristics, as a first step, we selected those companies from the entire company population whose characteristics correspond to the typical characteristics of SMEs:

- staff number should be at least 50, but less than 250,
- sales revenue in 2014 should be at least HUF 1 billion, but less than HUF 15.5 billion,
- balance sheet total in 2014 should be less than HUF 13.3 billion,
- there should be no state or local government ownership,
- the proportion of foreign owners should be less than 80 per cent.

The group identified in this way contains 1,684 companies, which we hereinafter refer to as the “analysed SMEs”, and serves as the basis for comparison for the further analyses. After this, we formed the pre-filtered population of 331 companies, ranked in the next step, with such further filtering criteria which we deem necessary so that a company can be successful on the stock exchange. Accordingly, we required that the company:

- should have operated for at least seven years,
- should have positive shareholder’s equity,
- should fulfil the definition of “gazelle” of the OECD, i.e. it should achieve growth higher than the average annual real growth of 20 per cent for 3 consecutive years.

Moreover, we also eliminated 14 companies, based on expert decision, which fulfilled the quantitative criteria listed above, but are not suitable for an IPO due to their form of operation (e.g. non-profit organisation) or ownership structure (e.g. agricultural co-operative, part of a company group).

3.3. Ranking

In order to rank the collected enterprises, we use corporate financial ratios and indicators used in the fundamental evaluation, which assess the quality of the enterprises in terms of operation, profitability, capital structure and risk. We also performed the ranking separately, taking into account liquidity indicators as well. A lower number reflects a better evaluation within the set of companies. Considering the basic principles of scoring, we look for an efficient, yet simple solution, and thus we compile the rankings on the basis of the indicators that best capture the property of the companies according to the given criterion. In many cases, we used the possible indicators that were available for as many enterprises as possible. The indicators primarily focus on profitability and business outlooks, and we performed risk filtering only after the ranking. We examined the indicators not only for a single time, but instead took into account their past 3-year average as well, which helps in avoiding misleading results because of one-time outstanding performance. By taking into account and applying an appropriate weighting of the most important corporate financial indicators accessible in the corporate database of NAV for the latest year, 2014, and the average values related to the three years between 2011-2013, we formed a composite indicator and ranked the pre-filtered companies on the basis of the values of this.

3.3.1. Indicators of profitability

Several profit ratios can be calculated on the basis of the profit and loss accounts. Of these, we use the *operating profit margin*, the *ROIC* (return on invested capital), the *effective tax rate* and the *pre-tax profit margin*, since these are the most relevant profitability measures from the standpoint of investors. The first

is the quotient of the operating result and sales revenue, the second is the ratio of after-tax profit and invested capital, whereas the last is the proportion of pre-tax profit and sales revenue. As was already mentioned in the summary of the literature, a positive, stable profit ratio indicates positive investor quality, whereas the amount of and growth in the operating result determines share prices. The management of an enterprise can primarily have an effect on operating earnings, and thus the *operating profit margin* may at the same time provide feedback on the quality of the management as well. The *pre-tax profit margin* is popular among investment analysts, since management has various techniques of influencing tax payments, which can be captured by this indicator. One of the factors fundamentally influencing profitability is the *effective tax rate*, which may differ from the official corporate tax rate because of several accounting factors. This indicator provides a realistic picture of the tax burden which the company faces in its operation.

3.3.2. Operating indicators

In addition to profitability, efficient operation is one of the most important criteria in terms of marketability. Therefore, of the indicators relevant in terms of operation, we use *tangible assets per sales revenue* (Pagano et al. 1998), *employees per sales revenue*, *ratio of exports* and *growth of sales revenue*. We can consider *tangible assets per sales revenue* and *employees per sales revenue* as sort of productivity indicators as well. In a wider sense, these attempt to capture how successfully the company generates sales revenue with its existing assets and intellectual capital. In the case of most enterprises, the available tangible assets embody a significant part of all the assets participating in production, and therefore the nature of sales revenue creating capability of these assets is necessary for efficient operation. Similarly, the employees participating in production make up the entirety of the intellectual capital of the companies, and thus the higher the sales revenue per employee, the higher we can consider the productivity of the company. Moreover, it is important to emphasise that industry-specific factors may influence the level of the above indicators.

In the case of Hungarian and regional enterprises, empirical results verify that exporting companies are more productive and grow faster than non-exporting companies (Rariga 2016; Békés et al. 2011; De Loecker 2007). Since efficient operation, stable cash flow and growth are essential in terms of a possible IPO, we considered it important to take into account this information (*ratio of exports per sales revenue*) in the course of ranking. Finally, we used the *growth of sales revenue* as well, since in this company size category investors expect dynamic growth from companies entering the stock market.

3.3.3. Indicators of capital structure

In terms of the operation of an enterprise it is essential to examine its financing position and indebtedness. For this we use the *leverage ratio*, the *capitalisation ratio* and the *ratio of external funds* (Pagano et al. 1998). The *ratio of external funds*

is a popular indicator for quantifying the capital structure of a company. A low value means that the company depends less on external funds and finances its operation largely from equity. It is worth examining the ratio of external funds not only as a proportion of total assets. Another common method for examining corporate indebtedness is the ratio of external funds to equity, also known as the *leverage indicator*. With this, we can obtain a more precise picture about the contribution of the suppliers, creditors and owners of the company to the operation of the company. The *capitalisation ratio*, which is the proportion of long-term liabilities and the sum of shareholder's equity and long-term liabilities, provides an even more detailed picture than the leverage indicator. This ratio focuses only on the structure of corporate capital, providing an even more exact picture of the extent of leverage. The analysis of the capital structure of companies provides very important information in terms of both operation and risk, but it is important to keep in mind that there is no general rule for capital structure and, in general, the optimal amount of debt depends strongly on industry and company-specific characteristics.

3.3.4. Liquidity indicators

We did not use the liquidity indicators in all the cases, because the evaluation is the least unambiguous in the case of liquidity. On the one hand, high liquidity decreases the risk of bankruptcy, but on the other hand it can also point to the fact that the given enterprise may be unable to start profitable investments from the accumulated liquid assets, and this can be a barrier to growth. This is why it appears as a sort of robustness test among the results in terms of how much it modifies the composition of the filtered company group if we take into account liquidity as well. We used two well-known indicators for the analysis of the liquidity situation of the filtered companies: the *liquidity rate*, which captures the amount of current assets available for covering short-term liabilities; and the *current ratio*, which is current assets divided by current liabilities. *Liquidity rate* is a widely popular indicator in financial reports because of its simplicity, but it may be misleading to rely solely on this indicator, since the incidental liquidation of all the current assets is less likely. It is also practical to examine the much more conservative *current ratio*, since this indicates the ratio of the most liquid assets and short-term liabilities, disregarding the asset-side working capital elements (trade debtors, inventories). It is important to note that an overly high current ratio is not necessarily positive in terms of the operation of the company, since the accumulation of large amount of current assets may hint at weak asset utilisation (instead of dividend payment or other utilisation).

3.3.5. Altman Z-score composite risk indicator (Altman 1968)

Finally, we also took into account the *Altman Z-score*, as part of a relatively simple risk filtering. This metric was developed by Edward Altman to estimate the likelihood of bankruptcy occurring within two years. The *Z-score* is based on five types of financial indicators and their factors. Its great advantage is that Altman

also determined exact threshold values for this, and thus its evaluation is simple. Therefore, a value above 3 means a safe company, whereas a value below 1.81 represents a problematic company. The index can be calibrated on the basis of the following five metrics:

- Working capital / Assets
- Profit reserves / Assets
- Operating profit / Assets
- Own equity / Liabilities
- Sales revenue / Assets

In the course of our analysis we also took into account this indicator for compiling the top 50 companies. A company could be selected to the best performing companies only if the Altman Z-score reached the safe value of 3 in all the years of the three-year period from 2012 to 2014.¹

In terms of statistics it is worth considering the weighting of the indicators used, but in practice the producers of corporate rankings typically weigh the indicators equally. On the other hand, in the course of aggregating the information, we left out the redundant variables based on a simple correlation matrix (the above list was already prepared this way). The question of weighting arises in connection with the time dimension as well, and in this regard we gave equal weights to the latest data point and the average of the previous 3 years.

4. Properties of companies selected based on the scoring

On the basis of the above criteria, we performed the quantitative filtering and ranking for the Hungarian SME sector. It is worth calculating the ranking as described above for the 331 companies that passed pre-filtering. Based on the ranking, the Budapest Stock Exchange should start the process of qualitative filtering for the companies which proved to be the best. In our current analysis,² we briefly show what characteristics the pre-filtered companies and the top 50 companies based on our ranking have compared to the analysed SMEs. On the one hand, this shows how efficient filtering itself is, while on the other hand it provides a picture about the group of enterprises that was able to produce relatively high growth in recent years. Moreover, we separately analyse the top 50 companies based on the ranking and compare these with the companies currently listed on the stock exchange (except for the premium category, since this category typically targets significantly larger companies).

¹ Moreover, risk filtering can also be supplemented with public information accessible on the market. An advantage of using several sources of information is that one can examine whether the risk rating of an evaluated enterprise is beyond average or not, even based on somewhat differing methodologies and data sets.

² The more detailed descriptive statistics of the individual groups of companies are included in Tables 2-5 of the Annex.

4.1. Results of pre-filtering and ranking

As a first step, we looked at the most fundamental characteristics of the various groups of enterprises formed according to the principles presented above, such as regional distribution, classification according to sectors of the Hungarian economy, number of employees and age. It can be seen that, in accordance with the significant regional differences in the Hungarian economy, the analysed groups of companies are dominated by the companies of the Central Hungarian Region. We do not see considerable difference among the groups, since approximately 40 per cent of the analysed SMEs are located in the most developed region, whereas this ratio is 43 per cent for the pre-filtered companies, and 42 per cent for the top 50 companies. As regards sectoral distribution, we found the dominance of manufacturing within all the groups. This dominance is especially strong in the case of the top 50 companies, since among them almost every second company operates in this sector. We saw a difference in the age of the companies according to the filtering criteria, but mainly in the lower half of the distribution, since here it mattered strongly that we formulated a minimum criteria of 7 years for IPO-maturity based on the literature (Figure 1). However, in the upper half of the distribution this difference disappears, which may be a result of the fact that many companies do not even want strong growth and produce similar performance over several decades.

Figure 1
Age distribution at the three groups of companies

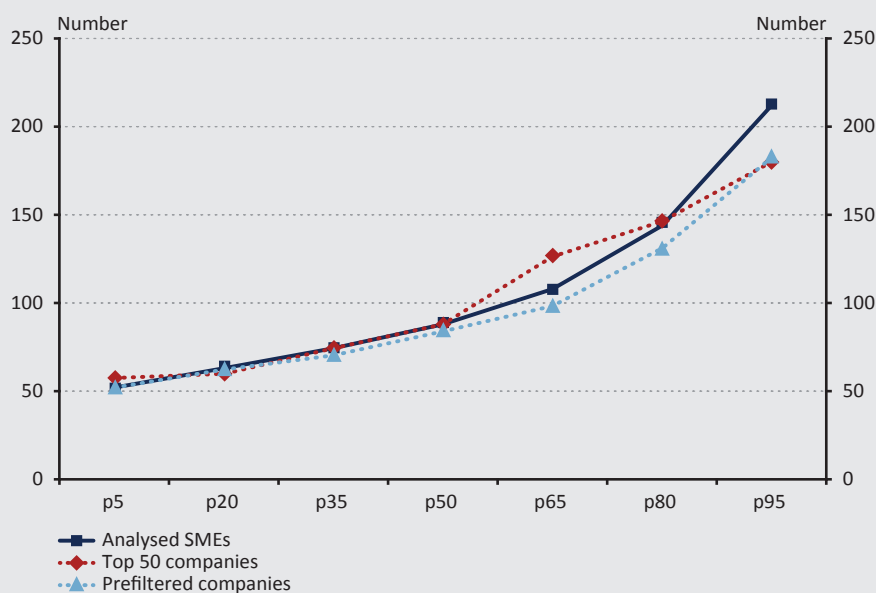


Note: The distributions in the figure refer to 2014. In the figure we indicated the percentiles with p. For example, p20 indicates the 20 percentile, which (in the case of the age of the company) shows that 20 per cent of the examined SMEs were founded in 2004 or later (they were at the most 10 years old in 2014).

Source: MNB, own calculations of the authors

Based on the number of employees, the majority of the companies is relatively small and in this respect there is no significant difference between the groups of pre-filtered companies, top 50 companies and all of the analysed SMEs. In all three groups, the number of employees is less than 100 in the case of approximately more than half of the enterprises. Naturally, this may also follow from the fact that the rapid growth we required can be achieved more easily in the case of smaller size. However, in terms of going public it is important that company size should be appropriate not only in terms of accounting. For example, it is an important question whether the staff is sufficient to fulfil the stock exchange requirements (*Figure 2*).

Figure 2
Distribution of staff number at the three groups of companies



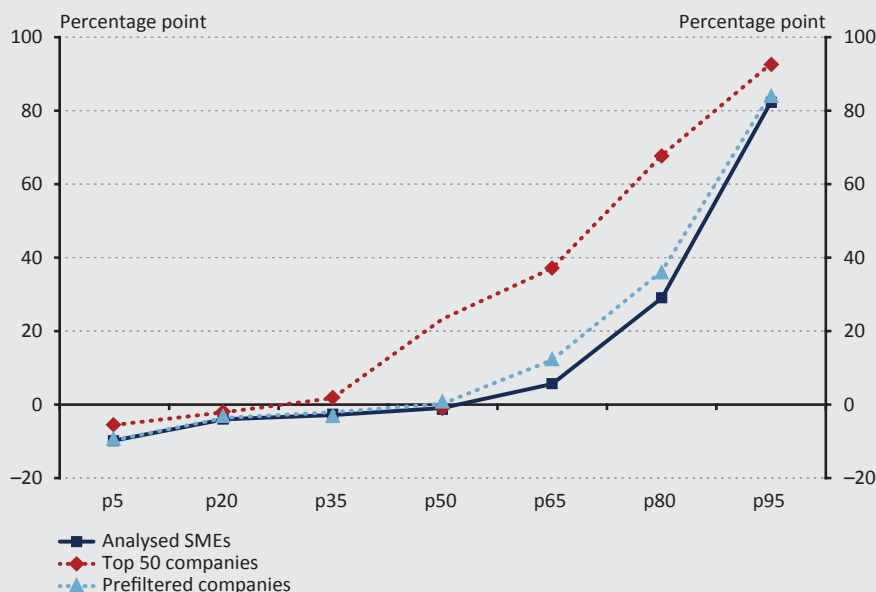
Note: The distributions in the figure refer to 2014. in the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note for Figure 1.

Source: MNB, own calculations of the authors

After analysing the basic properties, we examined in detail how the performance of the three groups of enterprises differed from each other. To do this, we typically examined the past three year average of the given indicator for the period between 2012 and 2014. First, we wanted to know what the ratio of exports was within total sales revenue at companies. Although this indicator does not provide direct information about the performance of the company, it still characterises it well. According to the observation of *Halpern and Muraközy (2010)*, innovative enterprises are more productive, they export more and with higher probability than their non-innovative counterparts. Innovative companies reach more markets

with their products and they can also export more, and thus the ratio of exports may point to the productivity of the given company and the role of innovation at the company. As we wrote earlier, the stock exchange as a financing form must support these types of enterprises, since in many cases they have more difficulty in accessing bank funds. In accordance with our expectations, the relative role of exports is significantly higher in the case of the pre-filtered companies and the top 50 companies than within the group of analysed SMEs (*Figure 3*). This is especially true for the top 50 companies, since at approximately 80 per cent of the them the role of exports is higher than in the other participants of the industry. Consequently, the scoring outlined above does indeed support the selection of companies for which going public may be useful.

Figure 3
Ratio of exports per sales revenue compared to the industry average at the three groups of companies
(average of 2012-2014)



Note: In the figure we indicated the percentiles with *p*. For interpretation of the percentiles, see the note for Figure 1.

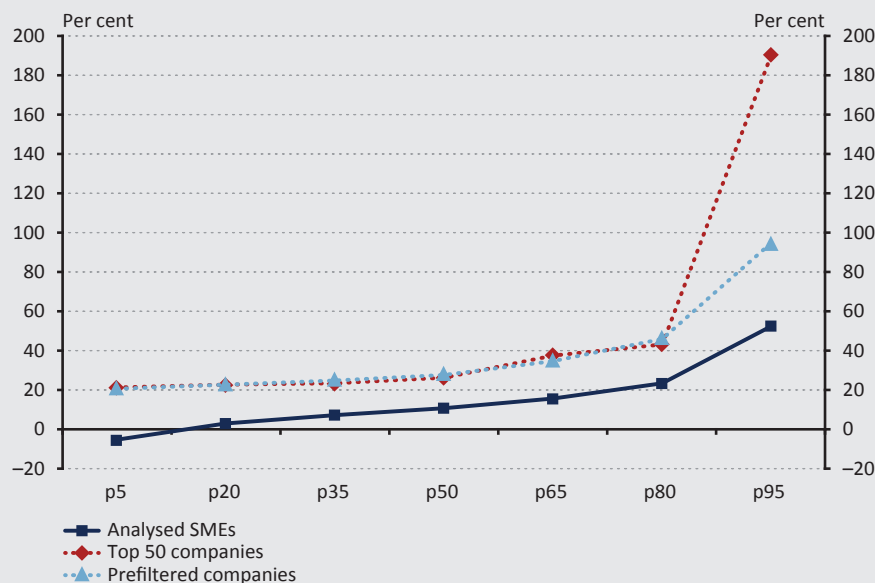
Source: MNB, own calculations of the authors

Of the indicators measuring corporate performance, we already took into account the annual average growth of sales revenue among the filtering criteria, since we determined a minimum value of 20 per cent in a 3-year average according to OECD's definition of gazelles. Accordingly, in the lower half of the distribution we expected better performance in the case of both the pre-filtered company group and the top

50 companies than the group of all analysed SMEs. It is important to emphasise, however, that there was a significant difference in the case of the entire distribution (Figure 4). The companies we selected performed significantly better than the entire group of analysed SMEs even at the 95th percentile, which shows that the set of companies that can produce fast growth permanently is very small.

Figure 4
Distribution of annual growth rate of sales revenue at the three groups of companies

(average of 2012-2014)

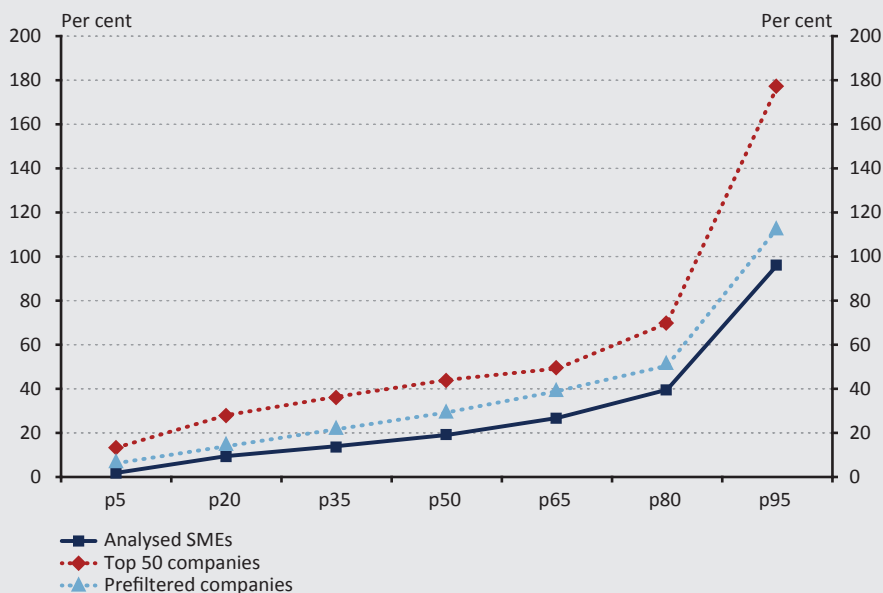


Note: In the figure we indicated the percentiles with *p*. For interpretation of the percentiles, see the note to Figure 1.

Source: MNB, own calculations of the authors

ROIC (Return on invested capital) is very important from investors' perspective. It can be seen that while the group of 331 companies, created with the pre-filtering, exceeds the group of the analysed SMEs only slightly, the difference is significant in the case of the top 50 companies (Figure 5). This confirms that the filtering we applied, although it narrows the SMEs in the appropriate direction, is not sufficient for selecting the companies potentially entering the stock market. For this purpose, it is important to compile a ranking, as a result of which we receive groups of companies performing even better.

Figure 5
Distribution of return on invested capital (ROIC) at the three groups of companies

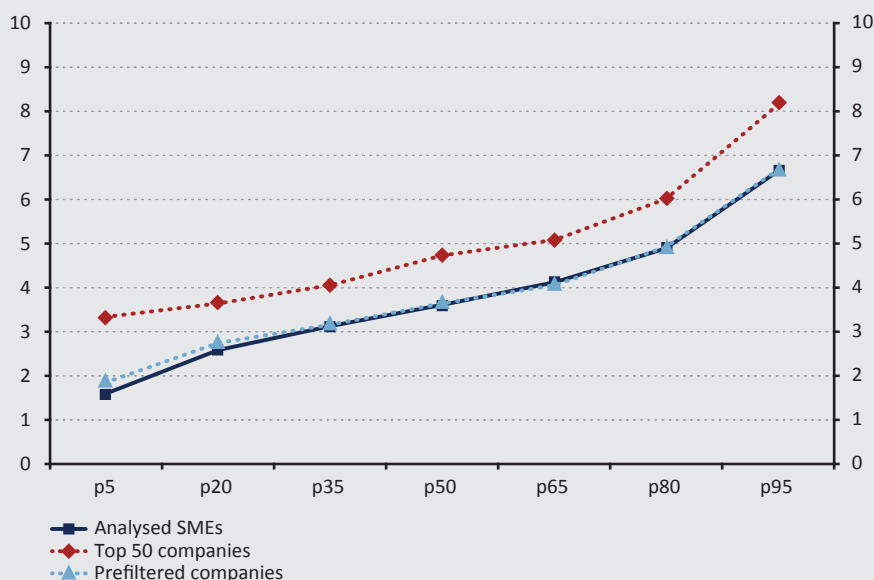


Note: The distributions in the figure refer to 2014. In the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1.

Source: MNB, own calculations of the authors

Finally, we examined the extent to which the groups of companies comply with risk filtering. For the top 50 companies, we set the condition that the risk indicator must reach the safe level (i.e. value 3) in all of the last 3 years. According to the data, in the case of these companies reaching the safe level is general, and almost all of them reach the value of 3 continuously in the three-year period. In terms of the distribution of the Altman Z-score, the pre-filtered companies only slightly differ from the entire group of the analysed SMEs, and 35 per cent of the companies of these groups of companies do not fulfil the requirement of reaching 3 for the risk indicator (Figure 6). All of this underlines the need for risk filtering.

Figure 6
Distribution of the Altman Z-score at the three groups of companies
(average of 2012-2014)



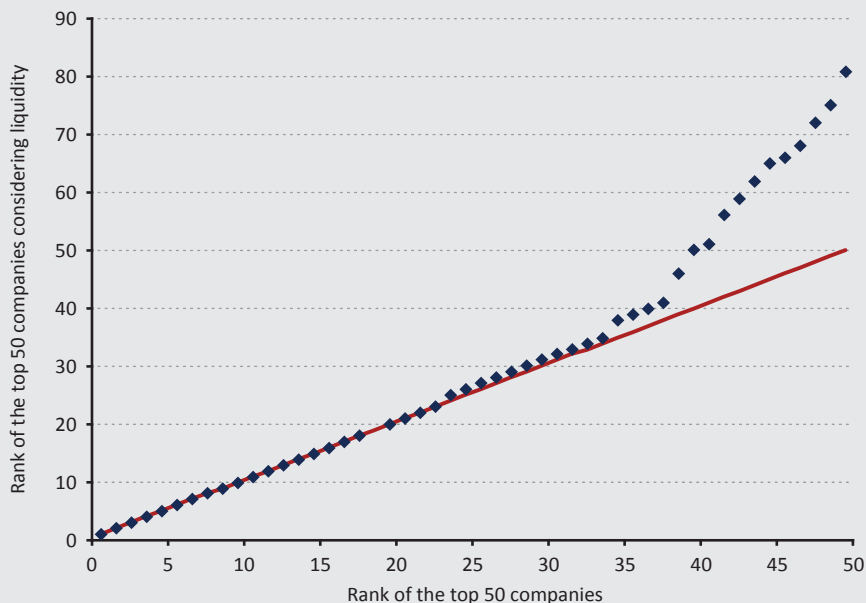
Note: in the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1.

Source: MNB, own calculations of the authors

According to the above, we also looked at how much the ranking would change if we used liquidity indicators as well. The interpretation of the liquidity situation is not unambiguous in terms of the stock exchange, especially because we only see a year-end data point. Therefore, we decided to use it only as an additional consideration. It can be seen that liquidity does not influence our results significantly (*Figure 7*). The position of the best 35 companies does not change if we take into account the liquidity situation as well, and, all in all, 40 of the top 50 companies are identical in the case of the two methods. Moreover, all of the 10 companies that drop out of the top 50 still remain in the first 90. Thus, taking into account liquidity is not necessary to receive appropriate results.

Figure 7

The ranking of companies with and without the consideration of liquidity



Source: MNB, own calculations of the authors

4.2. Comparison of the top 50 companies and the companies listed on the stock exchange

Up to now, we have presented how the simple scoring applied by us may assist the stock exchange in the selection of potential entrants. We could see that, by applying the method, we indeed received companies that exceed the performance of the analysed SMEs in terms of all the examined criteria (for more detail see the tables in the *Annex*).³ However, in terms of the stock exchange, what is important is not only that it can work together with companies producing good performance compared with the other participants, but also that these should compete with the companies already listed on the stock exchange. This is important for several reasons:

- Involving new participants is important not only to achieve that special companies can thus receive appropriate financing, but also in order to present new success stories. This is necessary to increase demand for corporate securities.

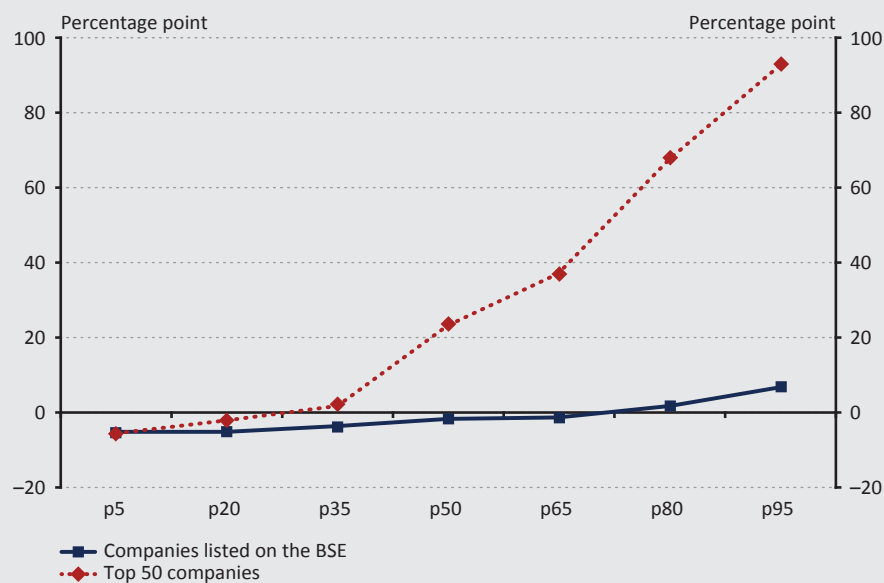
³ In order to obtain a picture of whether the relatively better performance of the top 50 companies received with the ranking compared to the group of the analysed SMEs can be considered to be persistent, we examined the distribution of a couple of performance indicators related to these groups of companies for the period between 2009–2011 as well (*Figures 11-13 in the Annex*). Based on the growth rate of sales income, the return on invested capital, and the Altman Z-score, it can be stated that the performance of the top 50 companies in 2014 exceeded significantly the performance of the group of the analysed SMEs not only between 2012–2014, but in the 3 years prior to that as well.

- There are several companies listed on the stock exchange – currently as well – that have not performed very well in recent years. It would be important to be able to avoid such cases in the future.

Based on our data, it can be seen that in terms of age the selected companies exceed the companies in the T and standard categories of the BSE. Whereas the median value is about 8 years in the latter case, it is almost 20 years in the former case.

As shown earlier, the ratio of exports per sales revenue characterises corporate performance very well. The top 50 companies are significantly better in this respect as well. The difference from the industry average is strongly positive for almost all of the top 50 companies, whereas in the case of listed companies it is mostly around zero, but mainly in the negative range (Figure 8).

Figure 8
Ratio of exports per sales revenue compared to the industry average at the two groups of companies
(average of 2012–2014)

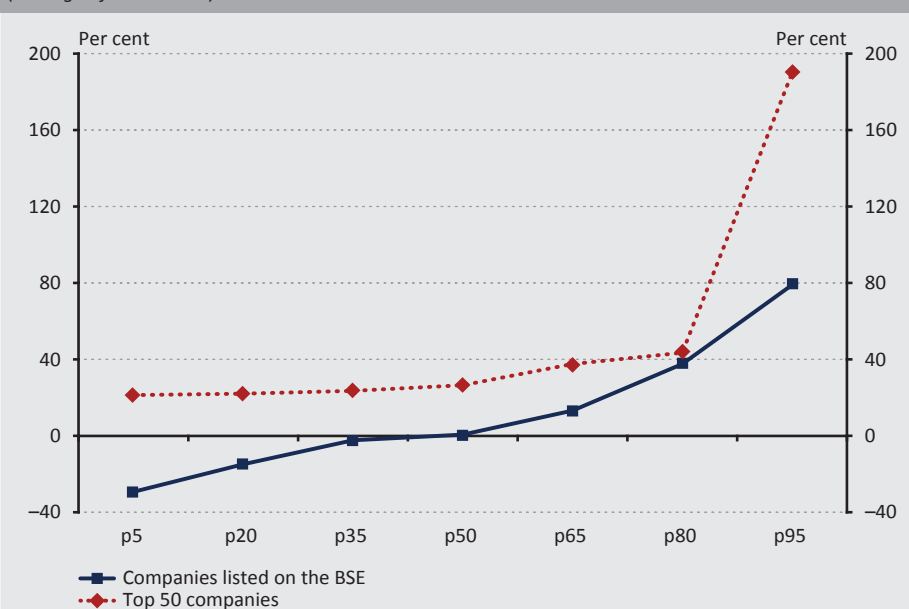


Note: In the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1. The analysis refers to the companies currently appearing in the T and standard categories of the BSE.

Source: MNB, own calculations of the authors

The growth rate achieved in recent years also shows that those companies that were ranked the best are stronger (Figure 9). The sales revenue of listed companies decreased slightly in several cases in recent years, whereas in the case of the top 50 companies we still see dynamic growth. And fast growth is necessary for successful performance on the stock exchange, especially in the case of SMEs.

Figure 9
Distribution of annual growth rate of sales revenue at the two groups of companies
(average of 2012–2014)

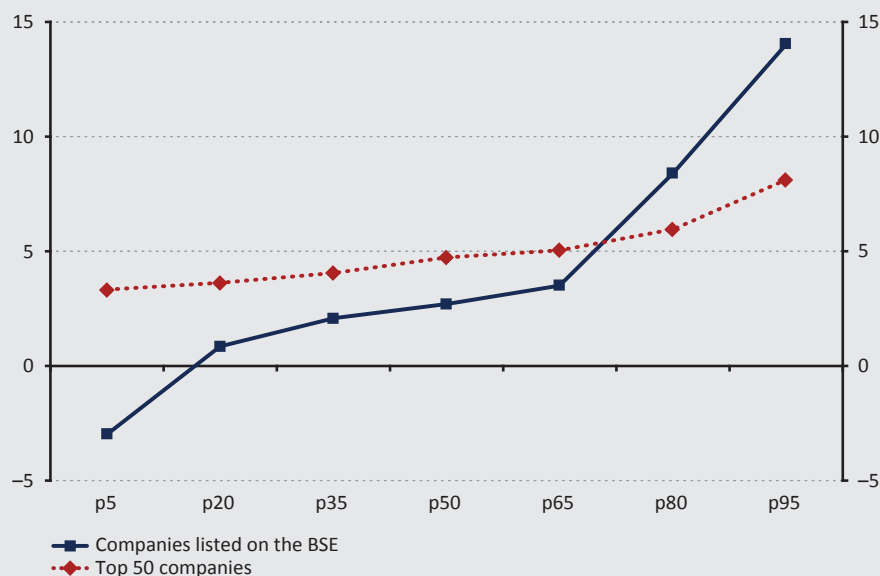


Note: In the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1. The analysis refers to the companies currently appearing in the T and standard categories of the BSE.

Source: MNB, own calculations of the authors

The Altman Z-score, which is used as a risk indicator, is mostly in harmony with this. The group of the top 50 companies shows worse results than the listed companies only at the upper edge of the distribution (Figure 10). That is, some listed companies have outstanding performance, but all in all it cannot be said that the group of companies listed on the BSE exceeded the group of top 50 companies that were selected according to our scoring methodology.

Figure 10
Distribution of the Altman Z-score at the two groups of companies
(average of 2012–2014)



Note: In the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1. The analysis refers to the companies currently appearing in the T and standard categories of the BSE.

Source: MNB, own calculations of the authors

5. Conclusion

After acquiring a majority stake in the Budapest Stock Exchange, the central bank of Hungary emphasised that the long-term development of the capital market is necessary and thus formulated a new strategy for the years ahead. This step is justified also because the programmes of the MNB supporting lending will be phased out gradually in 2016, and EU funds will also decrease significantly in the next budget period. In addition to the Hungarian outlooks, the literature also increasingly emphasises the necessity of developing the stock exchange. For example, the research of *Cecchetti and Kharroubi (2015)* showed that the really innovative and productive companies often do not receive bank financing, because they cannot provide tangible asset collateral for loans.

One direction of developing the stock exchange is that BSE would create a separate platform for SMEs, thus offering this segment the opportunity to access capital market financing. In this study, we examined whether there are indeed companies

in this segment that are suitable for listing on the stock exchange. We developed a simple scoring method, which consists of a quantitative pre-filtering on the one hand, and a ranking on the other hand. With this, we received a group of 50 companies which seems to be better in terms of its economic indicators than the enterprises currently appearing in the T and standard categories of the BSE. On the one hand, we thus presented a quantitative method for finding the companies that are worth taking into account in connection with a possible entry to the stock exchange. On the other hand, we demonstrated that there may be companies in the SME segment for which it may be worthwhile to go public.

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Annex

Table 2						
Descriptive statistics of the examined SMEs						
Variable	Unit	p5	p50	p95	Average	St. Deviation
Age	year	4	18	24	16	7
Number of employees	number	52	88	212	104	49
Sales income	HUF Bn	1.1	2.2	8.8	3.2	2.6
Total assets	HUF Bn	0.4	1.7	6.8	2.4	2.1
Sales income per capita	HUF Bn	10.6	23.5	91.4	33.3	28.2
Return on invested capital (ROIC)	Per cent	1.8	19.3	95.6	25.6	136.4
Debt to assets ratio	Per cent	22.5	58.7	93.9	58.4	22.1
Debt to equity ratio		0.2	1.4	11.3	-0.1	100.8
Liquidity ratio		0.6	1.5	5.9	2.2	2.4
AltmanZ score		1.6	3.6	7.0	3.9	2.1
AltmanZ score - 3 year average		1.6	3.6	6.7	3.8	1.8
Number of employees - 3 year average growth rate	Per cent	-8.5	2.9	37.4	8.8	30.5
Sales income - 3 year average growth rate	Per cent	-5.2	11.1	52.1	17.1	31.3
Total assets - 3 year average growth rate	Per cent	-7.6	8.7	41.5	12.1	18.1
Average wage - difference from the industrial average (3 year average)	HUF Million	-0.1	1.4	5.5	1.8	2.1
Ratio of fixed assets - difference from the industrial average (3 year average)	Per cent	-18.6	9.7	44.2	10.8	20.0
Export sales income - difference from the industrial average (3 year average)	Per cent	-9.7	-1.0	82.5	12.7	27.4
<i>Note: In the header of the table we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1 in the main text.</i> <i>Source: MNB, own calculations of the authors</i>						

Table 3

Descriptive statistics of the pre-filtered companies

Variable	Unit	p5	p50	p95	Average	St. Deviation
Age	year	9	18	24	18	5
Number of employees	number	52	84	182	97	44
Sales income	HUF Bn	1.2	2.4	10.3	3.6	3.0
Total assets	HUF Bn	0.5	1.8	7.2	2.4	2.2
Sales income per capita	HUF Bn	12.2	29.2	105.1	39.9	33.2
Return on invested capital (ROIC)	Per cent	6.0	28.9	112.4	39.3	47.1
Debt to assets ratio	Per cent	26.8	61.1	88.1	59.7	19.1
Debt to equity ratio		0.4	1.6	7.4	2.4	2.7
Liquidity ratio		0.8	1.5	4.3	1.9	1.5
AltmanZ score		2.0	3.7	6.7	4.1	3.0
AltmanZ score - 3 year average		1.8	3.6	6.7	4.0	2.3
Number of employees - 3 year average growth rate	Per cent	-2.5	10.3	61.2	18.6	39.2
Sales income - 3 year average growth rate	Per cent	20.4	28.0	94.9	41.0	39.2
Total assets - 3 year average growth rate	Per cent	1.0	19.5	63.6	24.4	22.6
Average wage - difference from the industrial average (3 year average)	HUF Million	-0.2	1.4	5.5	1.8	1.7
Ratio of fixed assets - difference from the industrial average (3 year average)	Per cent	-19.1	6.7	41.6	8.4	19.6
Export sales income - difference from the industrial average (3 year average)	Per cent	-9.6	0.4	84.6	15.1	28.6

Note: In the header of the table we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1 in the main text.

Source: MNB, own calculations of the authors

Table 4						
Descriptive statistics of the best 50 companies						
Variable	Unit	p5	p50	p95	Average	St. Deviation
Age	year	9	18	24	17	5
Number of employees	number	57	88	180	102	42
Sales income	HUF Bn	1.5	2.7	10.3	3.7	2.8
Total assets	HUF Bn	0.7	1.8	8.1	2.8	2.5
Sales income per capita	HUF Bn	14.4	30.4	91.2	36.3	23.1
Return on invested capital (ROIC)	Per cent	13.3	43.9	176.4	61.6	63.7
Debt to assets ratio	Per cent	15.1	41.8	73.1	42.0	16.2
Debt to equity ratio		0.2	0.7	2.7	0.9	0.8
Liquidity ratio		0.9	2.8	6.8	3.0	1.8
AltmanZ score		3.5	4.7	7.8	5.1	1.8
AltmanZ score - 3 year average		3.3	4.7	8.1	4.9	1.4
Number of employees - 3 year average growth rate	Per cent	1.6	11.4	72.4	28.2	71.4
Sales income - 3 year average growth rate	Per cent	21.1	26.3	189.8	44.1	44.4
Total assets - 3 year average growth rate	Per cent	5.1	24.5	98.0	30.4	26.5
Average wage - difference from the industrial average (3 year average)	HUF Million	0.1	2.2	6.1	2.5	1.9
Ratio of fixed assets - difference from the industrial average (3 year average)	Per cent	-19.7	-1.8	41.6	4.7	20.5
Export sales income - difference from the industrial average (3 year average)	Per cent	-5.6	23.1	93.0	29.8	32.8
<i>Note: In the header of the table we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1 in the main text.</i> <i>Source: MNB, own calculations of the authors</i>						

Table 5

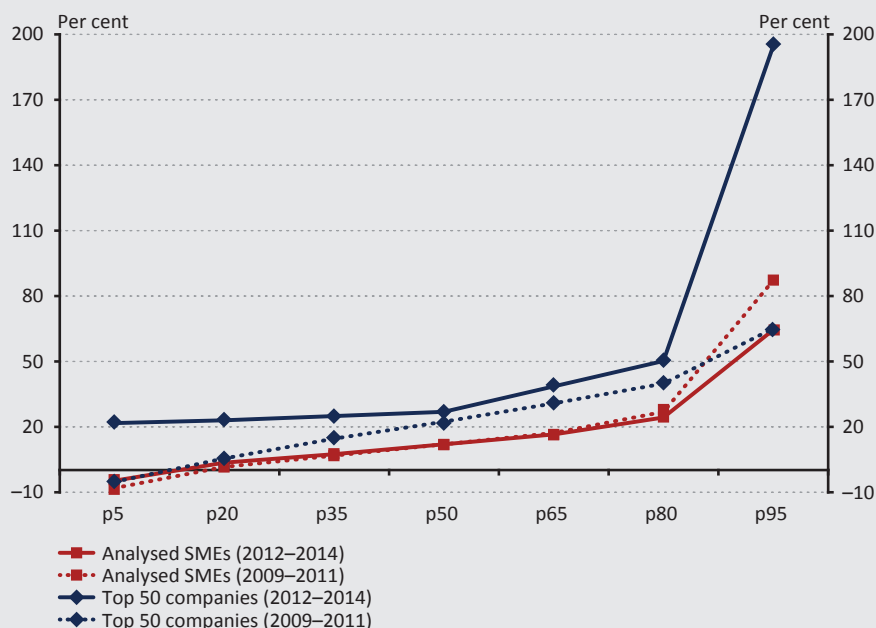
Descriptive statistics of the companies listed on the BSE

Variable	Unit	p5	p50	p95	Average	St. Deviation
Age	year	2	8	27	13	9
Number of employees	number	1	18	90	35	64
Sales income	HUF Bn	0.0	0.2	69.8	9.2	36.7
Total assets	HUF Bn	0.2	1.6	109.7	15.4	51.3
Sales income per capita	HUF Bn	0.0	24.5	591.8	79.7	183.1
Return on invested capital (ROIC)	Per cent	-40.5	0.2	324.1	25.7	124.5
Debt to assets ratio	Per cent	10.6	33.2	96.1	44.1	29.4
Debt to equity ratio		0.1	0.5	24.6	5.7	16.9
Liquidity ratio		0.4	2.0	20.2	6.8	17.1
AltmanZ score		-2.0	2.5	5.9	2.2	2.2
AltmanZ score - 3 year average		-3.0	2.7	14.0	5.3	12.1
Number of employees - 3 year average growth rate	Per cent	-25.0	0.0	57.7	5.3	31.2
Sales income - 3 year average growth rate	Per cent	-29.2	0.8	79.1	183.3	841.6
Total assets - 3 year average growth rate	Per cent	-20.9	-0.6	106.6	55.7	257.6
Average wage - difference from the industrial average (3 year average)	HUF Million	-0.4	2.6	17.4	4.7	6.4
Ratio of fixed assets - difference from the industrial average (3 year average)	Per cent	-33.7	-12.4	24.5	-10.7	16.9
Export sales income - difference from the industrial average (3 year average)	Per cent	-5.1	-1.8	6.8	-1.2	4.6

Note: In the header of the table we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1 in the main text. The values of the table refer to the companies currently appearing in the T and standard categories of the BSE.

Source: MNB, own calculations of the authors

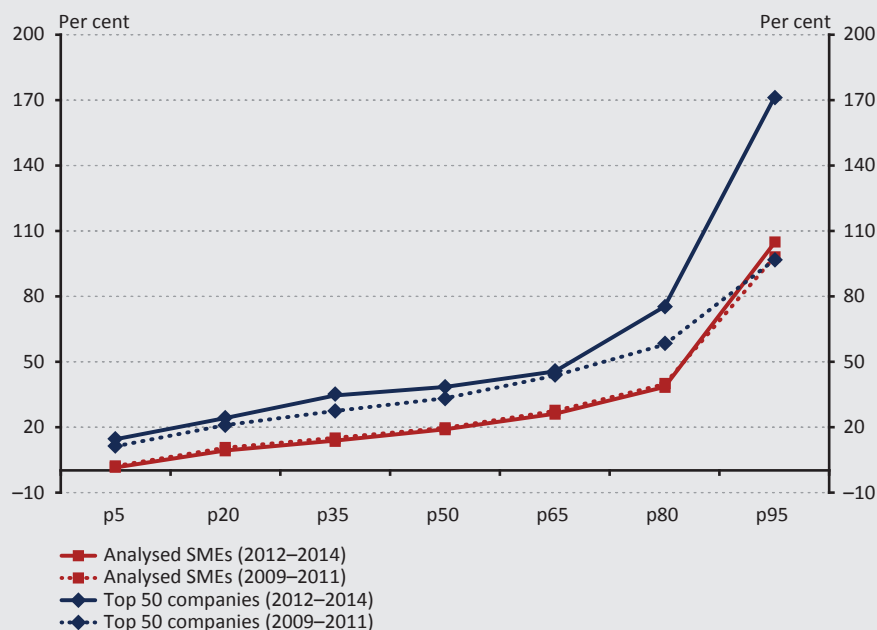
Figure 11
Distribution of annual growth rate of sales revenue at the two groups of companies
(average of 2009–2011 and 2012–2014)



Note: In the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1 in the main text.

Source: MNB, own calculations of the authors

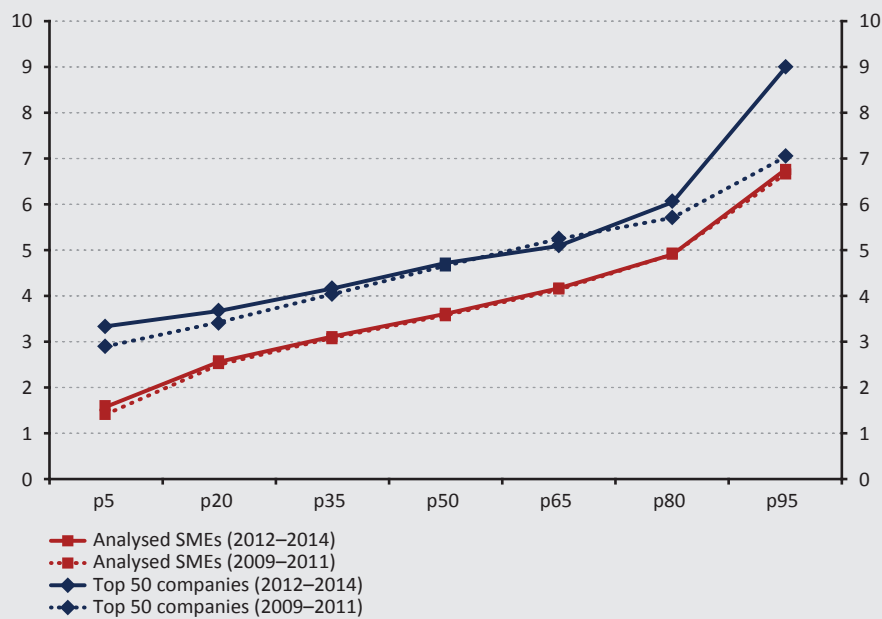
Figure 12
Distribution of return on invested capital (ROIC) at the two groups of companies
(average of 2009–2011 and 2012–2014)



Note: In the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1 in the main text.

Source: MNB, own calculations of the authors

Figure 13
Distribution of the Altman Z-score at the two groups of companies
(average of 2009–2011 and 2012–2014)



Note: In the figure we indicated the percentiles with p. For interpretation of the percentiles, see the note to Figure 1 in the main text.

Source: MNB, own calculations of the authors