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DEFAULTING ALONE:
THE GEOGRAPHY OF SME OWNER
NUMBERS AND CREDIT RISK
IN HUNGARY

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Defaulting Alone: The Geography of SME Owner Numbers and Credit Risk in Hungary

(A magyarországi KKV-k tulajdonosainak száma és hitelkockázatuk földrajzi összefüggései)

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Contents

Abstract

The transition from the state ownership to market mechanisms in Hungary fundamentally altered the geography of domestic micro, small, and medium enterprises (SMEs). This study investigates the spatial and temporal evolution of owner numbers, using data on all Hungarian SMEs between 1991 and 2019 and across 175 regional districts. Then it explores the relationship between the number of owners and the probability of credit default by joining data from the Credit Registry (KHR) for the period between 2007 and 2019.

The number of owners at an average SME sank from four in 1991 to two in 2019, with consistently higher averages in less populated regions. Meanwhile, SMEs with one owner only have up to twice as high credit default probability as SMEs with more owners over all geographies in all years. Therefore, regionally varying ownership structures mean regionally differing ownership and management practices and hence risk levels. These could be mitigated with targeted regional policy measures.

JEL codes: G21,G3,R3,R11,R1
Keywords: financial geography, ownership structures, credit risk, SMEs

Összefoglaló

A kis- és középvállalatok (KKV) földrajza az államkapitalizmusból piaci mechanizmusokra való átmenet során fundamentálisan átalakult. Ez a tanulmány a magyarországi KKV-k átlagos tulajdonosi számának területi és időbeli változását vizsgálja 1991 és 2019 között, járási szinten. Ezt követően a tulajdonosszám és a hitelkésedelmi valószínűség összefüggését elemzi a Központi Hitelinformációs Rendszer (KHR) adatai segítségével a 2007 és 2019 közötti időszakra vonatkozóan.

Egy átlagos KKV tulajdonosainak száma 1991-beli négyről kettőre csökkent 2019-re, a kevésbé sűrűn lakott járásokban konzisztensen magasabb értékek mellett. Emellett, azoknál a KKV-knál, amelyeknek csak egy tulajdonosa van, akár kétszer akkora hitelkésedelmi valószínűség található –tértől és időtől függetlenül. A területileg változó tulajdonosszámok területileg változó menedzsment- és tulajdonosi gyakorlatot jeleznek, ami a KKV hitelkockázatára is hatással van. Ezeket a jelenségeket érdemes lehet célzott területi és egyéb programokkal kedvező irányba befolyásolni.

1 Introduction

The geography of the economic transition from state control to market mechanisms in Central and Eastern Europe has been subject to considerable scrutiny. While the development of countries after the fall of communism was compared (Sokol, 2001, Agnew, 2001), and the impact of foreign direct investment has also been studied (Gál, 2015, Sass et al, 2018, Pavlínek, 2004), the geography of the domestic private sector is a less well understood.

Domestic small- and medium enterprises (SMEs) are important pillars of any market economy. The famous '*Mittelstand*', SMEs of Germany, represents 99 percent of all companies, is responsible for 58 percent of all gross value added (BVMW, 2021). In Hungary, the swift proliferation of business ownership after the fall of communism created a similarly important facet of the economy. In 2019, they represented 99 percent of all corporations, and provided jobs to two-third of all employees (KSH, 2020).

SMEs are by nature geographically bounded, which results in regionally diverging access to capital and bank financing (Klagge and Martin, 2005 for Germany and the UK, Pittaluga et al, 2005, Alessandrini et al, 2009 for Italy and Gál, 2005 for Hungary). Regional disparities in capital and funding consequently translate into spatially varying forms of ownership structures. This matters because the number of people involved in risk-related decisions influence the degree of risk assumed. This was seen in retirement decision making (Clark and Strauss, 2008) or in credit risk behaviour (D'Espallier et al., 2011, Yunus, 2011). Since credit- and risk-related decisions often involve owners of the SMEs, their numbers are expected to have an impact on its credit risk.

This study first investigates the spatial and temporal evolution of owner numbers using data on all Hungarian SMEs over the years between 1991 and 2019, by looking at the national Corporate Registry and the Corporate Income Tax database of the Hungarian National Tax and Customs Administration (NAV). It then explores the relationship between the number of owners and credit default probability by joining information from the national Credit Registry (KHR) for the years between 2007 and 2019. By doing so, I reproduced and complemented the dataset of Banai et al (2016), who studied the probability of default at Hungarian SMEs thoroughly.

As shown below, the number of owners at an average Hungarian SME gradually sank from four in 1991 to just below two in 2019. This transition has been delayed in more sparsely populated regions. SMEs there have been having consistently more owners than their counterparts in major cities, but their trajectory is similar. These differences are explained with regional disparities in the capital a would-be entrepreneur can invest in his or her startup, and variations in the credit available to buy out co-owners. While over time improving fortunes has made enterprising easier, less well-off entrepreneurs in the periphery are still more likely to join funds when starting a business than in core regions. This matters because more owners at an SME translate into up to 50 percent lower credit default probability. The reason for that lies in the nature of group decision making: groups usually assume less risk and reach more conservative financial decisions.

While this research contributes to the literature on the economic geography of transition economies, it also sheds light on the credit risk aspect of solo-enterprising. This may serve policy makers with new ideas, including more focused regional development policies, more intensive use of equity-like investments, and raising awareness on the significance of salient risk-related decision making.

The paper is structured as follows. The next section explores the literature on the impact of transiting from state-control to market-led systems in CEE countries on the geography of the firm, followed by a discussion on ownership structures and credit risk. The fourth section explains the data used for the study, followed by an empirical analysis. The final section concludes.

2 From State Control to Market Mechanisms

2.1 SME OWNERSHIP GEOGRAPHY IN THE 1990s

Despite the dominance of state ownership in Central Europe before 1990, Poland and Hungary had permissive rules for low-profile private ("household") companies. This created a tradition and know-how in enterprising (Cieślik and van Stel, 2014). After 1989, in Hungary, the GDP-share of the private sector went to 25 percent in 1990, and stabilized around 80 percent by 2000 (EBRD, 2007). The main driver behind the growth was the influx of foreign direct investment (FDI) (Gál, 2015). Foreign investors were often granted tax exempt status, who quickly snapped up previously state-owned bargains (Gál, 2013, György and Oláh, 2019). Though the Hungarian economic policy change after 2010 pushed back the foreign dependency in banking and utilities (Matolcsy, 2020), foreign presence in retail and in the production sector is as dominant as before.

In contrast, domestic investors initially lacked access to funds. SMEs share of all corporate bank loans was 34 percent in 1999, which went to 54 percent in 2006, often at the cost of significantly higher rates and often in foreign currencies to mitigate debt servicing costs (Némethné, 2008). Access to equity was even more dire. This variety of capitalism, described as dependent economy by Nölke and Vliegenthart (2009) or foreign funded dual economic setup (Matolcsy, 2020), consisted of the parallel existence of large foreign companies and mainly domestic SMEs (Kornai, 1991).

The capital scarcity of the 1990s created a situation where more investors had to join to start a "joint-stock" company. However, I expect this necessity to exhibit geographical patterns for the following reasons. Wealth to be invested accumulates in core regions more than in the periphery: core regions have deeper liquidity (Dow, 1990), and would-be entrepreneurs may possess higher housing wealth which may serve as collateral (Hamnett, 1992). The necessity to join funds seems to be more pressing in the periphery than in the cores, and this is expected to be visible in the number of company owners.

Geography molds the ownership structures of existing SMEs too. The classical model of Krugman (1991) showed that peripheral regions are less productive than the cores, driving to slower wealth creation there. External financing tends to be more accessible in larger cities than in rural areas in many countries (Klagge and Martin, 2005 comparing the UK with Germany, Pittaluga et al (2005), Alessandrini et al (2009) for Italy). The polarized spatial setup of the Hungarian banking system is reminiscent of the UK (Gál, 2005). And since company growth, loan- or equity financing is a prerequisite for co-owner buyouts and mergers, I also expect that the initial spatial differences in ownership structures did not disappear.

The complex regulation of land ownership rights amplify geographical differences further through the unique structure of agricultural farming enterprises. In the 1980s, all land belonged to large (state) agricultural cooperatives. In 1994, legislation introduced private ownership but limited the amount of land that could belong to a person. Corporate land ownership remained prohibited and lending out fields was capped both in terms of area and contract duration (at 20 years tenancy). Foreign ownership was not permitted until 2011, when the seven-years EU-derogation expired (Vincze-Lendvai, 2009). This means that farmers had limited opportunity to grow their enterprises, as returns were capped by a maximized land size, and company acquisitions were banned. Any new investments, however, required capital, and land could not serve as collateral. Hence, my hypothesis goes, the need to join funds to start SMEs with colleagues was even stronger. Since agriculture is rarely a metropolitan activity, it is expected to deepen regional differences.

2.2 EVOLUTION OF SME OWNERSHIP STRUCTURES IN THE 2000s AND 2010s

At least three measures contributed to the decline in average owner-numbers. First, the costs of setting up a business dropped from 40 percent of the GNI per capita in 2004 to 4.5 percent in 2019, along with most other countries (World Bank, 2019). The ease of doing business, a lot shorter time series, indicates similar cuts in the red tape necessary to operate an SME in Hungary (World Bank, 2021).

Second, SME loan availability grew better, which made co-owner buyouts possible. Although the 2008-crisis halted this process, the policy change after 2010 brought new SME-specific measures, including the NHP loan program of the MNB (National Bank of Hungary). Up until the COVID-crisis of 2020, it provided subsidized loans to over 40 thousand SMEs of over 7 thousand billion HUF (over 21 billion EUR) in total. The MNB also phased in an unsubsidized, market-based financing program (PHP) (MNB, 2018), while Hungary- and EU-subsidized funding programs also became available for SMEs (Csubák and Fejes, 2014, György and Oláh 2019).

Better access to funding made co-owner buyouts possible. Turzai-Horányi and Dunay (2017) found an increasing concentration among the owners of car retailers in Hungary. The average number of car dealerships per owner went from 1.55 to 1.71 from 2011 till 2017. At the same time, the geography of buyouts is not expected to be uniform: SME takeovers are more intense in geographical cores than on the periphery (Foreman-Peck and Nicholls (2012) for the UK, Rodriguez-Pose and Zademach, 2003, Zademach, 2005 for Germany). Although takeovers and buyouts are not the same thing, the arguments for geographical patterns are similar: deeper liquidity, better access to know-how and infrastructure in the cores.

Third, a significant proportion of Hungarian owner-managers started their firms in the 1990s and have been retiring recently. As of 2019, the average age of Hungarian family firm managers was high, and, it seems, professional investors dominate buy-outs (Szendrői, 2019). This means that an oversized proportion of entrepreneurs quit and sell their firm to investors, sometimes to private equity funds, who do not necessarily need co-investors. Again, institutional investors focus first on geographical cores and look at the periphery later (Mason and Harrison, 2002).

Further, unlisted factors made enterprising with less or no partners more probable. For instance, the gig economy, a system where work is available only for shorter periods, has been transforming the Hungarian micro enterprise-segment profoundly. This segment is excluded[1] from this research by not involving self-employed individuals and simplified taxation format companies (KIVA, KATA, EVA).

When I put these arguments together, I expect to see a general decrease of owner numbers at Hungarian SMEs, driven by the facts that (1) new companies have less owners and (2) the owner-numbers at existing companies are dropping. Moreover, these processes are expected to exhibit geographical patterns: in core regions, new companies have less owners and single owned co-owner buyouts are more frequent than in the periphery.

2.3 OWNER NUMBERS AND CREDIT RISK

Although the corporate governance literature identified that higher ownership concentration often leads to detrimental financial corporate equity and credit risk levels (Shleifer and Vishny (1997), Clark and Wójcik, 2005a, Fernando et al. (2020)), the separation of management and ownership becomes less straightforward when looking at SMEs, where the personal involvement of the owner(s) has been typical (Kornai, 1991). This means that the literature of group decision making is more appropriate.

Observed credit risk is the joint outcome of deliberate or spontaneous decision making in assuming risks (Clark and Knox-Hayes, 2009), and the process of achieving those plans (Chrisman et al ,2016). These two are not always distinguishable in the context of credit defaults, where even salient risk planer may execute his or her plan poorly. SMEs owners are often managers themselves; hence differences between individuals and groups of owners in risk attitude may explain a part of the differences in firm credit risk, whereas another part can stem from different execution abilities of the owners.

This can be illustrated with age: Risk aversion typically increases as years go by: the young are more likely to choose risky investments, and this decreases as they grow older. While the literature suggests that this is mainly driven by developmental changes in neural correlates (Albert and Duffy, 2012), managing an SME well also requires considerable cognitive and other physical abilities, and age impacts both. There may be a threshold age above which execution

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[1] In any case, including them would skew the results towards an even more concentrated picture.

capabilities decline, therefore, observed credit risk may rise again. Given the ageing population of owners at SMEs founded in the 1990s, age is a particularly important owner characteristic.

Further, women are more risk averse then men, but they are more open to social engagement and to sharing risks with others (Weber et al. 2002). Hence, the presence of women alters group dynamics. To illustrate: men with a spouse invest their retirement savings in a more risk averse manner than without (Clark and Strauss, 2008). In a credit setting, female credit takers were associated with lower credit risk, fewer write-offs, and fewer provisions (D'Espallier et al., 2011). As a result, at Grameen Bank, one of the most famous representatives of microfinance, 97 percent of all borrowers are women (Yunus, 2011).

Borrower groups are generally more preferred to single credit takers because of their risk-limiting nature, particularly so when they are led by women (Anthony and Horne, 2003). Anthony (2005) discusses the social forces working within borrower groups: he states that delinquency rates are lowest within groups with stronger shared identity; and highest at individuals. This boils down to the concept of social ties among borrowers: the presence of a social tissue decreases risky behavior.

Cooperative banks illustrate the relevance of social ties among owners. Traditional cooperative banks used to serve only their owners (Gál, 2011), and their local communities (Fonteyne, 2007), therefore, they are inherently regional phenomena. The cooperative model drifted away from this tradition in recent decades, and it gave birth to cooperatives with concentrated ownership (Marshall et al. 2003). Such managerial cooperatives turned out to be more profit-driven, changed legal form, and engaged in risky behavior. The elevated risk level drove some of them bankrupt, as the example of Northern Rock in the UK has shown (Klimecki és Willmott, 2009, Marshall et al., 2012). Similar conclusions were drawn about Hungarian cooperative banks (before the great legal overhaul): coops with more owners used to pay out less dividends and assumed lower credit risk (Gál and Burger 2013, Burger, 2013).

These arguments point towards a consequence of decreasing owner numbers at Hungarian SMEs: less owners mean higher risk levels, deliberate or not. Therefore, the financial profile of those companies is expected to point towards higher credit risk. Since ownership structures are expected to vary between regions, variations in observable credit risk are expected to vary across geographies. This is the second hypothesis investigated by this paper.

3 Evolution of Ownership Structures

3.1 DATA

This study builds on the excellent paper of Banai et al. (2016). I have extended their classical work on explaining default probability with financial metrics as follows. I used three large datasets:

(1) The official Company Register of Hungary ('*Cégjegyzék*'), with information on the owners of <u>all companies</u>, obtained from Opten, a data provider. I used this dataset from 1991 onwards for illustration and from 2003 for the analysis. It contains information on 1.1 million companies and their 5.7 million (not necessarily distinct) owners (Bt, Kft, Rt). Stock market participants and sole entrepreneurs are excluded. Note that the Company Registry is publicly available to anyone on the internet, making the information on private persons public.

(2) The annual Corporate Income Tax database of the Hungarian National Tax and Customs Administration ('*NAV Társasági Adó*') from 2003 till 2019. This covers balance sheets and income statements of all Hungarian companies liable for paying corporate income tax. This was narrowed down to 846 thousand distinct <u>active</u> companies and 32 million observations. The database does not include companies with beneficial taxation regimes developed for individuals below a small income threshold (EVA, KATA, KIVA), typically participants of the gig economy. Excluding them does not distort this research.

(3) The Credit Registry (KHR) for corporates, used from 2007 till 2019, contains information on all loans and leasing contracts, including information if and when a loan was delinquent. I identified 371 thousand distinct credit-taker companies in 6.9 million lines after the conversion to a quarterly frequency. Banai et al (2016) decided on using a 90 days-past-due definition for the default event. Moreover, I consider a company-level default only, if at least 99 percent of all loan amounts (by originally authorized amount) is in default. Finally, since one year PD is predicted, explanatory variables in the last four quarters before the default event are used to explain default probability. Hence, whenever this study refers to a 'Default Event', it means that a given company will be 90-days-past-due in less than 12 months. <u>Note that this way the "share of default events" values shown later are approximately four times as large as the true share of defaults</u>. Companies in default and in the first year after recovering from default were removed.

Given the varying temporal availability of the data sets, not all sections of the empirical part refer to the same timeframes (**Table 1**). Instead of using the narrowest timeframe only, I use all data available.

Table 1.
Availability and focus of the different data sets

Data	Availability	Main focus of the data set
Corporate Registry	1991-2019	Number of owners (used illustration only)
Corporate Income Tax Database	2003-2019	Financial risks and the number of owners (used in the first part of the empirical analysis explaining the number of owners)
Credit Registry	2007-2019	Probability of credit default and the number of owners (used in the second part of the empirical analysis on default probability)

Further, smaller datasets were joined to enhance the analysis:

(4) Regional, yearly, district-level ('*járás*') population density figures from the Hungarian Central Statistical Office (KSH). This is the official classification below the NUTS3-level, dividing Hungary into 175 districts (taking Budapest, the capital as one single district).

(5) Official list of first names in Hungary by gender (from the '*MTA Nyelvtudományi Intézet*'). It was used to determine the gender of private person owners. This way foreign first names are not identified, and count by default as non-private persons. Since the share of foreign owned SMEs is small, the distortion caused is not material.

(6) OpenStreetMap shapefiles to draw maps.

Banai et al (2016) constructed a flat table on a quarterly frequency, as a compromise between the daily accuracy of the Credit and the Company Registries, and the annual data from the Corporate Tax database. The values from this latter were interpolated: income statement positions were bluntly divided by four for the preceding quarters, while balance sheet values were linearly interpolated. Although this is admittedly a rough treatment of annual data, it would be challenging to estimate values before a default event or in highly seasonal industries.

The **Company Registry** data contains the owners' name and personal information in case of private persons (but no unique IDs); their corporate ID if it is another domestic company and information if it is a foreign individual or company. I therefore mapped the first-degree owners, though a network analysis of corporates would also be possible (see Borsos and Stancsics, 2020). Besides their gender and birth year, available from 2012 onwards, I opted against using further information to preserve privacy.

The analysis was narrowed down to the relevant, active SME segment, following the EU-wide accepted SME definition. SMEs were defined as companies with less than 250 employees or 50 million EUR revenues, or 43 million EUR assets. The micro-, small, and medium segment was also distinguished, as reflected by **Table 2.** I put all companies into its their most frequent category to have a stable SME-definition for each of them. This way each corporate belongs to one SME-category (or large corporate, before filtering them out) during all years of the analysis.

Table 2. SME categorization		
	Number of employees *	**Revenues**** (converted to EUR at year-end rates)
Micro segment	Less than 10	Less than 2 million EUR
Small Enterprises	Between 10 and 50	Between 2 million EUR and 10 million EUR
Medium Enterprises	Between 50 and 250	Between 10 million EUR and 50 million EUR

* When the number of employees was missing, the industry-average of personal costs / employee were used to estimate employee numbers
** Revenues or total assets, whichever greater

SME categorization is possible in real instead of nominal terms too, using purchasing-power-parity exchange rates to convert to EUR, since the exchange rate and price levels have changed during the period. However, the focus of this paper is on the 'SME segment' as most institutions, including the EU, use it, which has been stabile over the years. One goal of the analysis is to support financial risk management, and the most widespread definition serves that goal best.

Credit Registry contains all loans, leasing contracts, factorings, Lombard loans. The contract level-information was aggregated for each corporate. For a given quarter, the earliest start date and the latest repayment dates of all running loans were calculated. Banai et al (2016) decided on using a 90 days-past-due definition for the default event. Moreover, I consider a company-level default only, if at least 99 percent of all loan amounts (by originally authorized amount) is in default. This way, a forgotten credit card repayment may not put a company into default. Finally, since one year PD is predicted, explanatory variables in the last four quarters before the default event are used to explain default probability. Hence, whenever this study refers to a 'Default Event', it means that a given company will be 90-days-past-due in less than 12 months. Note that this way the "share of default events" values shown later are approximately four times as large as the true share of defaults. Finally, companies in default and in the first year after recovering from default were removed from the credit risk table.

The use of population density on geographical district-level ('járás') requires justification. Earlier I referred to the core-periphery relationship, a metaphor often discussed in economic geography without a thorough definition (Vanolo, 2010). Krugman (1991), cited before, models the spatial concentration process of manufacturing industries, which implicitly defines the core and the periphery. It is clear from Krugman's argumentation that the core corresponds to a higher concentration of productive firms and the periphery to a lower concentration. Admittedly, workers may live far from their workplaces, but most often job location is in the proximity of homes. In a similar vein, Zademach (2005) uses the concept of cores as the concentration of economic activity, which stems from the distance between economic actors. This means, to exploit efficiency gains, economic activity accumulates in core regions. This reduces physical distance between actors, therefore reduces transaction costs. The accumulation of production factors also correlates with an increase in population density, hence the relationship between population density and the core-periphery relationship.

I excluded companies at which the share of the state or the local municipality exceeds 25 percent; large companies (with an annual revenue of more than 50 mln EUR or 250 employees), and financial, utilities, own domestic services, mining, electricity; sole entrepreneurs. Passive companies (with zero, very low or missing revenues) were also removed.

At the end, the analysis uses

• 558 thousand tax-liable SMEs followed from 2004 till 2019 quarterly with the help of 16 million lines

• 163 thousand tax-liable, credit-taker SMEs from 2007 till 2019 quarterly with the help of 3.4 million lines.

3.2 THE NUMBER OF OWNERS AT HUNGARIAN SMEs

Figure 1 reflects the regional distribution of the average number of owners in 2004 and in 2019. The map of 2004 exhibits marked spatial autocorrelation with its two blocks of higher owner-numbers. The Great Hungarian Plain (Alföld) in the South-East and the Little Plains (Kisalföld) in the Northwest, where farms and cultivated fields are dominant, were clearly characterized by higher average owner numbers in 2004. Overall, averages for almost all districts dropped till 2019.
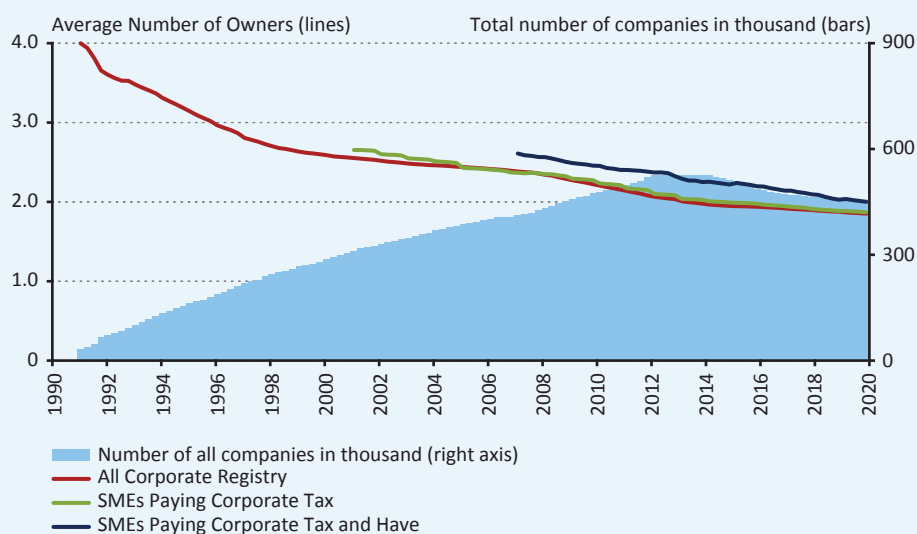
Figure 1.
Average number of owners in 2004 and in 2019 by district-level ('járás'). Major city borders are highlighted in black
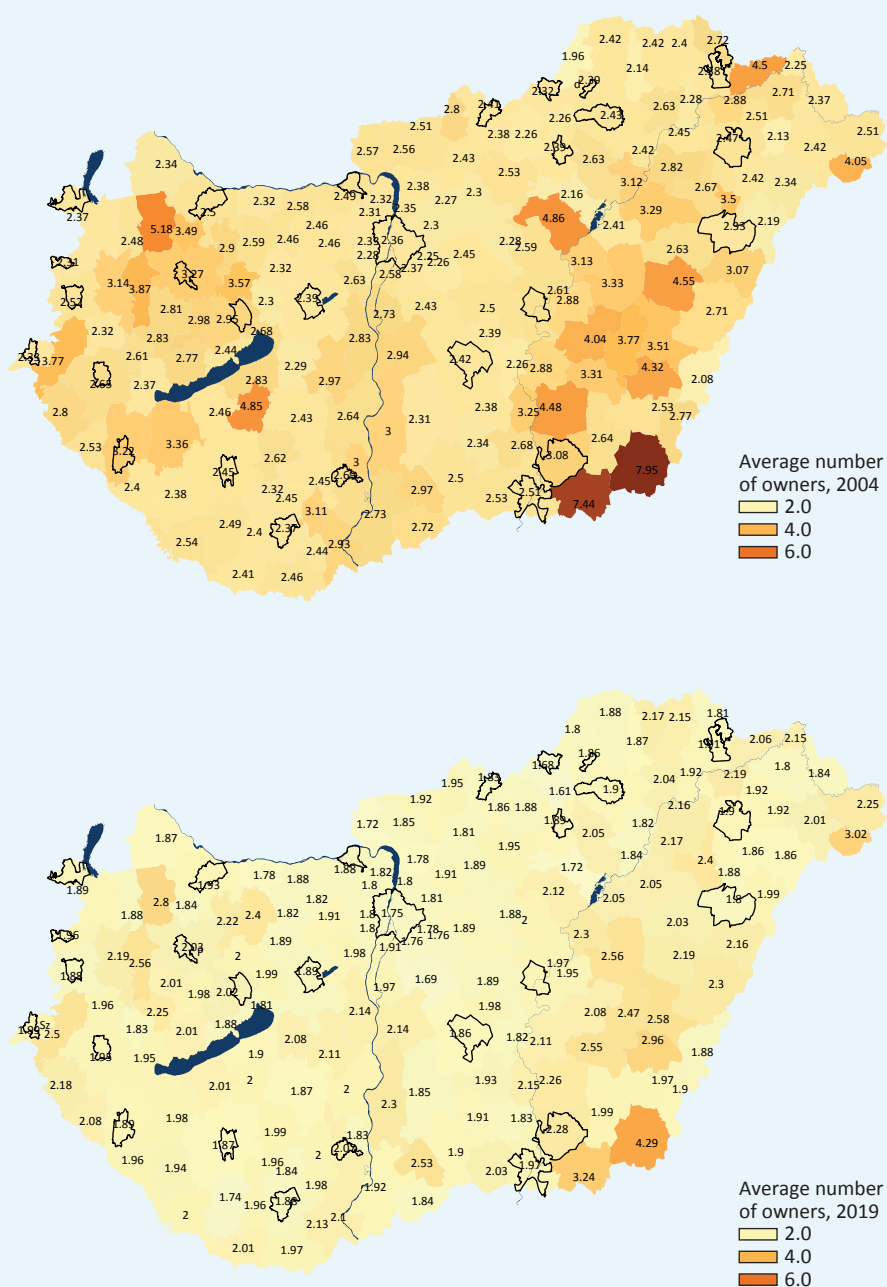
An average corporate had around four owners at the early 1990s, which figure dropped steeply during the 1990s, and kept decreasing unabatedly until now (**Figure 2**). At the end of 2019, the average stood around 1.8 for all corporates, around 1.9 for all SMEs and at 2.0 for SMEs with loans.

During this time, the total number of companies in the Company Register went from very low levels to 586 thousand in 2013. It peaked there, then stalled and started shrinking. While this decrease can be caused by a multitude of factors – the rise of sole entrepreneurs, a more efficient removal of passive companies, whitening of 'hidden employment', just to mention a few, this does not weaken my argument here.

Figure 2.
Average number of owners at Hungarian companies (left scale) and the total number of companies (right scale)

Average Number of Owners (lines)   Total number of companies in thousand (bars)

- Number of all companies in thousand (right axis)
- All Corporate Registry
- SMEs Paying Corporate Tax
- SMEs Paying Corporate Tax and Have

The analysis is continued using the data on companies present in the Corporate Tax dataset only. Overview on the descriptive statistics of these SMEs is provided by **Table 3.**

Table 3.
Overview of the Corporate Tax data-set (active SMEs only, thus values differ from the bars in Figure 1), averages

Year-end	Number of Companies in thousands	Avg. number of owners	Avg. nr. of employees	Average revenues (mln HUF)	Avg. leverage*	Average ROA	Share of comp. with negative equity	Average liquidity rate**	Average financial expenditures as a share of total assets	Average share of female owners
2003	145	2,62	7,24	28	60%	-1,2%	19%	2,71	0,94%	39%
2004	160	2,58	6,81	27	60%	-1,5%	20%	2,78	0,96%	39%
2005	218	2,51	5,65	22	60%	-1,2%	23%	2,98	0,78%	41%
2006	224	2,47	5,63	24	60%	-0,5%	21%	2,88	0,77%	41%
2007	229	2,45	5,57	25	58%	-0,1%	20%	3,00	0,79%	41%
2008	235	2,41	5,86	26	58%	-1,1%	21%	3,02	0,95%	40%
2009	242	2,35	5,13	22	58%	-2,3%	23%	3,02	0,98%	40%
2010	248	2,28	5,05	22	58%	-2,0%	23%	3,02	0,78%	40%
2011	257	2,22	4,90	23	58%	-1,7%	23%	3,09	0,72%	40%
2012	259	2,15	4,77	22	58%	-1,9%	22%	3,11	0,65%	40%
2013	262	2,09	4,76	23	56%	-0,8%	21%	3,19	0,51%	39%
2014	263	2,06	4,92	26	54%	0,1%	19%	3,32	0,39%	39%
2015	263	2,04	5,07	28	52%	0,4%	17%	3,50	0,34%	39%
2016	255	2,01	5,23	29	47%	0,2%	15%	4,03	0,29%	39%
2017	253	1,98	5,37	32	45%	0,5%	13%	4,17	0,23%	38%
2018	237	1,95	5,55	38	44%	0,9%	12%	4,22	0,22%	38%
2019	213	1,93	5,77	43	43%	0,8%	11%	4,30	0,22%	36%

* Calculated as the average of 1 – (Equity / Total Assets), where Equity was floored at zero

** The sum of cash, inventories, receivables, short-term securities divided by account payables; floored at zero and capped at 10

The share of companies with one owner only rose from 5.8 percent in 2003, after briefly shrinking in 2004 and 2005, to almost 34 percent by 2019 (**Figure 3.**). All other categories lost their relative weights; the largest drop can be seen at companies owned by two. Their share shrank from roughly 63 percent in 2003 to 50 percent in 2019. The share of SMEs with three or four or more owners has been shrinking during the entire period.

Figure 3.
Distribution of SMEs by the number of their owners (SMEs liable for Corporate Tax)
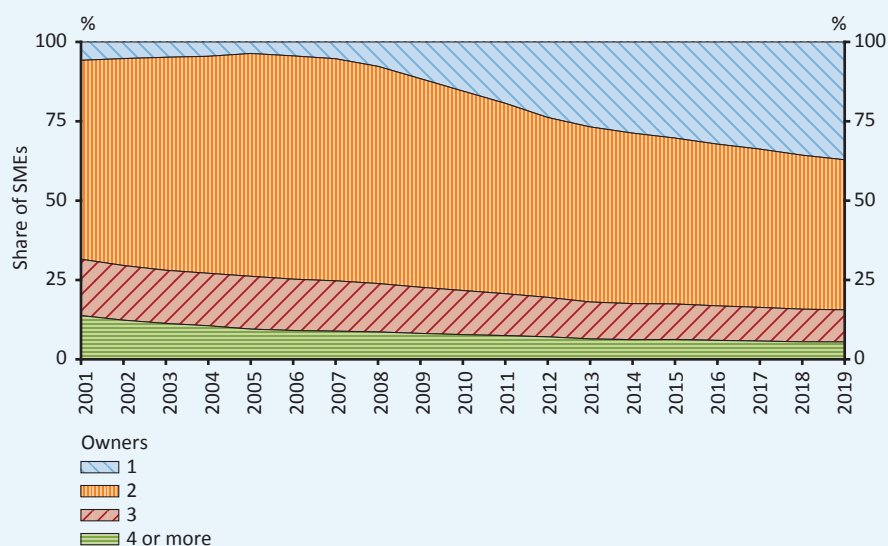

The dwindling average owner-numbers are a result of three processes (**Figure 4**). First, new companies tend to have less owners than all SMEs do. Second, disappearing SMEs have more owners than new SMEs do, which contributes to a reduction in the total average. Finally, at existing companies where the number of owners changed, there was on average a reduction in owner numbers, by an annual 0.3 - 0.4 owners or more (bars). These three processes together mean that buyouts, consolidations and smaller new companies contributed to the overall decline.

Figure 4.
Average number of owners at all SMEs paying Corporate Tax (black dashed line), new companies (yellow line), at disappearing companies (red line) and the average change of owner numbers at companies where a change took place (bars). Data: SMEs paying Corporate Tax
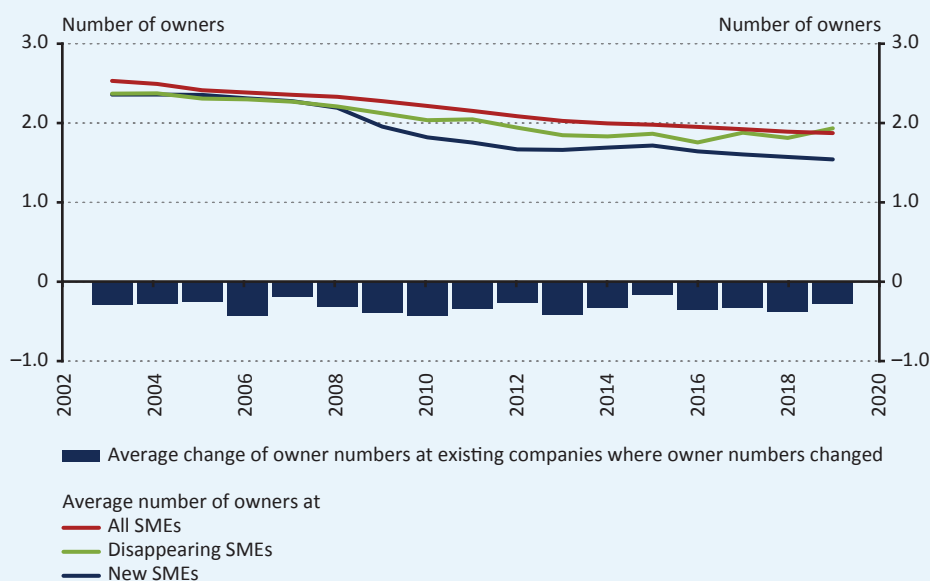
SMEs in agriculture, less likely to be present in metropolitan areas, not only have more owners on average than other NACE industry classes, but the speed of owner number reductions has been faster too (**Figure 5)**. Besides agriculture, averages of all other industrial categories moved tightly together and has been shrinking too.

Figure 5.
Average number of owners at Hungarian SMEs by industry (NACE categories)
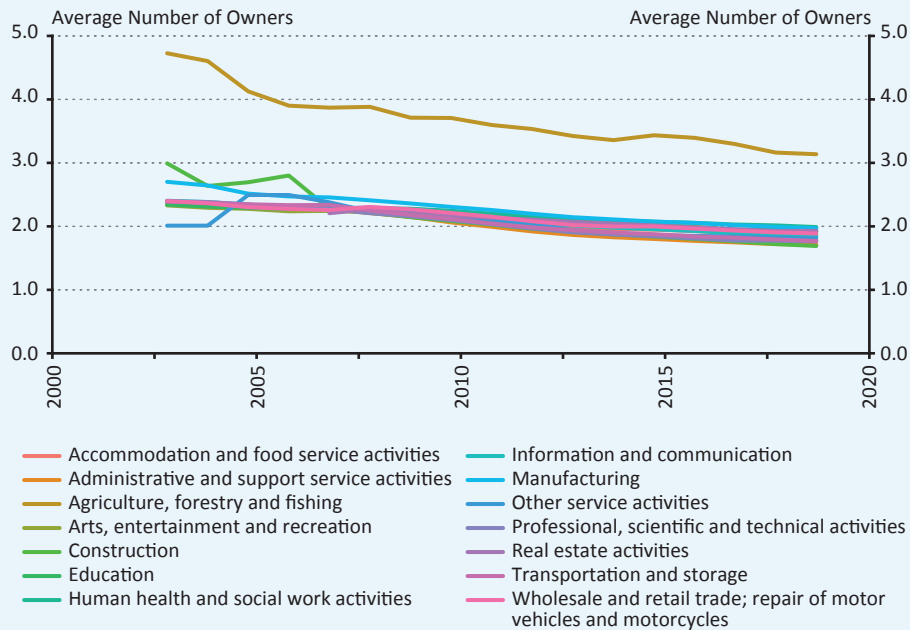
Spatial variations do not disappear when I exclude agricultural SMEs. The population density of 2019 for each district, expressed as population by square kilometers, was used to classify each SME into a category. The category-thresholds were defined arbitrarily to have roughly equal number of observations in each bracket, whereas the largest density category covers the capital, Budapest only (at 3335 inhabitants per square km). Average owner numbers were materially higher for sparsely populated districts over time, with or without agriculture (**Figure 6)**. SMEs in Budapest, the capital, had the lowest number of owners throughout the period.
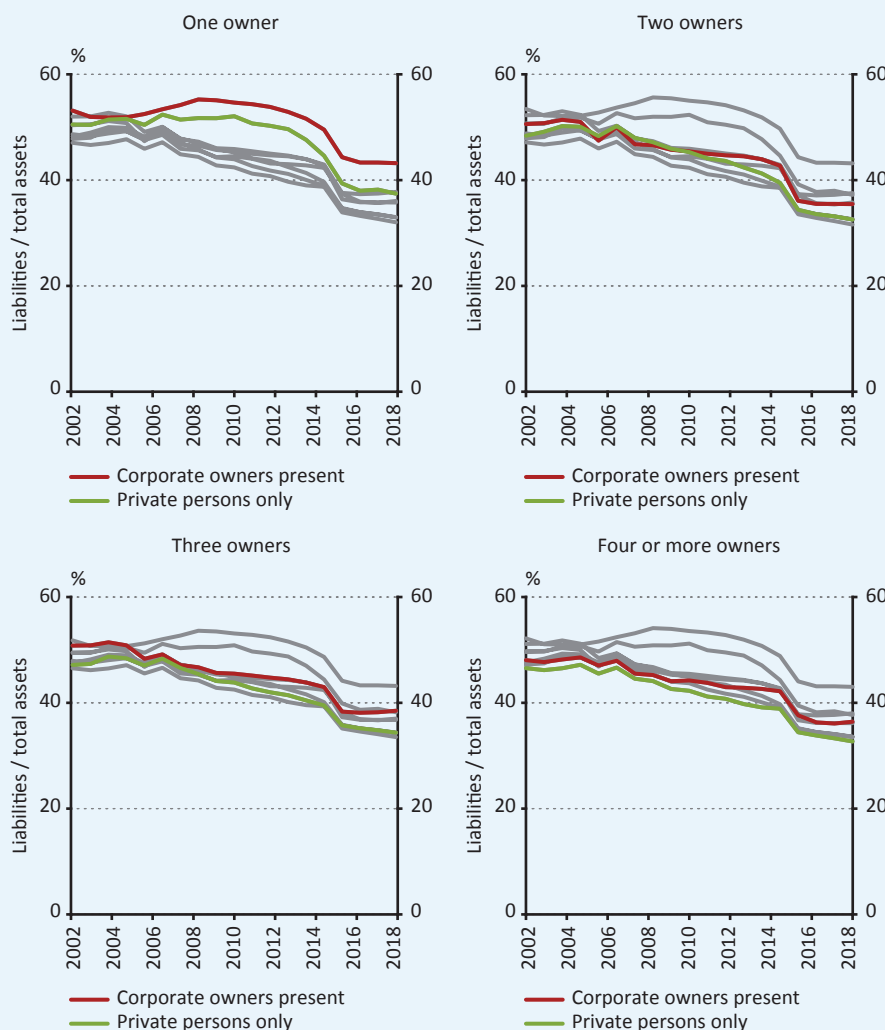
Figure 6.
Average number of owners by population density (defined on district-level (járás))
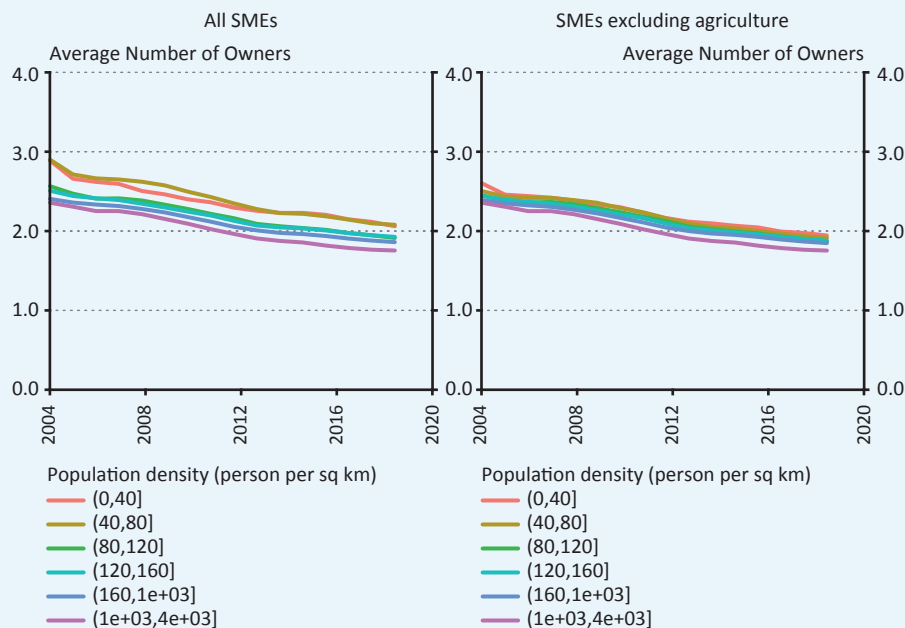
Owner numbers move together with several financial metrics. I propose to look at leverage, calculated as liabilities per total assets, since it explains parts of the financial risks the company assumes. And although leverage depends on funding conditions and payment terms, it gives an indication on indebtedness and thus, depicts one aspect of the risk profile.

Single-owned SMEs exhibit on average higher relative liability-values, both for private persons and corporates, than SMEs with multiple owners (**Figure 7**). Similarly convincing differences are visible when looking at the averages of other financial metrics by owner numbers, such as liquidity rate, return-on-assets and revenue change.

Figure 7.
Average leverage (liabilities / total assets) for corporate tax-paying SMEs; SMEs with positive equity only

SMEs belonging to corporate owners have on average higher equity book values, and the equity book values of companies owned by private persons have on average surprisingly similar averages since 2010 (**Figure 8**). Each owner owns on average less equity at SMEs where more than one owner is present. It seems, there is a relatively constant equity-level necessary to start a 'simple' enterprise, regardless of owner numbers. If that level is not achievable by a single owner, he or she invites another owner to start the company. In contrast, SMEs part of a group of enterprises can therefore tap into deeper sources of funds.

Figure 8.
**Equity book value by owner numbers and owner's legal form**
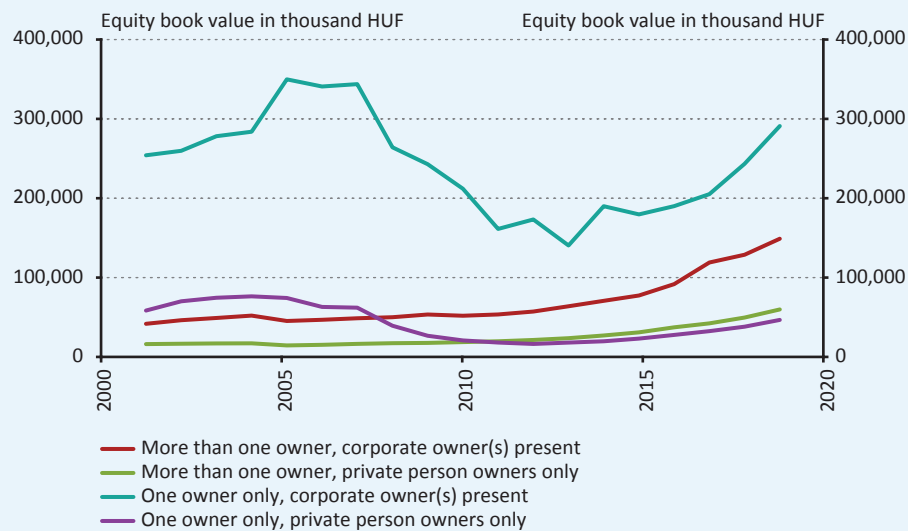
Since 89 percent of all SMEs had at least one private person owner, the analysis of their characteristics contributes to the understanding of credit risk. The average share of women among owners (for SMEs with at least one private person as owner) varied by the number of owners. While 29 percent of single-owned SMEs was owned by a woman, their share was around 40 percent for SMEs with more than one owners. The fact that women are underrepresented in the case single-owned companies is an indication for their lower willingness to take risks, and for their general position in the society, which may be explored elsewhere.

Single-owned SMEs are most common among the youngest and the oldest owners (**Figure 9,** bottom). Moreover, micro companies are on average owned by younger individuals[2] than small or mid-sized SMEs (top graph). In 2019, the average owner age at mid-sized companies was 54.2 years, followed by 51.1 for small and 49.2 for micro companies. Company growth requires time; and a successful buyout requires experience.

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[2] If a company is co-owned by a private person with a birth year and a company, I consider the age of the private person only. SMEs owned by other corporations are necessarily excluded.

Figure 9.
Distribution of companies by the average age of their owners in 2019 (top graph) and the share of single-owned SMEs by age group in 2019 (bottom graph)
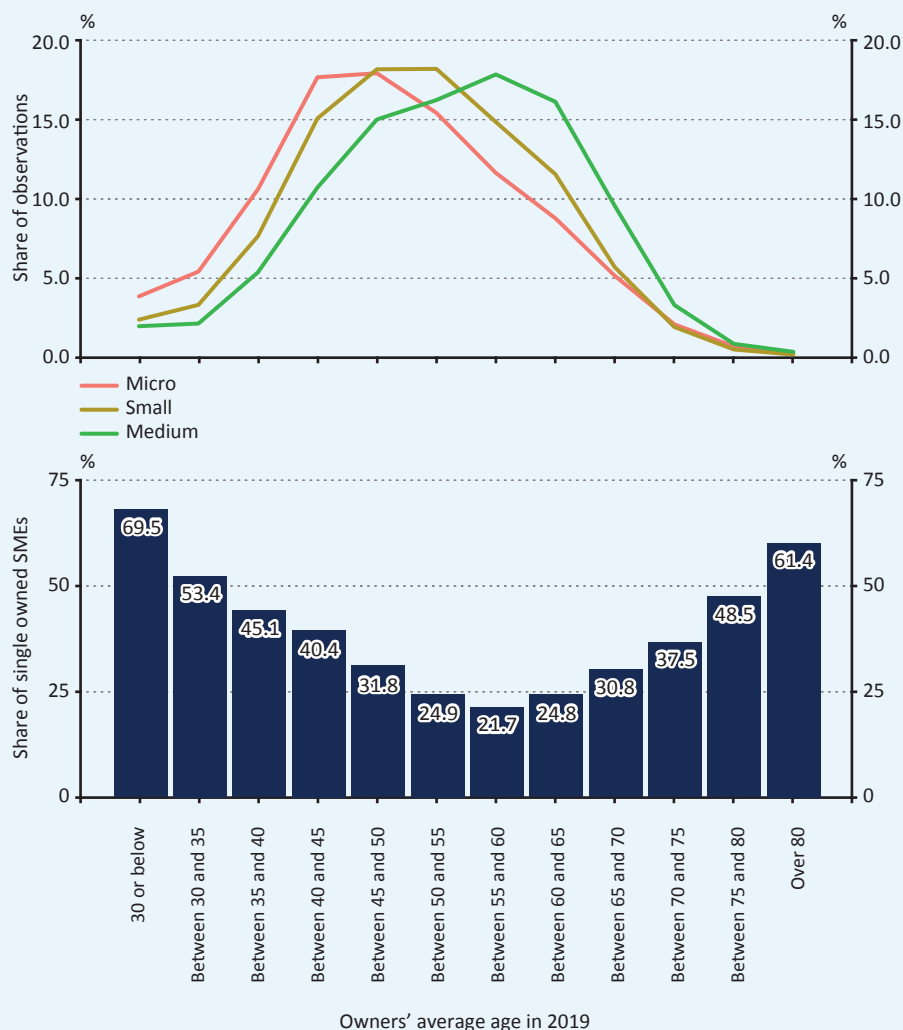
The development of owner numbers is finalized with the help of a binomial regression (**Table 4**). I explain the log-odds of having one owner only as opposed to having multiple owners. This means, a positive coefficient of an explanatory variable makes a single owner SME more probable, while a negative value indicates that having multiple owners is more probable. Reference values were:

• for size: Micro enterprise, as opposed to small and medium companies;
• 2003 was the reference year
• For population density, calculated for each of the 175 districts, was categorized and the most sparsely populated density category of 0-40 inhabitants per square-km was taken as the reference;
• for the industry: "Administrative and support service activities", the category with the lowest average number of owners in 2019
• The presence of corporate owners: 0 if not present, 1 if present with zero as reference
• Foreign flag: 0 if no foreign majority owner, 1 if yes with zero as reference
• Company age: the youngest category "Less than 2 years old" was used as the reference value

The regression analysis was carried out using year-end values only to make interpretations easier. Leverage (calculated as 1 – (equity / total assets) was capped at one, which limits the impact of negative equity corporations. Total equity was also floored at zero (eq_floored), and a 'negative equity' dummy was introduced.

Table 4.
Explaining if the SME has one single owner only (as opposed to multiple owners) with a logistic regression

	Variable name	Odds ratio	z-value	Probability
Intercept	(Intercept)	- 2,194	- 121,48	0,00***
Years (odds-ratios vs. 2003)	2004	- 0,047	- 2,69	0,01***
	2005	- 0,132	- 7,77	0,00***
	2006	0,118	7,29	0,00***
	2007	0,358	22,92	0,00***
	2008	0,779	52,33	0,00***
	2009	1,245	87,56	0,00***
	2010	1,618	116,62	0,00***
	2011	1,917	140,37	0,00***
	2012	2,190	161,96	0,00***
	2013	2,419	179,66	0,00***
	2014	2,561	190,56	0,00***
	2015	2,685	199,89	0,00***
	2016	2,833	210,56	0,00***
	2017	2,946	218,94	0,00***
	2018	3,082	228,12	0,00***
	2019	3,177	233,55	0,00***
Company age (vs. below 2 years)	Between 2 and 5 years	- 0,324	- 63,52	0,00***
	Between 5 and 10 years	- 0,839	- 164,79	0,00***
	10 years or older	- 1,842	- 354,95	0,00***
Population density in people / sq km (vs. 40 people / sqkm)	Between 40 and 80	0,010	1,00	0,3172
	Between 80 and 120	0,024	2,27	0,023*
	Between 120 and 160	0,062	5,90	0,00***
	Between 160 and 1000	0,080	8,16	0,00***
	Over 1000 (contains Budapest only)	0,347	35,62	0,00***
Industrial affiliation (vs. Administrative and support service activities, the cateory with the lowest avg. nr. of owners in 2019)	Accommodation and food services	- 0,249	- 28,44	0,00***
	Agriculture and forestry	- 0,454	- 40,13	0,00***
	Arts, entertainment, and recreation	- 0,232	- 19,98	0,00***
	Construction	- 0,104	- 13,85	0,00***
	Education	- 0,389	- 31,72	0,00***
	Human health and social work	- 0,689	- 67,68	0,00***
	IT and communication	- 0,235	- 27,34	0,00***
	Manufacturing	- 0,256	- 33,53	0,00***
	Other services	- 0,083	- 6,99	0,00***
	Professional, scientific and technical activities	- 0,099	- 13,98	0,00***
	Real estate activities	0,181	22,33	0,00***
	Transportation and strorage	- 0,114	- 13,36	0,00***
	Wholesale and retail trade, repair of vehicles	- 0,198	- 29,59	0,00***
SME size (vs. micro)	Small	0,277	50,57	0,00***
	Medium	1,006	62,84	0,00***
Further variables	Equity in mln (floored at zero)	0,000	40,98	0,00***
	Negative equity dummy (negative = 1)	- 0,213	- 42,10	0,00***
	leverage	0,248	35,04	0,00***
	Number of employees	0,002	18,61	0,00***
	ROA	- 0,359	- 30,93	0,00***
	Liquidity rate	0,001	2,32	0,0205*
	Presence of a corporate owner dummy (1 = present)	- 0,164	- 45,42	0,00***
	Share of Women among owners	- 1,203	- 258,38	0,00***

*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*

The regression is a relatively good fit, with a 0.1937 McFadden Pseudo R2-value. Its results confirm most of the observations suggested by the descriptive statistics (**Table 4)**. The 'Odds-ratio' column contains the log-odds of seeing one owner as opposed to several owners. A positive coefficient means that the increase of the explanatory variable (or the presence of categorical variable) implies that the SME is more likely to be single owned.

Over time, apart from 2004 and 2005, the probability of seeing single-owned SMEs increased in a gradual manner. Older companies tend to have more owners, which, in other words means that the number of owners has been decreasing over time.

Higher population density shows a gradually increasing odds of having one owner only. Its impact is indistinguishable at the category of 40-80 inhabitants per square kilometer in a district from the baseline 0-40 category, and it has a smallish positive log-odds value in the 80-120-category (significant at 5 percent). Above that, however, the log odds are higher, the higher the population density is, reaching its peak value in Budapest, the capital (with a density of 3335 persons per square km), at 0.347. This holds true *after* controlling for industry-affiliation, confirming the influence of geography on the structure of SME ownership, which translates into a residual impact of geography.

Surprisingly, agriculture does not have the highest probability of multiple owners after controlling for other factors; SMEs healthcare have lower coefficients.

Finally, both small and medium enterprises are more likely to have one single owner than micro enterprises, holding all other variables equal. (The materiality of the number of employees is small.) These all indicate that a larger the SME is, or a corporate investor is present, both raise the log-odds of having one owner only. Moreover, higher leverage also moves together with a higher probability of single ownership. Indeed, such companies are most probably mature, professionally managed SMEs, or special project companies owned by one investor. (Running the regression using owners' average age reinforces the observation that the youngest and the oldest are most likely to have single-owned companies. Regression is not shown as age is only available from 2012 onwards.)

The results above explain the geographical differences in SME owner numbers shown at the beginning of this section. While the regression does not deliver evidence for a causal relationship, it is a robust way of showing which variables move together with others. Regional variations are not only driven by the industrial composition of local firms, but also by firm size (larger firms are more likely to have one owner only; and are more likely to be in the capital and larger towns), financial metrics and a residual variable responsible for geography: SMEs in sparsely populated districts tend to have more than one owners, holding all else equal. Admittedly, the reasons for the temporal and the spatial effects are not visible from this analysis. It is only suspected by the literature review earlier that they originate from the temporal and geographically varying availability of capital and funding, at least, partially.

3.3 DEFAULT PROBABILITY AND OWNERSHIP STRUCTURE

Only a part of all SMEs appears in the credit registry with a performing loan: their share has been fluctuating around 28 percent (**Figure 10**). Over time, it peaked in 2009, after the global financial crisis. Then the share SMEs with performing loans steeply dropped until mid-2012. Thanks to the economic rebound, the MNB's and the Hungarian Government's programs to boost SME financing, the share climbed back to its pre-2008-crisis levels by the end of 2019.

Figure 10.
Share of SMEs with a performing loan
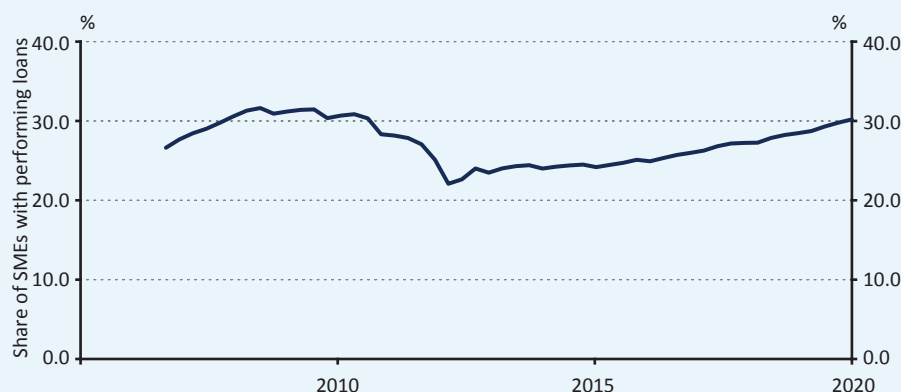
There is a difference between SMEs in the Credit Registry (with performing loans) and all SMEs, since commercial banks single out some companies when granting the loans; and not all SMEs apply for a loan anyway. However, there are similarities in trends when comparing the two groups of enterprises (**Table 5**). The share of single-owned SMEs has been increasing in both categories; and the share of enterprises in Budapest remained stable, around 27 percent for SMEs in the Credit Registry and 34 percent for all SMEs.

On average, loan taker SMEs have been employing almost twice as many people than all SMEs, have had higher equity book values and, expectedly, higher leverage ratios. The de-leveraging following the financial crisis of 2008 is also visible for both groups. Finally, loan-taker SMEs have lower liquidity on their books on average. At the same time, these differences do not challenge the observations made above on the development of the number of owners and the main relationships with financial metrics: running the same statistical tests as above deliver similar results (stats are not shown).

Table 5.
Selected indicators of SMEs with loans

| year	Number of SMEs in thousand		Average equity in mln HUF		Average number of employees		Average leverage*		Average liquidity rate**		Share of single owned SMEs Share of single owned SMEs	
	Credit Registry	All SMEs	Credit Registry	All SMEs	Credit Registry	All SMEs	Credit Registry	All SMEs	Credit Registry	All SMEs	Credit Registry	All SMEs
2007	66	229	65	32	10,7	5,6	64%	58%	2,1	3,0	7%	5%
2008	74	235	63	33	11,0	5,9	64%	58%	2,1	3,0	9%	8%
2009	76	242	63	34	9,3	5,1	64%	58%	2,1	3,0	12%	12%
2010	75	248	68	33	9,2	5,0	63%	58%	2,1	3,0	15%	15%
2011	69	257	70	32	9,4	4,9	62%	58%	2,2	3,1	18%	19%
2012	61	259	85	34	9,8	4,8	61%	58%	2,2	3,1	20%	24%
2013	63	262	87	36	9,8	4,8	60%	56%	2,2	3,2	23%	27%
2014	64	263	97	42	10,2	4,9	58%	54%	2,3	3,3	25%	29%
2015	66	263	105	46	10,4	5,1	55%	52%	2,5	3,5	27%	30%
2016	66	255	120	54	10,6	5,2	51%	47%	2,8	4,0	29%	32%
2017	69	253	141	63	10,6	5,4	49%	45%	2,9	4,2	31%	34%
2018	68	237	151	73	10,8	5,6	49%	44%	3,0	4,2	34%	36%
2019	65	213	169	87	11,0	5,8	48%	43%	3,1	4,3	36%	37%

* Calculated as the average of 1 – (Equity / Total Assets), where Equity was floored at zero and by nature capped at one

** The sum of cash, inventories, receivables, short-term securities divided by account payables; floored at zero and capped at ten

Figure 11 depicts the share of default events over time for the total SME portfolio in the Credit Registry (bars). The prolonged effect of the 2008 crisis on the loan portfolio is visible. The lines on the graph show the default proportion by owner-numbers: it was highest for single-owned SMEs in all years. While one may discuss the difference between the two, three or more owned SMEs' lines after 2017, their order is consistent with the hypotheses from above.

Figure 11.
Share of default events over time and by the number of owners. Default events are approx. 4-times the share of true defaults, see the section on data.
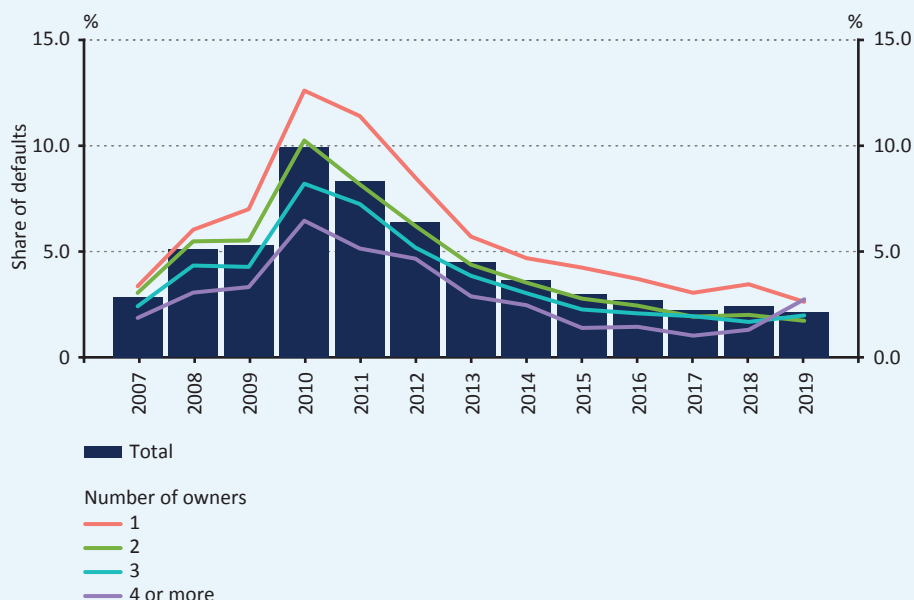
The map of default proportions (**Figure 12**) shows local stress-events in the rust belt regions, among others the homes to a once thriving heavy industry (*Kazincbarcika, Ózd, Salgótarján, Komló*), which have lost 13 percent of their population from 2001 to 2016 (KSH, 2018). It is rather the population density-category which tells us more on the impact of owner-numbers on default probabilities (**Figure 13**). It suggests that the relationship between owner numbers and default probability exists in all population density-categories. This statement put together with the message from the previous section, that SMEs have on average higher owner numbers in more sparsely populated districts, we may say that geography indirectly impacts local default probabilities by the nature of enterprising.

Figure 12.
Average share of default events by district ('járás'), 2007-2019 (Default events are approx. 4-times the share of true defaults, see the section on data.)
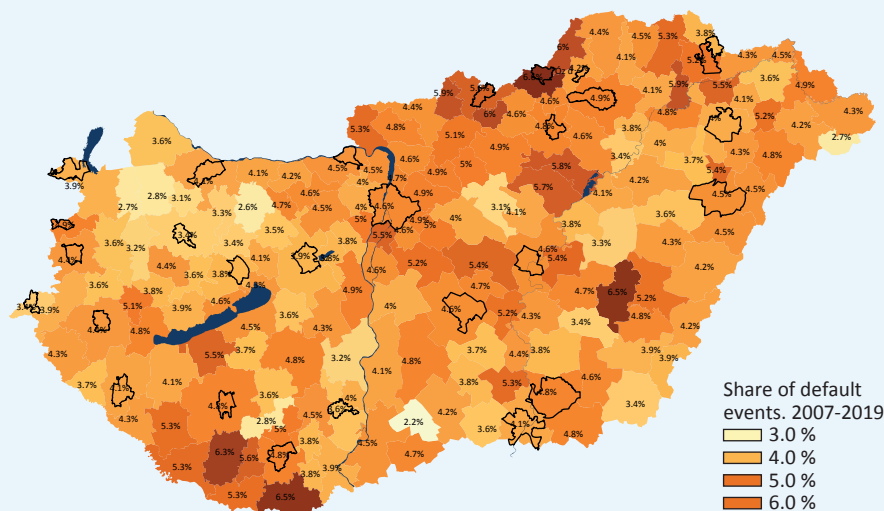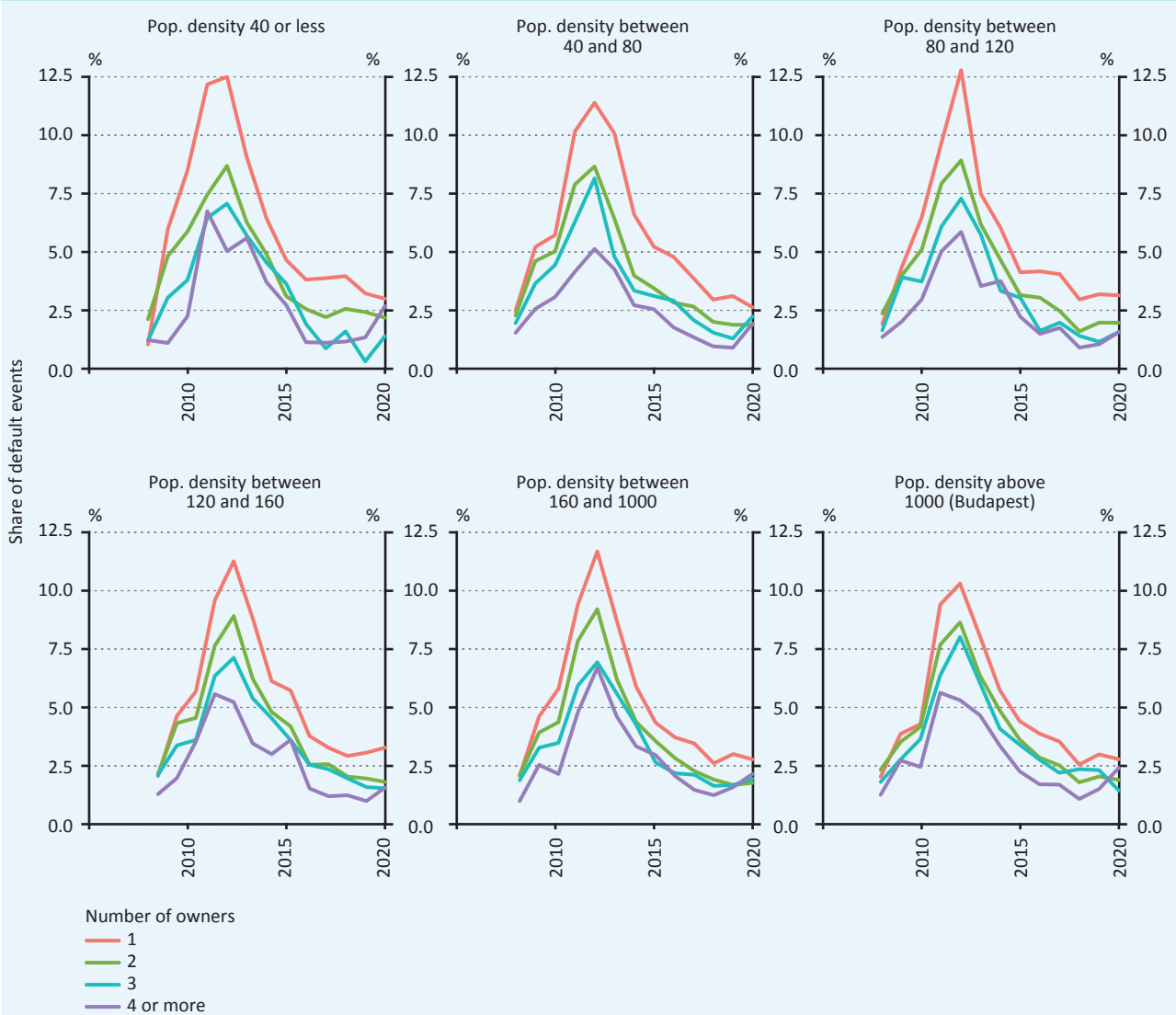
Figure 13.
**Default event share by population density (person / sq km) and SME owner numbers**

Given the relationship geography and owner numbers, the remaining part of this section explores the relationship between owner numbers and default probabilities. A classical analysis, such as the one written by Banai et al (2016), mostly explain default probabilities with financial metrics such as leverage, return-on-assets, various liquidity ratios. Based on the above cited tenet of corporate governance, these financial ratios move together with the characteristics of the owners, such as their numbers, age and gender. **Table 6** illustrates this for the selected year of 2015. Indeed, single-owned SMEs had higher leverage ratios, lower liquidity rates, less return on assets but faster growth. Their owners were on average also younger. In short, single-owned SMEs assumed higher financial risks. In addition, these relationships are similar when comparing SMEs with corporate owners only (except for owners' age, which is not available).

Table 6.
Selected average metrics of SMEs with loans, end of 2015

Number of owners	Leverage (1 – equity / total assets)	Liquidity rate (current assets / current liabilities)	Return on assets	Revenue change	Average age of owners (where available)
1	60%	2,29	1,42%	14,2%	44,7
2	54%	2,54	1,69%	7,8%	48,2
3	53%	2,52	1,67%	7,8%	47,5
4 or more	50%	2,52	1,51%	8,7%	49,0

Age and gender are owner characteristics relevant for around 88 percent of all SMEs, and add to the understanding of default probabilities. Both characteristics illustrate that the realized risk is a combination of planning, which is expected to be higher for the young and for men, and lower for the more experienced and for women, and execution. As **Figure 14** shows, the share of defaults is highest for the SMEs with the on average youngest owners, which value drops and reaches its minimum at the owners between 60 and 65. From that point onwards it picks up again for the oldest category.

Figure 14.
Share of default events by owners' average age in their respective year between 2012 and 2019
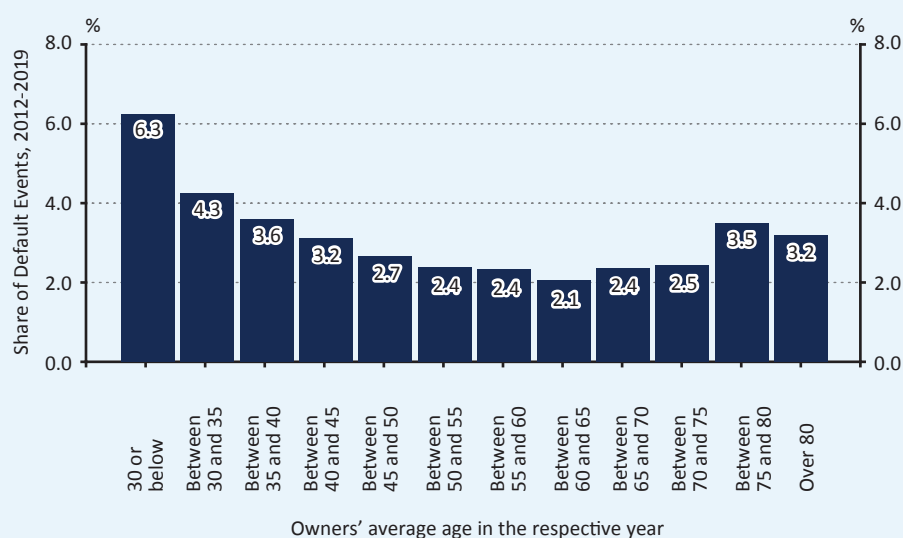
The share of defaults and the share of women among owners reflects a similar underlying trend (**Figure 15**). Single owned SMEs, if owned by a woman, tend to exhibit a higher share of default events than single-owned SMEs belonging to a man (bottom plot). This impact almost disappears when looking at companies with more than one owners. In this latter case, the presence of women may even decrease the probability of default (top plot). I suspect that this contrast is caused by the difference between intended and realized risk levels, which could be subject to further research.

Figure 15.
Share of default events at companies with at least one private person owner by owner number and gender.
Default events are approx. 4-times the share of true defaults, see the section on data.

The final part of this section explains the probability of default by fitting a binomial logistic regression (**Table 7**). I narrowed down the list of explanatory variables and validated my choice using the Least Absolute Shrinkage and Selection Operator (LASSO)-method and the gradient boosting classification methods (not published). Adding more variables would improve prediction performance slightly, it does not alter the message of this study.

Owner numbers are now used as explanatory variables, with single-owned SME as reference value. Macroeconomic variables (GDP change, the three-months Budapest Interbank Offered Rate (BUBOR_3M), unemployment rate) were added for the sake of clarity. I also added two loan-specific variables (elapsed and remaining maturity, taking the earliest and longest loans for a given quarter). Categorical variables' reference values are the same as in the previous section.

Overall, the regression has a McFadden R2 of 7,4 percent, a rather less powerful result. Nevertheless, the odds-ratios do explain how some variables move together with the probability of default:
• All financial and macroeconomic variables have similar coefficients to the values found elsewhere, but specifically, by Banai et al (2016).
• Population density, though significant, its coefficients are small. Variations in density do not move together with material changes in default probabilities, holding all else equal.
• SME size only matters as long as it is about a micro enterprise or a larger SME; there is only a tiny difference between the coefficients of small and medium companies.
• Company age, in contrast, matters and older companies have smaller PDs.
• Healthcare is the safest bet in terms of industries, though defaults do happen there too.
• And, as expected, the presence of a corporate owner lowers default probability.

The coefficients of owner-numbers are significant and are materially less for firms with more owners, even after controlling for financials. One explanation for this may be that financial figures capture only a part of the risk assumed by the company. Again, it must be underscored that these relationships are no evidence for a causal relationship but are a robust way of showing that they move together.

Table 7.
Results of the logistic regression explaining the probability of default

| Variable category	Variable	Estimate	z value	Probability
Intercept	(Intercept)	- 2,529	- 5,00	0,00***
Macroeconomic variables	GDP change vs last quarter	0,020	3,92	0,00***
	HUF / EUR exchange rate	- 0,009	- 17,11	0,00***
	Change of the HUF / EUR exchange rate vs last quarter	2,467	17,28	0,00***
	3 months BUBOR	- 0,080	- 10,85	0,00***
	Change in the 3-months BUBOR vs. last quarter	0,317	26,95	0,00***
	Level of unemployment	0,035	5,45	0,00***
Population density in people / sq km (vs. 40 people / sqkm)	Between 40 and 80	- 0,039	- 2,43	0,02*
	Between 80 and 120	- 0,081	- 4,74	0,00***
	Between 120 and 160	- 0,095	- 5,60	0,00***
	Between 160 and 1000	- 0,063	- 4,01	0,00***
	Over 1000 (contains Budapest only)	- 0,055	- 3,47	0,00***
Years (odds-ratios vs. 2007)	2008	0,405	18,98	0,00***
	2009	1,237	36,68	0,00***
	2010	1,301	31,78	0,00***
	2011	1,378	35,59	0,00***
	2012	1,450	35,16	0,00***
	2013	1,169	23,81	0,00***
	2014	0,889	16,23	0,00***
	2015	0,667	11,43	0,00***
	2016	0,612	9,91	0,00***
	2017	0,309	4,84	0,00***
	2018	0,442	6,66	0,00***
	2019	0,542	7,89	0,00***
Industrial affiliation (vs. Administrative and support service activities, the category with the lowest avg. nr. of owners in 2019)	Accommodation and food services	- 0,032	- 1,74	0,08
	Agriculture and forestry	- 0,244	- 12,19	0,00***
	Arts, entertainment, and recreation	- 0,029	- 1,02	0,31
	Construction	0,091	6,33	0,00***
	Education	- 0,308	- 9,63	0,00***
	Human health and social work	- 0,888	- 37,39	0,00***
	IT and communication	- 0,109	- 5,68	0,00***
	Manufacturing	0,007	0,50	0,62
	Other services	- 0,229	- 8,01	0,00***
	Professional, scientific and technical activities	- 0,240	- 15,32	0,00***
	Real estate activities	0,025	1,56	0,12
	Transportation and storage	0,187	12,26	0,00***
	Wholesale and retail trade, repair of vehicles	- 0,111	- 8,32	0,00***
continued overleaf				

Table 7.
Results of the logistic regression explaining the probability of default

Variable category	Variable	Estimate	z value	Probability
SME size (vs. micro)	Small	- 0,181	- 22,40	0,00***
	Medium	- 0,178	- 8,86	0,00***
Company age (vs. below 2 years)	Between 2 and 5 years	- 0,259	- 16,72	0,00***
	Between 5 and 10 years	- 0,517	- 32,32	0,00***
	10 years or older	- 0,827	- 51,02	0,00***
SME-level variables	Revenue change	- 0,290	- 53,03	0,00***
	ROA	- 2,552	- 81,37	0,00***
	Equity (floored at zero)	- 0,000	- 21,82	0,00***
	Liquidity rate	- 0,075	- 50,07	0,00***
	Fin. expenditures as a share of total assets	4,856	50,69	0,00***
	Number of employees	0,000	3,58	0,00***
	Remaining maturity in years (longest loan)	0,029	54,10	0,00***
	Elapsed loan term (Earliest loan)	0,052	43,86	0,00***
	Share of female owners	0,195	14,35	0,00***
	Dummy for the presence of a corporate owner	- 0,087	- 11,31	0,00***
Number of owners (vs. having one owner only)	Two owners	- 0,149	- 16,93	0,00***
	Three owners	- 0,249	- 18,05	0,00***
	Four owners or more	- 0,391	- 20,15	0,00***
Interaction: share of female owners and number of owners	Two owners: share of female owners	- 0,293	- 15,65	0,00***
	Three owners: share of female owners	- 0,320	- 9,55	0,00***
	Four owners or more: share of female owners	- 0,434	- 8,62	0,00***

The interaction between gender and owner numbers is slightly difficult to be interpreted from the regression results. Therefore, I prepared a prediction for an average micro company in Budapest, active in trade (retail or wholesale) in the year of 2014 (for all other variables I took the average values. The results (**Figure 16**) confirm the higher default probability seen for single, women owned SMEs, which turns into advantage once more owners are present. (The interaction of female-owner-share and five owners or more is not significant.)

Figure 16.
Predicted default-event probabilities for a micro enterprise, between 2 and 5 years old, in trade, in Budapest with no corporate owners in 2014. All other variables were averages (Default events are approx. 4-times the share of true defaults, see the section on data.)
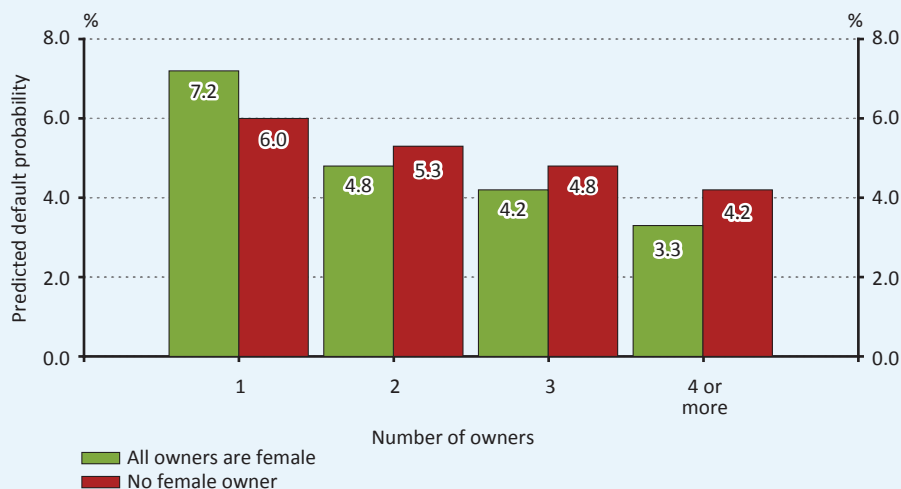
Finally, since age is only available from 2012 onwards, I prepared a separate regression using that information too (not shown). Its results reinforce the U-from relationship between expected PD and age.

4 Conclusion

The aim of this paper was to establish a link between the geography of SME owner numbers and credit risk. By doing so, it first showed that the number of owners at Hungarian SMEs as moved from an average four in the 1990s to below two in 2019, mostly as a consequence of the transition from state control to market mechanisms. SMEs located in geographically more densely populated regions are going through these changes earlier than sparsely populated regions.

In a second step, the paper linked SME owner numbers to credit risk. It argued, citing the literature on corporate governance, that ownership structures influence financial metrics and risk profile. It was shown that the less owners an SME has, the more risky its financial profile is, and the more likely it is to default on its loan. Moreover, this relationship holds true almost regardless of geography. When this is taken together with the first statement, we can say, that geography influences SME credit risk through regionally and temporally varying ownership structures.

The paper contributes to the literature on the economic geography of transitions by showing the decreasing share of jointly owned companies and increased ownership concentration at Hungarian SMEs; and the geographically different speed of this process. I argue that better funding, capital availability and the ease of doing business were the drivers behind both the regional variations; and regional scarcity fosters cooperation in enterprising more than abundancy. At the same time, it is the cooperation of owners that mitigates credit risk.

I highlight three policy implications from this research. First, equity investors may help single-owned SMEs more than banks offering loans, because of the additional control a new owner may bring to the table. This may be supported by public or private programs by offering new financing vehicles. Second, entrepreneurs must be made aware of the additional risks their single-minded decisions may mean with the help of educative programs provided by public bodies such as industry chambers. Admittedly, they may intentionally take on risks in exchange for additional returns. But there are cases where a bit of education provided to, for instance, young entrepreneurs yields benefits. Lastly, growing enterprises should be encouraged to introduce good corporate governance practices, for instance, by directing them towards the stock exchange when they seek additional funding.

Finally, this paper also generated further research ideas. The geography of SME ownership structures should be studied in other European countries in ways that would allow for comparative analysis and a joint European regional policy. An inter-country analysis could also highlight what (reporting or other) measures force SMEs to have better corporate governance policies. And lastly, while this paper looked into the geography of owners and credit risk, the geography of returns or risk-adjusted returns could be investigated.

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