ISSN 1648-0627 / eISSN 1822-4202

VILNIUS TECH
Vilnius Gediminas Technical University

BUSINESS: THEORY & PRACTICE

2025
Volume 26
Issue 1
Pages 153–161
https://doi.org/10.3846/btp.2025.22184

FINANCIAL PERFORMANCE AND CAPITAL STRUCTURE DYNAMICS OF THE HIGH-TECH STARTUPS IN THE BALTIC REGION

Daina KLEPONĖ[1, 2], Laima OKUNEVIČIŪTĖ NEVERAUSKIENĖ[1, 2]✉

[1]*Vilnius Gediminas Technical University, Saulėtekio al. 11, LT-10223 Vilnius, Lithuania*
[2]*Lithuanian Centre for Social Sciences, A. Goštauto g. 9, LT-01108 Vilnius, Lithuania*

Article History:
- received 9 September 2024
- accepted 15 October 2024

Abstract. This study examines young fast growing technology startup companies in Baltic region. Employing unique datasets of startups financial accounting data from Lithuania, Latvia and Estonia comparative and correlation analysis between growth, profitability and financial leverage indicators reflects how lifecycle stages influence startups profitability and capital structure. By analysing the development patterns of innovative products, investment phases, and capital structures, the research aims to uncover the strategic choices made by startups at different stages of their lifecycle and the implications of these choices on their financial performance. By comparing startups with other control groups in hi-tech and traditional industries research provides empirical evidence on the unique developmental trajectories of startups which enhances the strategic decision-making capabilities of investors and policymakers by providing a deeper, empirically grounded understanding of how startups differ from other sectors in terms of growth, profitability, and capital structure dynamic.

Keywords: startups, technology, finance, leverage, growth, profitability.

JEL Classification: G30, G32, L25, O30, M13.

✉Corresponding author. E-mail: ***laima.okuneviciute.neverauskiene@vilniustech.lt***

1. Introduction

After the 1990s, a new form of economic activity and entrepreneurship was born in the U.S. Silicon Valley. Since then, there has been no agreement on what to call them and they have been named differently: "start-ups", "born globals", "high grow's", "gazelles", "blitzscalled" ventures, "scalleup's", "unicorns" or "decacorns". Same term is used to name technology powerhouses generating billions of dollars of revenue in global markets, to young businesses that have been developing advanced technology-based products for decades with zero revenues. And while these start-ups (ST) are still as mysterious as the unicorns, it is unlikely that we will find a government today that does not have a line in its budget dedicated to stimulating these new types of businesses. ST are companies that are mainly associated with technologies, innovations, and high growth. Estonia (EE) since 2015, Latvia (LV) since 2017 and Lithuania (LT) since 2019 has defined ST in their legal acts mainly as: "<...> micro or small enterprise with a high and innovation-based business development potential, registered in the Register of Legal Entities for not more than 5 years, having large and innovation-based business development potential, which means the potential of a small or the capacity of an innovative medium-sized enterprise to provide goods and/or services to expand to international markets without using additional production resources" (Lietuvos Respublikos Seimas, 2019). The European Commission announced funding worth €1.6 billion for EU innovators to scale up breakthrough technologies in 2023. At the same time is widely acknowledged that ST are high financial risk businesses. Despite these doubts, everyone is investing in ST – private investors and governments alike. But do ST behave like other traditional or hi-tech businesses? How do the financial performance and capital structure of ST evolve over time compared to not startup firms, and what are the dynamics and relationships between their financial indicators? This study aims to investigate dynamics of capital structure and profitability of the startups as they age. Our hypothesis is that in the early development phases, ST exhibit distinct growth patterns, profitability trajectories, and capital structure dynamics, influenced by innovative nature of their products and highly risky business models. Understanding these differences is crucial

for investors, stakeholders, and the companies themselves as they strategize for growth, manage risk, and position themselves in the marketplace. It's important to note that while high leverage and low profitability are concerns, they are also characteristic of the growth-focused business model of ST. These insights provide a snapshot of financial health and efficiency of ST across the Baltic states, and it could be useful for investors, analysts, and policymakers engaged in the region's ST ecosystem. The differences in these trends across the three countries could also provide insights on differing economic environments, regulatory frameworks, access to capital and entrepreneurial culture.

2. Literature analysis

In traditional industries, corporate financing theories apply consistently across both small and large firms, as demonstrated by Cassar and Holmes (2003) who provided empirical evidence linking profitability and growth with a firm's capital structure and financing strategies. But in innovative industries the effects can vary. Financial performance of ST evolves as they mature. The discussion on the financial performance of ST center on four distinctive features: their youthful age, high growth potential, innovative nature, and their high-risk business models. Research around the technology firms financing could be divided to the studies focusing on the startup firms access to finance and funding sources, estimating impact of financial constraints on firms growth and survival and investigating the financial dynamics indicators as profitability and capital structure.

Access to finance constrains is an important determinant for firms' growth and survival. But it affects hi-tech and low-tech firms differently: for low tech firms it might positively induce cost saving practices and increase efficiency, while in high-tech will decrease product innovation levels (Bonanno et al., 2023; Okunevičiūtė Neverauskienė & Pranskevičiūtė, 2021a). Also, development in equity and credit markets affects innovation differently in high-tech and low-tech industries as it was revealed by Zhu and Kim (2023): equity markets have a diminishing impact on innovation in high-tech sectors, while credit markets are a primary driver of innovation in non-high-technology industries. In traditional industry newly founded firms rather heavily rely on external debt financing: owner-backed bank loans, business bank loans, and business credits. The average amount of bank financing outperforms by seven times average amount of insider-financed debt lines (Robb & Robinson, 2014). Even for the newly established firms that rely on inside debt, the average amount of outside debt is twice higher inside debt. But when it comes to technology ST, the picture changes. Due to the high-risk business models ST funding sources are specific (Manigart & Struyf, 1997). From company financing perspective, because of the lower survival rates ST are attributed to the higher risk businesses (Mattsson & Andersson, 2019). ST usually lack access to formal capital markets and are relying on the investments or loans from internal network (Gabrielsson & Manek Kirpalani, 2004) or other financing sources as i.e. government grants as well as personal savings of the entrepreneurs themselves (owners' equity or debt), occasionally supplemented with capital or loans from family or friends (Coleman et al., 2016) or the specific players of the business investment market: business angels and venture capital firms (Frid et al., 2016; Khanna & Mathews, 2022). More efficient ST are financed by CEOs and their families or relatives, over the ST financed by funds of CEOs and external investors as by Chung et al. (2022). ST capital sources also might differ by subindustry as showed by the Giaretta and Chesini (2021) on the example of fintech ST.

Access to finance is crucial for ST, particularly in technology driven sectors. Technology firms developing innovative products usually have a higher set up costs thus are determined by higher leverage and longer maturity debt levels (Derrien et al., 2021; Okunevičiūtė Neverauskienė et al., 2021b; Okunevičiūtė Neverauskienė et al., 2024b). Because of the innovative products ST suffer more by financial constraints than other small firms (Ferrucci et al., 2021) and it can determine the future development strategy by influencing growth levels as by Koed Madsen et al. (2000): firms with scarce internal funds are forced into inefficiently liquidating their operating assets and often operate at arm's length in foreign markets. Endogenous borrowing constraints evolve based on the interplay between existing debt and future access to credit (Albuquerque & Hopenhayn, 2004; Opuala-Charles et al., 2023), however, if level of entrepreneurship is high some of the constrains might not have a negative effect as it was revealed by Honjo et al. (2024). Younger firms tend to grow faster and have lower survival rates and firms with greater debt usually have higher assets and turnovers. Ling Ng et al. (2024) showed that access to external financing negative effect on firm growth was especially strong for smaller and younger firms. Also Kerr and Nanda (2010) confirmed a negative relationship between financing constrains and firm size at entry level. Newman et al. (2012) has found that firm size (larger firms used more external sources) and profitability (more profitable firms had lower leverage) had a significant impact on the firms' financing decisions. In the study of Fuertes-Callén et al. (2022) of the hi-tech sector young firms was revealed a positive correlation between survival and liquidity or debt levels as well as the significant increase of bankruptcy risk for the unprofitable after 1-year firms. Bolton et al. (2019) established a positive connection between the growth of the young firm and its liquidity and cash holdings. Further on Serrasqueiro et al. (2023) study identified nonlinear relationship between profitability and growth: in active growth stages profitability decreases, but beyond the certain level, due to the increased productivity and internally generated financial resources it starts to grow.

Pecking Order Theory (Myers, 1984) suggest that firms prioritize their sources of financing according to the least effort or least resistance principle. Companies prefer to finance new investment projects using firstly the internal funds or retained earnings and more profitable firms tend to have lower levels of leverage. The debt is preferred over equity as a new source of external funds because debt

typically has lower transaction costs and doesn't dilute ownership. Issuing new equity is considered the least preferred option. The theory was empirically tested by number of authors in different countries. Lang et al. (1996) established a negative relationship between the leverage level and firms' growth potential for traditional industry, same trend was confirmed by Somya and Saripalle (2023) for ICT sector: high leverage firms are unable to invest. High leverage ST had the lowest 12-year survival probability in the study of De Haas et al. (2022) and their internationalization and integration was negatively related with leverage in the study of Cappa et al. (2020). In study by Tong and Saladrigues (2023) leverage and liquidity show a negative and statistically significant effect on profitability, this could be explained by the evidence provided by Baños-Caballero et al. (2016) that higher leverage is related with higher borrowing and debt repayment costs. Rajaiya (2023) examined the relationship between equity and debt financing for the firms carrying on innovative activities and established a negative correlation between higher level of innovation and debt ratios, however different result was received by Gomezel (2022) who established positive relationship between short time debt and innovation performance. But generally, the trend for ST to finance by debt is increasing as it was emphasized by Neville and Lucey (2022).

Higher share of intangible assets and operating in the sectors with a demand for a high external financing ST makes them more vulnerable to the increase of costs of external finance (Albert & Caggese, 2021). Access to finance is one of the major ST ecosystem competitiveness criteria estimated by availability and ease of access to specific for ST financing sources (Filho et al., 2024; Okunevičiūtė Neverauskienė & Kleponė, 2024a). In some cases this specific could be addressed by the traditional finance market players as discussed by Hyun and Lee (2022) who suggested for traditional finance markets players different portfolio financing strategies to manage credit risk by preferring equity financing at early and shifting towards debt in more mature stages to leverage the high potential of innovation. Other sources as i.e. capital gain taxes which could increase ST access to finance as the tax benefit is captured by investors and invested into other ST as showed by research of Edwards and Todtenhaupt (2020) could be used as well.

3. Data and methodology

Data sources. ST legal registry codes were received from the public authority in LT "Innovation agency", the ST association in LV "Startin.lv", and extracted from the website of the public agency in EE "Startupestonia." Firms operational and financial data was extracted from the open sources of the national registry systems: "Lithuanian Registry Centre", "Lithuanian State Social Insurance Fund", "Estonian Open Government Data Portal", and "Latvian Open Data Portal" for all available periods. Hitech and knowledge intensive (HT) control group was selected out based on the firms' economic activities codes corresponding to the aggregated industrial codes (NACE) from Annex 3 – High-tech aggregation by NACE Rev.2" and "Aggregations of services based on NACE Rev 1.1" redactions by EUROSTAT. HT group of firms was filtered out by economic activity codes, which are attributed to the high- tech industries, other group of companies was called ALL. As economic activity codes were available only in LT and EE, so only two enterprises groups (ST and ALL) were compared for LV: in total 8 different pooled cross-sectional datasets. Only the firms with legal status of joint stock company or closed joint stock company were selected. For summary of the observations, see Table 1.

Table 1. Number of observations in research groups

Country (time period of the data)	ST	HT	ALL
Lithuania (2011–2022)	5110	289 411	819 584
Latvia (2014–2022)	4801		1 337 294
Estonia (2020–2022)	2701	289 411	547 301

Collected variables

From the firm's financial accounts data following indicators for all available periods were extracted:

1. Firms' registration year (RY).
2. Number of employees (EMPL) – average annual number.
3. Turnover (TRN) – annual, in euros.
4. Equity (EQT) – annual, in euros.
5. Total liabilities (LBL) – annual, in euros.
6. Earnings before interest and taxes (EBIT) – annual, in euros.
7. Total assets (TA) – annual, in euros.

Financial data from primary sources contains extreme values. These outliers can distort the mean, making it an unreliable indicator of the "typical" value in the data. Trimming a percentage of the extreme values (both from the top and bottom) helps to reduce the skewness caused by these outliers, providing a more accurate reflection of the central trend in the data. Due to heavy-tailed distribution of the datapoints, it was decided for the exploratory analysis to use trimmed data:

$$\bar{X}\ \text{trimmed} = \frac{1}{n-2k}\sum_{i=k+1}^{n-k} x_i, \tag{1}$$

where n is the total number of observations in the data set; k is the number of observations removed from each end of the data set (for 10% trimming at each end, $k = 0.1\times n$); $x(i)$ is the i^{th} data point in the sorted data set.

Calculated variables

Firms' annual financial performance variables (calculated for every observation for respective period):

1. Firm's age, number of years:

$$\text{Age}_i = \text{Year}_{i.t} - \text{RY}_i, \tag{2}$$

Year – year of the datapoint; RY – registration year of the firm.

2. Average annual turnover growth, %:

$$TRN\_GR_{avg} = \frac{1}{i}\sum_{n=1}^{i}\left(\frac{TRN_{t,n} - TRN_{t-1,n}}{TRN_{t-1,n}}\right)\times 100. \quad (3)$$

3. EBIT margin, %

$$EBIT\_MRG_{avg} = \frac{1}{i}\sum_{n=1}^{i}\left(\frac{EBIT_{t-1,n}}{TRN_{t-1,n}}\right)\times 100, \quad (4)$$

EBIT – firm's annual profit before taxes; TRN – firm's annual turnover.

4. Average annual debt to equity (DTE) ratio, %

$$DTE_{avg} = \frac{1}{i}\sum_{n=1}^{i}\left(\frac{LBL_{t-1,n}}{EQT_{t-1,n}}\right)\times 100, \quad (5)$$

LBL – firm's annual total liabilities; EQT – firm's annual equity.

5. Average annual debt to assets (DTA) ratio, %

$$DTA_{avg} = \frac{1}{i}\sum_{n=1}^{i}\left(\frac{LBL_{t-1,n}}{TA_{t-1,n}}\right)\times 100, \quad (6)$$

LBL – firm's annual total liabilities; TA – firm's annual total assets.

6. Average annual return on equity (ROE), %

For operational efficiency metrics we decided to use EBIT instead of net profit as EBIT allows for a more standardized comparison of financial performance across different enterprise groups and countries, eliminating the effects of non-operational factors like taxes and interest, which can vary widely between jurisdictions and capital structures.

$$ROE_{avg} = \frac{1}{i}\sum_{n=1}^{i}\left(\frac{EBIT_{t-1,n}}{EQT_{t-1,n}}\right)\times 100, \quad (7)$$

EBIT – firm's annual profit before taxes; EQT – firm's annual equity.

Average annual return on assets (ROA), %

$$ROA_{avg} = \frac{1}{i}\sum_{n=1}^{i}\left(\frac{EBIT_{t-1,n}}{TA_{t-1,n}}\right)\times 100, \quad (8)$$

EBIT – firm's annual profit before taxes; TA – firm's annual total assets.

Comparative analysis

To test our hypothesis three enterprise categories (ST, HT and ALL) datasets we segmented into 11 age groups ranging from the age up to 1 to more than 10 years and performed comparative analysis. Indicators trimmed mean values were used.

Correlation analysis

Spearman correlation, suitable to handle skewed distributions and less affected by outliers, was performed for pairs of variables. Spearman correlation evaluates monotonic relationships, which does not need to be linear.

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)}, \quad (9)$$

where ρ – Spearman's correlation coefficient rho, d_i – difference between the ranks of corresponding values, n – number of observations.

As significant we analysed only moderate and strong values of Spearman's rho:

Moderate correlation: $0.3 < \rho < 0.6$ or $-0.3 < \rho < -0.6$;

Strong correlation: $0.6 < \rho < 1$ or $-0.5 < \rho < -1$.

4. Results

4.1. Comparative analysis

Turnover growth

All age ST exhibit positive and high growth rates in comparison with other groups. Especially high growth is in the first 4 years, slows down in the 5th to 7th year and catches up with HT and ALL at around 10th year, however in LV ST manage to keep more stable growth and outpace other companies even in the more than 10 years old age group, see Figure 1.

EBIT margin

Heterogenous EBIT margin trajectories for ST within LT, LV and EE emerges across the observed timelines. Despite the country-specific variations in EBIT margin development, a convergent trend is evident at the inflection points occurring in the 5th and 6th years. In LT ST have a volatile

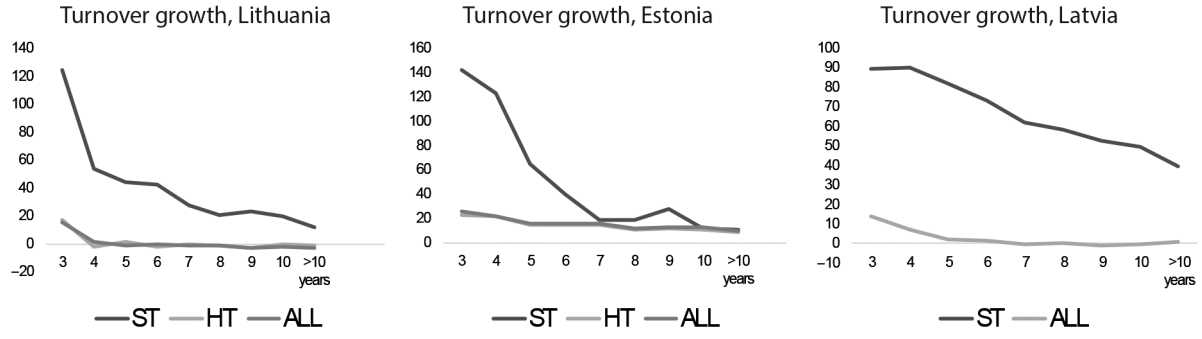

Figure 1. Average annual turnover growth (%) in age groups for startups (ST), hi-tech (HT) and all other firms (ALL)

but generally increasing EBIT margin. Higher volatility in EE could be explained the period of the data collected – for EE it was Covid 19 pandemia period (2020–2022) which might have influence on the profitability indicators, see Figure 2.

ROA and ROE

ROA for ST is lower and negative in the initial stages compared to other groups, except LV case, but improve as ST grow, indicating that asset and equity utilization becomes more efficient over time. The trend in EE is highly erratic, with periods of negative returns, indicating inconsistencies in asset utilization efficiency, see Figure 3.

The ROE for ST in all three countries has a different pattern: in LT it fluctuates but remains around the same range, indicating stability in the returns generated on equity. EE ST have a decreasing ROE, suggesting they are generating less return on equity over time, same worsening returns on equity for ST in LV, see Figure 4.

In markets where there is a high expectation of growth, such as in technology-focused economies, as EE there may be more equity available. However, if the growth does not materialize as expected, ROE can decrease.

Capital structure (DTE and DTA)

Capital structure of ST in early stages show varying DTE ratios, which could indicate more equity financing or negative equity due to accumulated losses, see Figure 5.

ST often rely on equity financing in their early stages to fund growth without the burden of debt repayments.

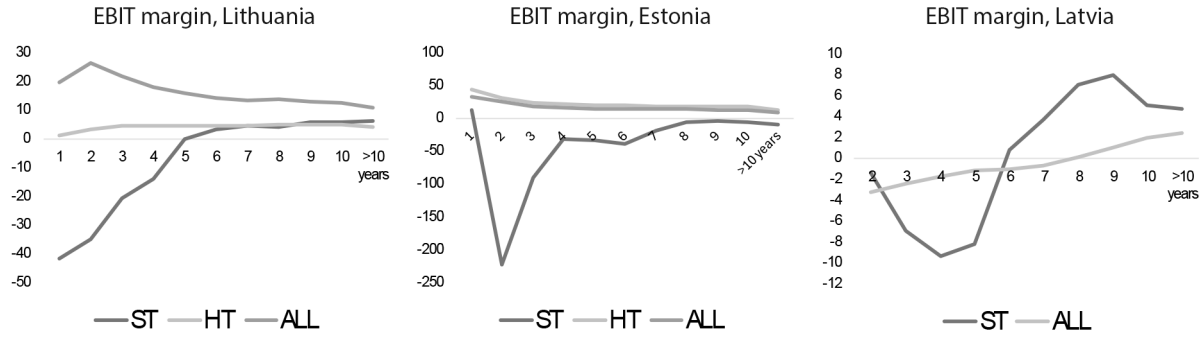

Figure 2. Average EBIT margin (%) in age groups for startups (ST), hi-tech (HT) and all other firms (ALL)

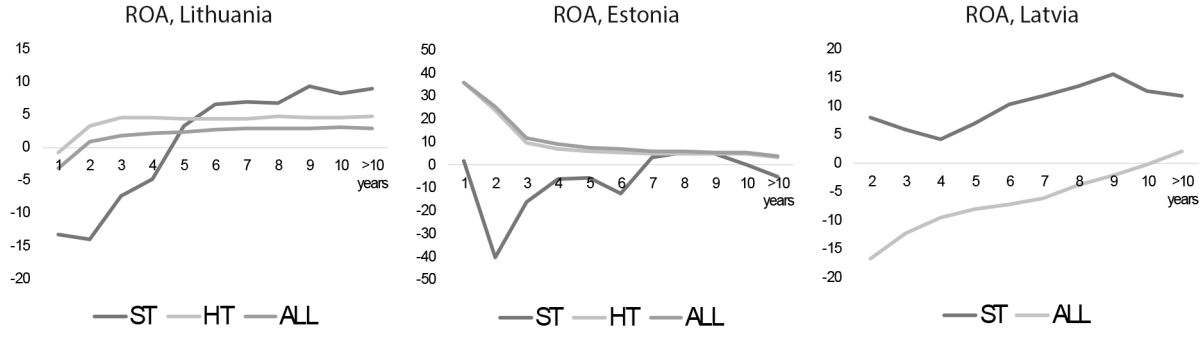

Figure 3. Average ROA (%) in age groups for startups (ST), hi-tech (HT) and all other firms (ALL)

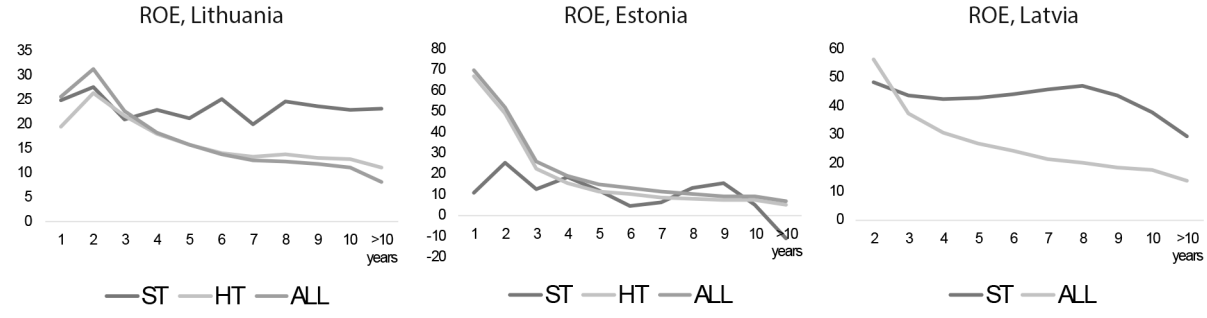

Figure 4. Average ROE (%) in age groups for startups (ST), hi-tech (HT) and all other firms (ALL)

ST with access to more equity investment may not need to rely as heavily on debt financing, which can lead to a lower debt-to-equity ratio. This can result in a more stable ROE, as seen in LT, where the ROE remain around the same range over the observed period.

The relatively high levels of both DTE and DTA suggest that LT ST are comfortable with taking on debt, which could imply a favourable lending environment or a strategic choice to leverage for growth, see Figure 6.

In all three countries DTE shows a general upward trend indicating that ST are increasingly relying on debt to finance their growth compared to equity, see Figure 7. Whereas DTA starts a decline but suggesting that over time, assets are increasingly financed through debt rather than equity or retained earnings.

Noticeable fluctuations in both DTE and DTA ratios in early stages could reflect the initial instability that is typical for ST they experiment with different financing structures and respond to the challenges of early-stage growth.

4.2. Correlation analysis

Moderate and strong correlation values in the Spearman correlation matrix for ST in LT, LV and EE suggest certain trends and relationships between various financial and operational metrics, see Figure 8.

TRN_GR (moderate positive) with TRN and ROE (only in EE), and with Age (moderate negative) in LT and EE. As ST age their growth slows down, but their performance improves in terms of better asset management. EBIT margin with ROA and EBIT (strong positive) and with EQT and ROE

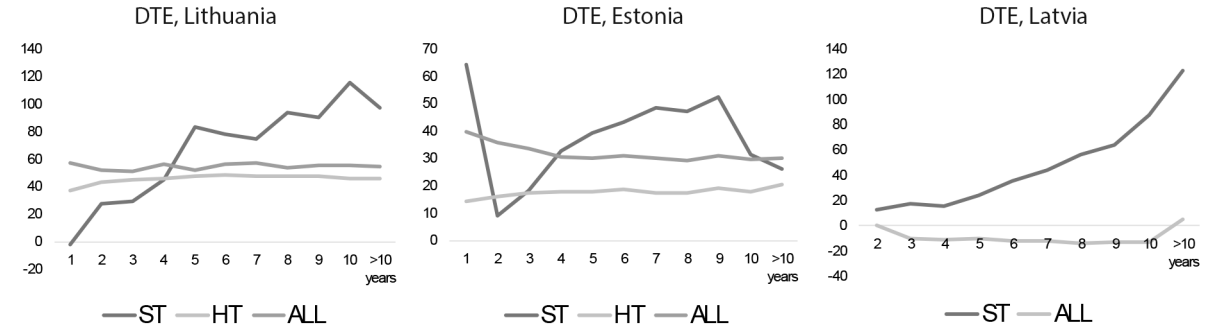

Figure 5. Average DTE (%) in age groups for startups (ST), hi-tech (HT) and all other firms (ALL)

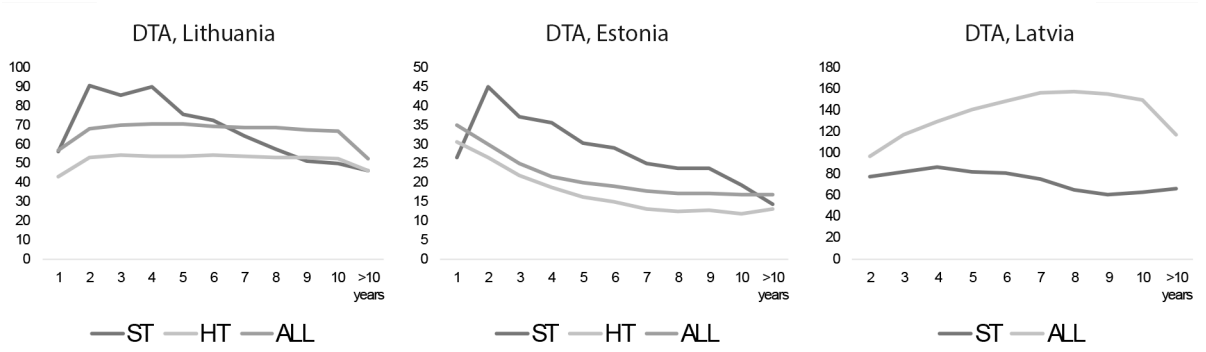

Figure 6. Average DTA (%) in age groups for startups (ST), hitech (HT) and all other firms (ALL)

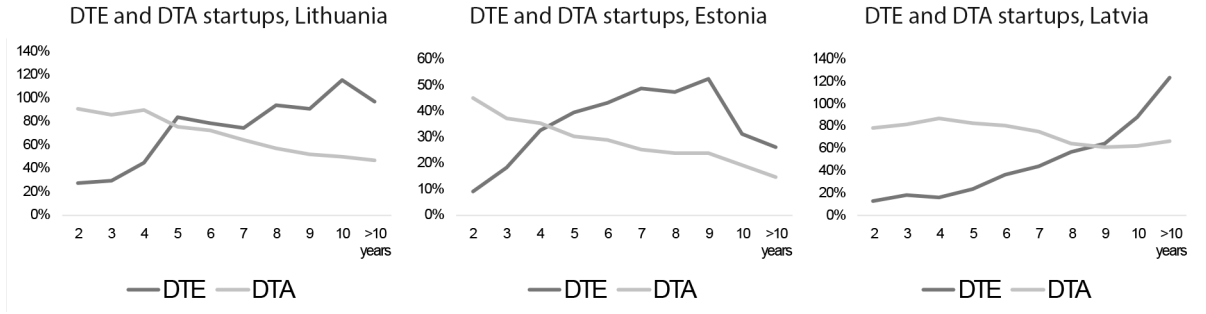

Figure 7. Comparison of DTE and DTA levels by age, only startup companies

Variable	TRN_GR			EBIT_MRG			EQT			DTE			DTA			ROA			ROE		
Country	LT	LV	EE	LT	LV	EE	LT	LV	EE	LT	LV	EE	LT	LV	EE	LT	LV	EE	LT	LV	EE
EMPL	0.04	0.00	0.13	0.14	-0.11	-0.12	0.49*	0.48*	0.44*	0.24	0.30*	0.19	0.01	-0.03	0.211	0.17	-0.13	-0.09	0.20	-0.12	-0.01
EQT	-0.01	0.02	0.05	0.39*	0.35*	0.25				0.47*	0.51*	0.30*	-0.48*	-0.67*	-0.25*	0.38*	0.31*	0.30*	0.02	-0.11	-0.11
LBL	0.10	0.03	0.15	-0.01	-0.21	-0.15	0.36*	0.35*	0.39*	0.31*	0.27	0.35*	0.44*	0.26	0.59*	-0.04	-0.27	-0.12	0.10	-0.17	0.04
EBIT	0.07	0.15	0.11	0.92**	0.82**	0.85**	0.48*	0.52*	0.31*	0.22*	0.23*	0.12	-0.29	-0.47*	-0.16*	0.91**	0.78**	0.85**	0.51*	0.37*	0.53*
TRN	0.16	0.14	0.25	0.30*	0.21	0.19	0.58*	0.62*	0.58*	0.31*	0.31*	0.22	-0.02	-0.27	0.16	0.31*	0.20	0.21	0.27	0.05	0.17
ROE	0.12	0.17	0.26	0.51*	0.37*	0.54*	0.02	-0.11	-0.11	-0.06	-0.08	-0.25	0.01	-0.08	0.05	0.52*	0.37*	0.58*			
EBIT_MRG	0.09	0.16	0.16				0.39*	0.35*	0.25	0.18	0.16	0.07	-0.34*	-0.48*	-0.22*	0.95**	0.89**	0.89**	0.51*	0.37*	0.54*
TA	0.07	0.05	0.14	0.17	0.05	0.00	0.69**	0.71**	0.70**	0.35*	0.35*	0.20	-0.04	-0.24	0.08	0.14	0.00	0.05	0.11	-0.13	0.04
ROA	0.09	0.16	0.21	0.95**	0.89**	0.89**	0.38*	0.31*	0.30*	0.18	0.15	0.09	-0.36*	-0.49*	-0.25				0.52*	0.37*	0.58*
DTE	0.08	0.06	0.04	0.18	0.16	0.08	0.47*	0.51*	0.30*				0.03	-0.18	0.40*	0.18	0.15	0.09	-0.06	-0.08	-0.25
Age	-0.32*	-0.08	-0.29	0.22	0.02	0.07	0.30*	0.09	0.27	0.08	0.11	0.13	-0.21	-0.03	-0.07	0.21	0.03	0.04	0.05	-0.04	-0.11
TRN_GR				0.09	0.16	0.16	-0.01	0.02	0.05	0.08	0.06	0.04	0.08	0.00	0.09	0.09	0.16	0.21	0.12	0.17	0.26
DTA	0.08	0.00	0.09	-0.34*	-0.48*	-0.22	-0.48*	-0.67*	-0.25*	0.03	-0.18	0.39*				-0.35*	-0.49*	-0.25	0.01	-0.08	0.05

Figure 8. Spearman rank correlation coefficient r_s, *moderate ($0.3 \le r_s < 0.70$), **strong ($0.70 \le r_s < 1.0$)

(moderate positive). This suggests that as ST manage to earn more profit, they also tend to be more efficient with their assets and have better margins. EQT with TA (strong positive), with EMPL, LBL, EBIT, TRN, ROA, DTE (moderate positive), notably high positive correlation with total assets (TA) in all three countries, implying that companies with more equity tend to have larger total assets, also it could reflect the equity significance in the later growth stages, when ST grow in terms of TRN, EMPL and LBL. This could be also illustrated by the moderate positive correlation between DTE and EQT, LBL and TA. There are also negative correlations to consider, especially the moderate negative relationship between DTA and EBIT, EBIT margin, EQT and ROA, especially in Latvia and Estonia. This indicates that a higher proportion of debt relative to assets is associated with lower profitability and ROA.

5. Conclusions and discussion

Profitability ratios. EBIT margin trajectories for ST vary across countries, with fluctuations in early years followed by more stable or convergent patterns around the 5th and 6th years. Development of the innovative products in ST requires high initial investment costs, which is reflected by negative EBIT margins in the initial stages of the development. ST prioritize rapid expansion, often sacrificing short-term profitability for long-term market share and growth potential. The investment phase for ST, reflected in their lower profitability metrics, is critical for innovation and disruption in the market. The volatility in EE EBIT margin and ROA might suggest that EE ST are more willing to take risks, possibly investing in high-potential projects that may not always yield immediate returns. ROA for startups improves with age, transitioning from negative or low returns to more efficient asset utilization over time. However, in EE, the trend is more erratic, likely due to economic disruptions like the Covid-19 pandemic (EE data was available only for 2020–2022). ROE also demonstrates variability: while it stabilizes over time in LT, it decreases in EE and LV, indicating reduced returns on equity, potentially due to challenges in generating expected growth. A moderate positive correlation between turnover growth and other performance indicators like ROE (particularly in EE) suggests that as ST age, their growth slows down, but their financial performance tends to improve. Strong positive correlations between EBIT margin, ROA, and other profitability measures indicate that more profitable startups also tend to have better asset utilization and margin efficiency. The negative initial ROA and fluctuating ROE across countries suggest challenges in early-stage profitability. What strategies can be adopted by startups to improve asset and equity utilization more effectively during these early stages?

Capital structure. All 3 countries show a general trend of increasing leverage over time, with ST relying more heavily on debt as they mature. The reasons behind these patterns could vary, including the stage of business development, the cost of debt versus equity, risk tolerance of business owners, high levels of debt relative to equity and assets can indicate either a healthy use of leverage to facilitate growth or a potential risk if the debt levels are unsustainable. The higher DTE and DTA ratios in ST suggest a higher financial risk. This could impact their ability to secure future funding. However, investors often accept higher risk in ST due to the potential for high returns. In every country, there are periods where the DTE and DTA ratios diverge from each other: after 5 years of development in LT and EE and after 9 years in LV, indicating that the capital structures are changing, not just in the level of debt but also in how that debt relates to both equity and assets. Different use of debt can be influenced by interest rates and the availability of credit. In periods or regions where credit is cheaper or more accessible, ST might opt for debt over equity to preserve ownership and control. LV increasing reliance on debt (as shown by DTE and DTA) could imply either a more aggressive growth strategy using leverage or potentially a challenging environment for equity financing. Equity shows a strong positive correlation with total assets and a moderate positive correlation with debt levels, indicating that as ST grow in assets and equity,

they also tend to take on more debt. Negative correlations, particularly between DTA and profitability measures (EBIT, EBIT margin, ROA), highlight that higher debt relative to assets is associated with lower profitability, especially in LV and EE. The correlation between high DTA and lower profitability in LV and EE indicates a potential financial risk. What policies or financial strategies could mitigate this risk while supporting growth?

Overall, the comparative and correlation analysis reveal that the financial performance and capital structure of ST evolve significantly over time, with notable country-specific differences. The relationship between financial indicators suggests that profitability, growth, and financing strategies are deeply interconnected, with early-stage growth being equity-driven and later stages marked by a greater reliance on debt. These dynamics highlight the need for balanced financial strategies to ensure sustainable growth and profitability. What roles do country-specific financial policies, economic conditions, and lending environments play in shaping the capital structure and financial performance of ST? And how can these differences be leveraged to create a supportive ecosystem for ST? I.e. the data indicates a high level of reliance on debt in LT startups. How does this reliance on debt impact long-term financial stability, and how does the lending environment influence these financing choices? One of the options could be to encourage a balance between debt and equity financing for STby offering tax incentives for equity investment and low-interest loan programs. This can reduce the over-reliance on debt and mitigate financial risks, especially for STin their early stages. Other option – to implement policies that encourage banks and financial institutions to create ST friendly lending products, such as flexible repayment schedules, lower collateral requirements, and loan guarantees and apply credit risk assessment frameworks that consider the unique nature of ST, allowing them better access to debt financing. Or in Estonia (EE) where volatility in financial performance and a higher risk of over-leverage are present, implement policies that support financial stability by incentivizing equity financing and offering debt restructuring programs for STstruggling with profitability.

References

Albert, C., & Caggese, A. (2021). Economics working paper series cyclical fluctuations, financial shocks, and the entry of fast-growing entrepreneurial startups cyclical fluctuations, financial shocks, and the entry of fast-growing entrepreneurial startups. *The Review of Financial Studies, 34*(5), 2508–2548. https://doi.org/10.1093/rfs/hhaa112

Albuquerque, R., & Hopenhayn, H. A. (2004). Optimal lending contracts and firm dynamics. *Review of Economic Studies*, *71*(2), 285–315. https://doi.org/10.2139/ssrn.273255

Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2016). Financing of working capital requirement, financial flexibility and SME performance. *Journal of Business Economics and Management, 17*(6), 1189–1204. https://doi.org/10.3846/16111699.2015.1081272

Bolton, P., Wang, N., & Yang, J. (2019). Investment under uncertainty with financial constraints. *Journal of Economic Theory*, *184*, Article 104912. https://doi.org/10.1016/j.jet.2019.06.008

Bonanno, G., Ferrando, A., & Rossi, S. P. S. (2023). Do innovation and financial constraints affect the profit efficiency of European enterprises? *Eurasian Business Review*, *13*, 57–86. https://doi.org/10.1007/s40821-022-00226-z

Cappa, F., Cetrini, G., & Oriani, R. (2020). The impact of corporate strategy on capital structure: Evidence from Italian listed firms. *The Quarterly Review of Economics and Finance*, *76*(C), 379–385. https://doi.org/10.1016/j.qref.2019.09.005

Cassar, G., & Holmes, S. (2003). Capital structure and financing of SMEs: Australian evidence. *Accounting and Finance*, *43*(2), 123–147. https://doi.org/10.1111/1467-629X.t01-1-00085

Chung, W. Y., Lee, J. G., Seo, J., Kim, J., Jo, Y., & Lee, D. (2022). From whom should ICT startups raise capital? The effect of ownership structure on efficiency in new ICT startups. *International Review of Economics and Finance*, *82*, 82–91. https://doi.org/10.1016/j.iref.2022.06.010

Coleman, S., Cotei, C., & Farhat, J. (2016). The debt-equity financing decisions of U.S. startup firms. *Journal of Economics and Finance*, *40*, 105–126. https://doi.org/10.1007/s12197-014-9293-3

De Haas, R., Sterk, V., & van Horen, N. (2022). Start-up types and macroeconomic performance in Europe (Staff Working Paper No. 986). *SSRN*. https://doi.org/10.2139/ssrn.4168872

Derrien, F., Mésonnier, J.-S., & Vuillemey, G. (2021). *Set-up costs and the financing of young firms* (Working papers 792). Banque de France. https://doi.org/10.2139/ssrn.3771327

Edwards, A., & Todtenhaupt, M. (2020). Capital gains taxation and funding for start-ups. *Journal of Financial Economics*, *138*(2), 549–571. https://doi.org/10.1016/j.jfineco.2020.06.009

Ferrucci, E., Guida, R., & Meliciani, V. (2021). Financial constraints and the growth and survival of innovative start-ups: An analysis of Italian firms. *European Financial Management, 27*(2), 364–386. https://doi.org/10.1111/eufm.12277

Filho, P. C. S., Siluk, J. C. M., de Freitas Michelin, C., Rigo, P. D., Júnior, A. L. N., Rosa, C. B., & da Silva, W. V. (2024). A measurement tool for the competitiveness of startups' innovation ecosystem. *Journal of the Knowledge Economy*, *15*(2), 8262–8289. https://doi.org/10.1007/s13132-023-01170-7

Frid, C. J., Wyman, D. M., Gartner, W. B., & Hechavarria, D. H. (2016). Low-wealth entrepreneurs and access to external financing. *International Journal of Entrepreneurial Behavior & Research*, *22*(4), 531–555. https://doi.org/10.1108/IJEBR-08-2015-0173

Fuertes-Callén, Y., Cuellar-Fernández, B., & Serrano-Cinca, C. (2022). Predicting startup survival using first years financial statements. *Journal of Small Business Management*, *60*(6), 1314–1350. https://doi.org/10.1080/00472778.2020.1750302

Gabrielsson, M., & Manek Kirpalani, V. H. (2004). Born globals: How to reach new business space rapidly. *International Business Review*, *13*(5), 555–571. https://doi.org/10.1016/j.ibusrev.2004.03.005

Giaretta, E., & Chesini, G. (2021). The determinants of debt financing: The case of fintech start-ups. *Journal of Innovation and Knowledge*, *6*(4), 268–279. https://doi.org/10.1016/j.jik.2021.10.001

Gomezel, A. S. (2022). Firm characteristics, debt maturity structure, and innovation performance of small firms. *Dynamic Relationships Management Journal*, *11*(1), 3–15. https://doi.org/10.17708/DRMJ.2022.v11n01a01

Honjo, Y., Ono, A., & Tsuruta, D. (2024). The effect of physical collateral and personal guarantees on business startups. *Journal of Economics and Business*, *130,* Article 106172. https://doi.org/10.1016/j.jeconbus.2024.106172

Hyun, S., & Lee, H. S. (2022). Positive effects of portfolio financing strategy for startups. *Economic Analysis and Policy*, *74*, 623–633. https://doi.org/10.1016/j.eap.2022.03.017

Kerr, W. R., & Nanda, R. (2010). Banking deregulations, financing-constraints, and firm entry size. *Journal of the European Economic Association*, *8*(2/3), 582–593. https://doi.org/10.1111/j.1542-4774.2010.tb00528.x

Khanna, N., & Mathews, R. D. (2022). Skill versus reliability in venture capital. *Journal of Financial Economics*, *145*(2), 41–63. https://doi.org/10.1016/j.jfineco.2021.07.007

Koed Madsen, T., Rasmussen, E., & Servais, P. (2000). Differences and similarities between born globals and other types of exporters. In A. Yaprak & H. Tutek (Eds.), *Globalization, the multinational firm, and emerging economies. Advances in international marketing* (Vol. 10, pp. 247–265). Emerald Group Publishing Limited. https://doi.org/10.1016/S1474-7979(00)10013-4

Lang, L., Ofekb, E., & Stulz, R. (1996). Leverage, investment, and firm growth. *Journal of Financial Economics, 40*(1), 3–29. https://doi.org/10.1016/0304-405X(95)00842-3

Lietuvos Respublikos Seimas. (2019). Law of the Republic of Lithuania on Small and Medium-sized Business Development (amendment to the 2,8,9 articles). *TAR*, 2019-06-19, Nr. 9827.

Ling Ng, Y., Theng Lau, W., Ni Soh, W., & Ab Razak, N. H. (2024). Financial constraints to firm growth: The role of firm age in ASEAN–6 countries. *Comparative Economic Research. Central and Eastern Europe*, *27*(1), 93–111. https://doi.org/10.18778/1508-2008.27.05

Manigart, S., & Struyf, C. (1997). Financing high technology start-ups in Belgium: An explorative study. *Small Business Economics*, *9*, 125–135. https://doi.org/10.1023/A:1007967722346

Mattsson, L.-G., & Andersson, P. (2019). Private-public interaction in public service innovation processes-business model challenges for a start-up EdTech firm. *Journal of Business & Industrial Marketing*, *34*(5), 1106–1118. https://doi.org/10.1108/JBIM-10-2018-0297

Myers, S. C. (1984). Capital structure puzzle. *Journal of Finance*, *39*(3), 575–592. https://doi.org/10.2307/2327916

Newman, A., Gunessee, S., & Hilton, B. (2012). Applicability of financial theories of capital structure to the Chinese cultural context: A study of privately owned SMEs. *International Small Business Journal*, *30*(1), 65–83. https://doi.org/10.1177/0266242610370977

Neville, C., & Lucey, B. M. (2022). Financing Irish high-tech SMEs: The analysis of capital structure. *International Review of Financial Analysis*, *83*, Article 102219. https://doi.org/10.1016/j.irfa.2022.102219

Okunevičiūtė Neverauskienė, L., & Pranskevičiūtė, I. (2021a). Hybridity of social enterprise models and ecosystems. *Journal of International Studies*, *14*(1), 41–59. https://doi.org/10.14254/2071-8330.2021/14-1/3

Okunevičiūtė Neverauskienė, L., Danilevičienė, I., & Rutkauskas, A. V. (2021b). Portfolio of macroeconomic processes as a tool of the country's economic efficiency management. *Transformations in Business and Economics*, *20*(2), 62–84.

Okunevičiūtė Neverauskienė, L., & Kleponė, D. (2024a). Empirical evidence on the startup growth in the Baltic Region high tech landscape. *Transformations in Business & Economics*, *23*(63A), 1164–1191.

Okunevičiūtė Neverauskienė, L., Ginevičius, R., & Danilevičienė, I. (2024b). The influence of wage and employment on competitiveness: An assessment. *Journal of Competitiveness*, *16*(4), 83–105.

Opuala-Charles, S., Omoke, P. C., & Uche, E. (2023). The dynamic role of financial development in analyzing the N-shaped tourism-led growth hypothesis in Mauritius. *Journal of the Knowledge Economy*, *14*(4), 4903–4928. https://doi.org/10.1007/s13132-022-01048-0

Rajaiya, H. (2023). Innovation success and capital structure. *Journal of Corporate Finance, 79*, Article 102345. https://doi.org/10.1016/j.jcorpfin.2022.102345

Robb, A. M., & Robinson, D. T. (2014). The capital structure decisions of new firms. *The Review of Financial Studies*, *27*(1), 153–179. https://doi.org/10.1093/rfs/hhs072

Serrasqueiro, Z., Pinto, B., & Sardo, F. (2023). SMEs growth and profitability, productivity and debt relationships. *Journal of Economics, Finance and Administrative Science*, *28*(56), 404–419. https://doi.org/10.1108/JEFAS-01-2022-0018

Somya, S., & Saripalle, M. (2023). The determinants of firm's growth in the telecommunication services industry: Empirical evidence from India. *Journal of Quantitative Economics*, *21*(1), 193–211. https://doi.org/10.1007/s40953-022-00334-7

Tong, Y., & Saladrigues, R. (2023). The influence of intellectual capital on the financial performance of Spanish new firms. *Montenegrin Journal of Economics*, *19*(2), 179–188. https://doi.org/10.14254/1800-5845/2023.19-2.15

Zhu, X., & Kim, J. (2023). Financial development and innovation: The role of market structure. *Journal of Money, Credit and Banking*. https://doi.org/10.1111/jmcb.13125