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Article

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Is financial constraint an impediment to Firm's high growth?☆

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ABSTRACT

This paper investigates how financial constraints impede firms' ability to achieve high growth. Using a comprehensive panel dataset of Turkish firms from 2012 to 2021, we analyze the relationship between short-term debt intensity — our proxy for financial constraints — and firms' likelihood of becoming high-growth enterprises, measured by turnover and employment expansion. Employing rigorous econometric techniques, including fixed-effects logit, instrumental variable estimations, and dynamic panel GMM, we find that higher short-term debt significantly reduces the probability of high growth. Our findings highlight the crucial role of external financial frictions in shaping firm growth dynamics, particularly in emerging markets characterized by underdeveloped long-term credit markets. These results offer new insights into the broader literature on high-growth firms by integrating external financing constraints into the growth narrative.

1. Introduction

Credit constraints have long been recognized as a major focus of both macroeconomic and microeconomic research due to their significant impact on firms and the economy as a whole. Neoclassical theory assumes a perfect credit market in which a firm's investment, hiring and expansion decisions are unaffected by the financial constraints it faces (Modigliani & Miller, 1958), but this ideal is not always realized in real markets. The inherent imperfections of real markets, such as information asymmetries, borrowing costs and limited access to external finance, create significant problems that are reflected both at the firm level and in macroeconomic outcomes (Stiglitz & Weiss, 1981). These distortions not only increase economic volatility, but also constrain employment and output by limiting the ability of firms to pursue growth opportunities, especially in sectors that rely heavily on external financing (Pagano & Pica, 2012). Therefore, in addition to the impact of financial constraints on macro variables, their micro effects should also be assessed.

In addition to limiting the ability to finance innovation, capital expansion and market entry and to invest in fixed capital (Winker, 1999), financial constraints can also reduce financial flexibility and make it difficult to adapt to market conditions (Arslan-Ayaydin et al., 2014). As a result, financially constrained firms tend to grow more

slowly and their competitive characteristics suffer. SMEs, which are more vulnerable in terms of financial constraints, experience growth problems due to financial constraints in terms of innovation and productivity despite being at the center of the economy (Beck et al., 2005; Öztürk & Mrkaic, 2014). Moreover, this vulnerability increases as credit constraints increase during periods of economic contraction for SMEs as well as other firms that are highly dependent on external credit. Thus, these dynamics provide explanatory insights into how access to financial resources supports firm growth. Moreover, it is important to note that firms need to overcome these structural challenges in order to realize and sustain growth (Coad & Hölzl, 2012).

Although firm growth is affected by various factors, financial constraints stand out as one of the most significant barriers to sustainable growth. Firms facing financial constraints often face problems in obtaining external financing, which limits their long-term expansion opportunities (Whited & Wu, 2006). In addition, these constraints limit firms' access to investment opportunities, hinder their ability to innovate (Savnac, 2008) and reduce their ability to compete effectively in both domestic and international markets (Beck et al., 2005). Overcoming these challenges is critical not only for improving firm performance, but also for guiding policymakers in formulating policies that support growth-oriented ecosystems and ensure long-term economic resilience. While it is not easy to identify precise and reliable measures

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that accurately capture financial constraints at the firm level, debt maturity has become a widely accepted indicator of financial constraints (Demirgüç-Kunt & Maksimovic, 1999; Almeida et al., 2004).

Single indicator variables as a financial constraint have been criticized for reducing a firm's financial constraint to a single indicator and for not including other heterogeneous factors across firms. Instead, indices are constructed that use several indicators simultaneously. The advantage of indices is that they summarize various aspects of the different financial structure of companies in a single indicator and allow capturing the degree of financial constraints unlike binary classification (Bottazzi et al., 2014). In this context, the Kaplan and Zingales (1997) index has been pioneering and later, Lamont et al. (2001) and Baker et al. (2003) developed the KZ index. In addition, Cleary (1999), Whited and Wu (2006) and Mulier et al. (2016) have developed new financial constraints indices with country-specific and subjective criteria. However, the application of these indices for Türkiye may be problematic due to various ratios such as dividend payout, firm market capitalization, and cash flow, for which micro data are not yet available and cannot be calculated for all firms. For these reasons, instead of firm-specific indicators such as age, tangibility, debt ratio and the above-mentioned indices, the share of short-term debt in total debt, which affects the growth of firms and reduces the enjoining problem for financial constraint, is taken as a financial constraint indicator.

In particular, short-term debt is closely associated with urgent liquidity needs and increased rollover risks, which reduce financial flexibility and make firms more vulnerable to external shocks (Dangl and Zechner, 2021) and these challenges are particularly restrictive for high-growth firms that need resources to grow. Moreover, studies by Diamond and He (2014) and Acharya et al. (2011) explain that excessive reliance on short-term debt increases financial vulnerability, limits the ability to share risks, and hampers growth by restricting firms' ability to invest. In this context, we adopt an empirical approach to measure financial constraints based on the methodology introduced by Almeida et al. (2009) and used by Demirhan and Aldan (2021). This strategy, which focuses on the timing of long-term debt maturities and their short-term weight, has been widely applied in the literature to examine the relationship between financial constraints on labor and investment, including Benmelech et al. (2011). Specifically, we define financial constraints as the ratio of long-term debt maturing in a given year to a firm's total assets. This measure reflects the burden of upcoming debt obligations that firms should consider early in their planning process. The primary motivation for this approach is that firms with a higher ratio of maturing debt are more likely to face liquidity constraints, reducing their ability to allocate resources to growth-oriented activities. This measure is particularly effective in markets with underdeveloped credit markets, or where access to credit and resource allocation are more important, and provides important insights into how firms cope with financial difficulties in such environments.

Firm growth is critical for economic development and job creation. However, firms with high growth potential may have difficulties in realizing this potential due to financial constraints. Financial constraints can hinder firms' growth by limiting their ability to invest, innovate and compete in the market. This study aims to contribute to the literature by examining the relationship between financial constraints and high growth performance of firms in Türkiye. In the literature, financial constraints are usually analyzed with measures such as cash flow, profitability or access to credit (Fazzari et al., 1988; Kaplan & Zingales, 1997). However, this study uses short-term debt to total debt ratio as a measure of financial constraints and analyzes the impact of this measure on high growth for the first time. Moreover, firm growth is measured in two different ways as turnover growth and employee growth, which adds a new dimension to the literature. Another novelty of the study is that it compares the impact of financial constraints on different firms by conducting separate analyses for SMEs and large firms. Moreover, this is the first time that the impact of financial constraints is analyzed in such a detailed manner for "sectoral breakdowns" (manufacturing, services,

agriculture, energy and mining, construction, trade and tourism). In addition, separate analyses are conducted for exporter and non-exporter firms and high and low debt firms to reveal the impact of financial constraints on different firms. This study makes an important contribution to understanding the relationship between financial constraints and firm growth in a developing country by focusing on active and bank-loan borrowing firms in Türkiye. The findings will be instructive for policymakers and financial institutions to develop strategies to support firm growth.

This paper makes important contributions to the existing literature on financial constraints and firm growth. First, it is among the first studies to use short-term debt intensity as a financial constraint variable in a large dataset of about 400,000 firms, using Birch's high-growth definition. This innovative approach allows for a more nuanced understanding of how financial constraints affect firm growth trajectories. Second, the study extends prior research by examining financial constraints across multiple dimensions, including manufacturing, export-oriented firms, SMEs and large and indebted firms. While previous research has largely emphasized the critical role of small and medium-sized enterprises (SMEs) in driving employment and economic dynamism, this study extends the scope by examining how financial constraints also affect larger firms. By distinguishing between firms of different sizes, the study also provides a more nuanced understanding of how financial constraints shape growth trajectories across scales and sectors. Third, this study explores the complex relationship between financial constraints and firm growth, with a particular focus on how high levels of debt (debt overhang) interact with financial constraints to impede growth. Using logistic regression models, we find that financial constraints significantly reduce the likelihood of achieving high-growth status, especially for highly leveraged firms. These findings provide empirical support for the debt overhang hypothesis, which suggests that excessive debt limits the ability of firms to allocate resources effectively to growth-oriented opportunities (Stiglitz and Weiss, 1981).

This study also offers a novel application of the analysis of high-growth firms in Türkiye and provides valuable insights into the determinants of high-growth firms in a developing economy. It addresses the unique challenges faced by firms operating in an environment where financial markets are underdeveloped and access to credit is limited. Unlike previous research, this study integrates balance sheet data and credit records to create a comprehensive measure of financial constraints, with a particular focus on short-term debt intensity. In doing so, it sheds light on how financial constraints affect firm growth and contributes to the broader global discourse on firm performance by providing evidence from a dynamic yet financially constrained business environment. The findings underscore the urgent need for tailored financial policies and structural reforms to mitigate barriers that limit firms' access to credit. These findings are particularly important for high-growth firms and sectors that are highly leveraged or export-dependent. By examining debt dynamics in depth, the study not only advances the academic literature, but also provides actionable guidance for policymakers and stakeholders. By focusing on the economy of Türkiye, this study provides a robust framework for understanding the drivers of high-growth firms and makes an important contribution to promoting sustainable growth in developing economies.

In the following sections, Chapter 2 delves into the motivation behind this study, addressing the rationale for undertaking this research. Chapter 3 provides a comprehensive review of the literature on high-growth firms. Chapter 4 outlines the hypotheses and details the identification strategy along with the model specifications. Chapter 5 presents and analyzes the model results, examining various dimensions and subgroup effects. Finally, Chapter 6 concludes by highlighting the unique contributions and implications of the study.

2. The foundation of the study

This study is grounded in the Modigliani-Miller Approach (1958).

This theory particularly examines how capital structure influences the value of a firm. Modigliani and Miller contributed to making the theory of financial structure more comprehensible and established a significant paradigm in a world where firms strive to create value through combinations of debt and equity financing. The Modigliani-Miller Approach posits that a company's market value is independent of its capital structure. In other words, a firm's value depends solely on the value of its assets and expected cash flows, while the method of financing (debt or equity) does not affect this value. According to this theory, a firm's financing structure (the mix of debt and equity) does not alter its value, and market value is solely dependent on the future cash flows of assets and the risk associated with those cash flows.

In contrast to the Modigliani-Miller approach, the main hypothesis of our study is focused on exploring the relationship between short-term borrowing and firm growth. To express this more clearly and explicitly: as firms increase their short-term debt, their financial constraints grow. Firms with limited access to financing experience a negative impact on their growth. The supportive evidence for the negative effects of increased short-term debt on financial constraints and, consequently, on firm growth can be discussed through the following theories and literature.

- a Financial Constraints Theory: This theory can be examined, particularly through the "Financial Constraints Hypothesis" developed by (Fazzari et al., 1988). It suggests that companies can typically finance their growth potential through internal funds (equity), but access to external sources of finance (such as borrowing or issuing equity) is contingent upon certain conditions and financial constraints. The increase in short-term debt can restrict a firm's access to external financing sources, thereby raising financial constraints. This, in turn, can limit the firm's growth and investment decisions.
- b Pecking Order Theory: Developed by Myers and Majluf (1984), this theory proposes that firms have a hierarchical preference for financing, favoring internal sources over external sources. The increase in short-term debt may heighten firms' need for longer-term, more stable financing. In such cases, companies may face difficulties in securing external financing, as a high level of short-term debt can complicate access to capital.
- c Agency Theory: The rise in short-term debt typically implies higher interest rates and more frequent payment requirements. This situation can hinder firms, particularly those experiencing cash flow difficulties, from pursuing further borrowing and growth strategies. In light of Jensen and Meckling's (1976) theory, companies with a high debt load may lose financial flexibility and struggle to access the necessary resources to evaluate investment opportunities.

In academic literature, the ratio of a firm's short-term debt to its assets is a key indicator used to assess financial health, liquidity and payment capacity. This ratio is measured using liquidity ratios (such as the current ratio and acid-test ratio) and reflects the firm's ability to meet its short-term obligations. A high proportion of short-term debt can increase financial leverage risk, leading to payment difficulties. Additionally, it raises interest costs, which requires careful consideration in financing strategies. This ratio also affects debt servicing and firm value, providing insight into the overall financial performance.

In imperfect capital markets where Modigliani-Miller assumptions break down, firms relying more heavily on short-term debt face increased refinancing risks, greater exposure to liquidity shocks, and higher financial distress costs. Short-term debt dependence reflects a lack of access to stable, long-term financing, aligning with the Pecking Order Theory's assertion that financially constrained firms prefer internal financing and are forced to resort to short-term borrowing when external equity is costly. Therefore, short-term debt intensity serves not only as a contextually appropriate proxy in the Turkish environment (characterized by underdeveloped long-term credit markets) but also captures fundamental aspects of financial constraint theory.

This study aims to examine the negative effects of short-term debt on firm growth by questioning the impact of the Modigliani and Miller (1958) approach on financial structure. While Modigliani and Miller suggest that capital structure does not affect a company's value, our study argues that as short-term debt increases, firms face greater financial constraints, which limits their growth potential. Short-term debt can restrict firms' access to external financing sources, thereby limiting investment decisions and obstructing growth. This argument is supported by fundamental approaches in the literature, such as financial constraints theory, the pecking order theory and agency theory.

3. Literature review

The interaction between firm growth, capital structure and debt maturity has received extensive attention in the corporate finance literature. Although Modigliani and Miller (1958) argued that capital structure is irrelevant under perfect capital market assumptions, subsequent research has weakened this theory, highlighting emphasizes its limitations. Firms' financing costs significantly affect firms' decisions on capital structure and growth strategies (Baker & Wurgler, 2002; Myers & Majluf, 1984). Thus, capital structure decisions directly affect firm growth as they determine a firm's ability to access external financing and invest in growth opportunities. Debt maturity, an important component of capital structure, also plays a critical role in firm growth. Long-term debt maturity provides financial stability to a firm and reduces the frequency of refinancing, which in turn affects a firm's ability to pursue growth opportunities (Stohs & Mauer, 1996). As such, the study of capital structure and debt maturity with connection to firm growth offers valuable insights into how firms manage complex financial environments to achieve long-term success.

The existing literature provides insights on the positive and negative effects of debt maturity on firm performance: having longer-term debt can signal financial stability for the firm, mitigate the effects of information asymmetry and reduce the risk of refinancing costs (Diamond, 1991; Stulz, 2000). On the other hand, an increase in long-term debt burden can also create renegotiation difficulties and create financial pressure and constrain growth, especially in difficult economic times (Frank & Goyal, 2003; Lang et al., 1996). For firms seeking rapid growth, debt maturity decisions are particularly important because access to appropriate financing - whether short- or long-term - can shape growth trajectories. This relationship is particularly important in emerging economies where credit markets are less developed and access to finance is limited.

Financial constraints are one of the most important obstacles to firm growth, especially in developing economies with underdeveloped financial markets. Small and medium-sized enterprises (SMEs), which are often critical employers in these economies, have difficulty accessing financing due to high borrowing costs and stricter credit conditions (Ayyagari et al., 2011; Beck et al., 2005). Access to financing is also very important for export-oriented firms. Because export firms without sufficient financial resources cannot benefit from economies of scale and global demand and have difficulty maintaining their competitiveness in the international market (Beck et al., 2008; Bravo-Biosca et al., 2016). In addition to firm size and export status, another important factor is the examination of the relationship between firm sector and financial constraints. The manufacturing sector is particularly sensitive to financial constraints due to its capital-intensive nature that requires significant upfront investments in equipment, infrastructure and technology, and financial constraints limit the ability of firms with limited access to finance to increase productivity or expand their market presence (Rajan & Zingales, 1998; Carpenter & Petersen, 2002; Guariglia, 2008). Finally, overly indebted firms with excessive debt burdens often prioritize debt repayments over growth initiatives, further hindering their potential to achieve high growth (Diamond & He, 2014).

High-growth firms (HGFs), often referred to as "gazelles", play a critical role in boosting employment, innovation and economic

dynamism, despite accounting for a small share of the total firm population (Birch, 1987). These firms face high vulnerabilities to financial constraints due to their intensive capital needs to sustain rapid growth. Without adequate financing, HGFs are forced to scale down their operations, undermining their growth potential (Coad et al., 2014). Several studies have emphasized that access to resources is critical as it limits the capacity of high-growth firms to invest (Aivazian et al., 2012). This challenge is even more pronounced in developing and transition economies, where underdeveloped financial markets exacerbate these constraints. Addressing the financial constraints faced by HGFs is essential to ensure their contribution to broader economic growth.

While prior research on high-growth firms has primarily focused on internal firm characteristics (e.g., innovation, firm age, size, productivity) as key drivers of rapid expansion, the role of external financial frictions has received comparatively less systematic attention. Our study complements and extends this body of work by investigating how financial constraints — proxied through firms' reliance on short-term debt — inhibit high-growth potential, particularly in an emerging market setting.

By doing so, we contribute to a more comprehensive understanding of growth dynamics that incorporates the external financing environment, offering insights especially relevant for economies where credit market imperfections are pervasive.

While prior work establishes key determinants of high-growth firms, some unresolved debates motivate our study. First, existing studies use inconsistent growth metrics (e.g., Birch Index vs. OECD definitions), complicating cross-country comparisons. Our harmonized Birch-Strayer approach enables replication in emerging markets. Second, most evidence comes from developed economies (e.g., Bravo-Biosca et al., 2016), neglecting how credit market frictions in emerging economies (e.g., Türkiye's high short-term debt reliance) alter HGF trajectories. We extend Demirgüç-Kunt and Maksimovic's (1999) maturity mismatch framework to HGFs. Third, we reveal sectoral blind spots. Manufacturing dominates HGF studies (Henrekson and Johansson, 2011), despite services driving most of Turkey's employment. Our sectoral stratification reveals services' unique constraint dynamics.

This study offers several unique contributions to the literature on financial constraints and HGFs. Unlike previous studies that often rely on single data sources, this research combines balance sheet data and credit records to provide a comprehensive analysis of financial constraints, particularly focusing on short-term debt intensity. Additionally, while much of the existing research focuses on developed economies, this study examines Türkiye as a developing economy, providing valuable insights into the determinants of high-growth firms in a financial context with limited credit access. The study also explores the concept of debt overhang—high indebtedness that constrains growth—and its interaction with financial constraints, offering a fresh perspective on how short-term financial pressures affect firms with significant debt burdens. By incorporating sectoral differences, firm size and export orientation, the research highlights how financial constraints impact firms across diverse contexts.

The findings reveal that financial constraints significantly hinder the growth potential of SMEs, highly indebted firms and those in capital-intensive sectors like manufacturing. Exporting firms are also affected, though to a lesser degree compared to non-exporters. These insights emphasize the need for tailored financial policies and institutional reforms to address structural barriers in accessing credit. By focusing on the interplay between financial constraints and firm characteristics, this study contributes to a deeper understanding of the factors that shape high-growth firms and offers actionable recommendations for policymakers in similar developing economies.

4. Methodology and data

In this section, the independent variables used in the study are introduced, alongside the methodology employed to measure them and

the hypotheses required for the model are constructed. A detailed examination is conducted to provide a clearer understanding of growth dynamics through the use of independent variables. The choice of growth indicators is crucial, as it determines which variables are controlled and ensures the reliability and validity of the model's results. In this context, turnover and employment are widely used measures in the literature due to their availability, ease of accessibility and representation of firm-level dynamics (Delmar et al., 2003). Turnover, in particular, are preferred in this study because they are less sensitive to capital intensity and are available for a broader range of firms. By incorporating these measures and carefully designed variables, the study aims to provide robust insights into the determinants of firm growth, particularly in the context of financial constraints and sectoral differences.

The study adopts the Birch-Strayer Index as the primary metric for defining high-growth firms, adhering to the widely accepted OECD standard definition. This framework is grounded in growth metrics based on employment or turnover, offering a robust and standardized approach to analyzing firm growth dynamics. While prior research has employed a range of growth measures, inconsistencies in their application have often led to divergent findings and limited comparability across studies. As highlighted by Delmar (1997), the use of disparate growth metrics complicates efforts to draw robust conclusions, necessitating the adoption of a consistent and comprehensive measure.

To address this issue, the current study applies the Birch-Strayer Index (equation (1)), which emphasizes the use of a single and consistent metric. This approach enhances the reliability and validity of the analysis, ensuring a more accurate identification of high-growth firms. By focusing on employment and turnover growth over a specified period, the Birch-Strayer Index allows for a nuanced understanding of firm dynamics. Specifically, HGFs are defined as firms ranking in the top 10 % of all firms in terms of their growth trajectory, accounting for both relative and absolute growth measures (Acs & Mueller, 2008; Schreyer, 2000).

$$\text{Birch Index} = \left(\frac{x_t - x_{t-1}}{x_{t-1}} \right) \cdot \left(\frac{x_t}{x_{t-1}} \right) \quad (1)$$

In operationalizing this measure, the study considers both employment growth and turnover growth variables to capture a holistic view of firm expansion. The use of the Birch-Strayer Index not only strengthens the methodological rigor but also aligns with established standards in high-growth firm research, thereby contributing to a more unified understanding of growth patterns across different firm sizes and sectors.

Firm growth has been linked in the academic literature to certain firm-level characteristics, particularly age and size. These variables are widely recognized as important determinants of firm growth and the probability of achieving high growth status. Grounded in Gibrat's law, which suggests that firm size and age are independent of firm growth rate, this relationship has been further explored in various studies (Dunne et al., 1989; Evans, 1987; Geroski, 1995), which have shown that firm size and age are positively related to survival probabilities and growth rates, emphasizing that older and larger firms tend to survive and expand more reliably than their smaller and younger counterparts. Among the main drivers of firm growth, firm age also plays a particularly central role. There are also studies suggesting that firms grow slower as they age, due to factors such as reduced flexibility and more complex bureaucratic structures (Cabral & Mata, 2003). Building on these insights, this study contributes to a deeper understanding of firm dynamics and their implications for high growth potential by incorporating the combined effects of size and age on firm growth.

Export activity emerges as another critical determinant in high-growth firm models, significantly shaping the paths firms follow to achieve rapid expansion (Burger et al., 2013). From a globalization perspective, high-growth firms are often characterized by their focus on international markets and export-oriented strategies (Robson & Bennett,

2000). Engaging in exports provides access to larger markets, diversifies revenue streams and enables firms to benefit from economies of scale, all of which are essential for sustaining growth. Exporting also exposes firms to increasing global competition, stimulating innovation and competitiveness, which in turn forces efficiency improvements and strategic adaptation. Studies by [Atkin et al. \(2017\)](#) and [Cruz et al. \(2021\)](#) highlight the positive impact of export intensity and show that firms expanding into international markets achieve sustainable growth by overcoming domestic growth.

Cash and leverage are two interrelated factors that play an important role in shaping company growth, especially under financial constraints. Strong cash reserves not only enable companies to invest in growth opportunities without over-reliance on external financing ([Abraham et al., 2023](#); [Gill & Mathur, 2011](#)), but also contribute to growth by providing companies with the financial flexibility to finance expansion at lower costs ([Bianchini et al., 2017](#)). However, some studies also show that high cash holdings may lead managers to underinvest and underutilize resources, investing in products with lower returns ([Kalcheva & Lins, 2007](#); [Weidemann, 2018](#)). For high-growth firms, this feature is particularly important for capturing non-debt features of access to finance. While debt can serve as an important source of growth financing, overreliance on leverage increases financial risk and can limit a company's ability to pursue long-term growth initiatives. Companies burdened with high levels of debt face constraints in reallocating resources to innovation or expansion, especially during periods of economic uncertainty ([Beck & Demirgüç-Kunt, 2006](#)). There are also studies that show that high indebtedness contributes positively to firm growth through tax deductions, the opportunity to invest without equity and debt discipline ([Andrieu et al., 2021](#)). The balance between cash and leverage is therefore crucial, as firms with healthy liquidity are better able to manage their debt obligations while maintaining growth momentum.

Profitability is another important driver of firm growth, acting both as a source of internal financing and as a signal to attract external investors. Profitable firms have better access to capital at lower costs as their financial performance reduces perceived risks for lenders and investors ([Alchian, 1950](#); [Jang & Park, 2011](#)). At the same time, profitability minimizes debt dependence by generating internal resources for investment and expansion. Empirical research supports this view, with [Myers and Majluf \(1984\)](#) showing that profitability encourages higher levels of investment, which in turn supports growth. For HGFs, profitability not only finances rapid growth but also signals operational efficiency and competitiveness, further strengthening their ability to achieve high growth. In addition, by examining the role of operational profitability, this study sheds light on its dual function as both a driver and a facilitator of firm growth.

Tangibility, defined as the ratio of tangible assets to total assets, is another important factor affecting firm growth, especially when access to external finance is limited. Firms with higher levels of tangible assets are generally perceived as more creditworthy by lenders because these assets can act as collateral to reduce credit risks ([Fan et al., 2012](#)). However, the role of tangibility varies depending on firm size, sector and financial environment. For smaller firms or firms in financially constrained markets, higher tangibility may provide a distinct advantage by reducing borrowing costs and improving access to credit ([Almeida & Campello, 2007](#); [Berger & Udell, 1998](#)). In other words, tangibility provides a channel for investment and growth by increasing access to external finance for financially constrained firms.

Logit models, commonly referred to as logistic regression models, are a widely employed statistical tool for estimating the probability of an event occurring. They are particularly effective for binary outcomes, such as success versus failure, or categorical outcomes. The underlying mechanism of the logit model is the logistic function, which maps relationships between a binary dependent variable and multiple independent variables. This function outputs values between 0 and 1, making it ideal for modeling probabilities ([Hosmer et al., 2013](#)). In the

context of this study, the logit model is used to estimate the likelihood of a firm achieving high-growth status. This choice is particularly relevant given the nature of high-growth firms, which are defined by a binary outcome—whether a firm meets the criteria for high growth or not. By incorporating key firm-specific variables, such as size, leverage, tangibility, export intensity and financial constraints, the logit model provides a robust framework for analyzing categorical outcomes.

To further strengthen causal interpretation and mitigate endogeneity concerns (including reverse causality and omitted variable bias), we additionally employ a dynamic panel data estimation strategy by applying the Blundell-Bond System GMM estimator. The System GMM approach allows us to instrument potentially endogenous regressors (such as financial constraint measures) using their own lagged values, while simultaneously controlling for unobserved firm-specific heterogeneity and growth persistence via the inclusion of lagged dependent variables. This method is particularly well-suited for our panel dataset structure (large N, small T) and for contexts where financial variables may be simultaneously determined with firm growth outcomes. The validity of our instruments is confirmed through Sargan tests for over-identifying restrictions and Arellano-Bond AR(2) tests for absence of second-order autocorrelation. The System GMM results, discussed in detail in Section 5, reinforce the robustness of our main findings.

The selection of the logit model is further supported by its suitability for firm-level analysis in high-growth scenarios. High-growth status, as defined in this study, aligns with dichotomous outcomes that make logistic regression particularly well-suited. Additionally, the logit model accommodates the nonlinear relationships often observed between firm characteristics and growth probabilities. Its flexibility and interpretability have made it a preferred choice in prior studies examining firm growth dynamics and financial constraints ([Coat et al., 2014](#); [Greene, 2012](#)). The adoption of the logit model in this study not only ensures methodological robustness but also enhances the reliability of predicting firm growth. By controlling firm fixed effect, we absorb unobserved, time-invariant characteristics that could bias estimates and controlling time fixed effect, we absorb economy-wide effecting firm high growth. With controlling these effect, we also represent that our results reflect dynamics changes rather than static differences and also avoid spurious conclusions.

The logit function can be expressed as follows:

$$\text{logit}(P) = \log\left(\frac{P}{1-P}\right) = Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n \quad (2)$$

Here in equation (2), P represents the probability of the event occurring, 1-P is the probability of the event not occurring, Z is the linear combination of the independent variables weighted by their respective coefficients, B_0 is the intercept of the model and B_1, B_2, \dots, B_k are the coefficients for each independent variable X_1, X_2, \dots, X_n in the model. This equation allows for the estimation of the probability of an event (e.g., a firm becoming a high-growth firm) based on the independent variables included in the model. The logistic regression model obtained for the variables in our study is given below as equation (3).

$$\begin{aligned} \text{Logit}(P(\text{HGF} = 1 | x_1, x_2, x_3, x_4, x_5, x_6, x_7)) = & \beta_0 \\ & + \beta_1 \text{Financial Constraint}_{i,t-1} + \beta_2 \text{Age}_{i,t-1} + \beta_3 \text{Size}_{i,t-1} + \beta_4 \text{Cash}_{i,t-1} \\ & + \beta_5 \text{Leverage}_{i,t-1} + \beta_6 \text{Profitability}_{i,t-1} + \beta_7 \text{Export}_{i,t-1} \end{aligned} \quad (3)$$

This study demonstrates that the short-term debt-to-asset ratio, used as a proxy for financial constraints, effectively captures the degree of financial limitations faced by firms through an analysis of investment-cash flow sensitivity. By revising the model originally introduced by [Fazzari et al. \(1988\)](#), firm-specific variables were incorporated and the analysis was conducted using a fixed-effects panel regression approach. Correlation Matrix is share in Table E.

Examining firm growth dynamics requires consideration of firm-specific factors, which is a common approach in the literature.

However, one of the primary challenges in this area is the lack of access to comprehensive panel datasets. In this study, a rich dataset covering a 10-year period and a large number of firms is utilized, providing extensive coverage across various firm sizes. Notably, micro-enterprises are excluded from the analysis, as the study focuses on high-growth firms defined in terms of turnover and employment growth.

The firm-level data was obtained from the Revenue Administration and shared through the Central Bank of the Republic of Türkiye. The dataset includes annual firm-level financial statements, along with other relevant information such as sector, location and age of the firms. These datasets were merged to create a comprehensive panel dataset that encompasses all active and continuously operating firms with detailed monthly credit records.

To ensure data consistency, a series of manipulations was performed to construct the panel dataset. Specifically, firms with missing data on total assets, total debt, or gross sales below zero were excluded from the analysis. Additionally, the dependent and independent variables used in the study are summarized in Table 1, which provides a clear overview of the key variables employed in the analysis.

Before discussing the model results, it is essential to examine some basic descriptive statistics related to the dependent variables. In this context, the analysis includes all observations satisfying the high-growth criteria, measured by both turnover growth and employment growth. The descriptive statistics focus on the yearly changes in the number of firms meeting these criteria, as well as the differences in mean and median growth rates between high-growth firms and non-high-growth firms. Additionally, the annual number of observations and the growth distributions are presented in Table 2 for further clarity.

According to Table 2, the average growth rates of high-growth firms differ significantly from the average growth rates of non-high-growth firms. The differentiation in growth averages is also observed in the median data. High growth firms have grown by 113.40 % on average over the last 10 years, while non-high growth firms have grown by 7.4 %. A similar divergence is also observed in the median data and leads to a significant differentiation. In 2019, when high growth firms recorded the lowest growth averages, non-high growth firms grew negatively, i.e. they contracted. From this point of view, it is possible to say that both groups of firms generally grow in the same direction. On the other hand, although the growth data of firms that meet the high growth condition according to turnover increases do not differ from the other group as much as the firms that meet the high growth condition in terms of employee growth, it is possible to say that it is higher than the other group for each year. Similar differentiation is also observed in the median data. According to these results, when the data for the last 10 years are taken into account, realized turnover growth averaged 71.2 % for high growth firms and 17.5 % for non-high growth firms. The same

Table 1
Definitions of variables.

	Variable	Definition
Dependent variable	BS index employee HGF	If it is in the top 10 percent in terms of employee growth for the relevant year, assign 1; otherwise, assign 0.
	BS index turnover HGF	If it is in the top 10 percent in terms of turnover growth for the relevant year, assign 1; otherwise, assign 0.
Independent variable	Financial Constraint	Amount of long-term debt as a fraction of total assets that matures within the year
	Age	Difference in current year and foundation year plus 1
	Tangibility	Tangible fixed assets divided by total assets
	Size	Log of real total assets
	Cash	Liquid assets plus marketable securities divided by short-term liabilities
	Leverage	Financial liabilities plus trade debts divided by total assets
	Profitability	Operating profit divided by net sales
Export	Exports divided by gross sales	

directional movement between the two groups seen in headcount growth is not observed in turnover growth.

In addition, the descriptive statistics of high growth and non-high growth firms according to employee growth and turnover growth are given in Table 3.

To further validate the financial constraint proxy, we conduct a cash flow sensitivity analysis, following the approach of Fazzari et al. (1988). Specifically, we regress investment rates (measured as investment-to-assets and investment-to-capital ratios) on cash flow, firm characteristics (size, age, leverage, export share), the financial constraint proxy (short-term debt ratio), and the interaction term between cash flow and financial constraints. The results, reported in Appendix Table A, reveal that cash flow is positively and significantly associated with investment, as expected. Financial constraint proxy (short-term debt ratio) also enters positively and significantly, suggesting that more financially constrained firms adjust investment more sensitively. Crucially, the interaction term (Cash Flow × Financial Constraint) is negative and statistically significant, indicating that the investment–cash flow sensitivity decreases for firms facing tighter financial constraints. These findings are consistent with theoretical expectations and provide additional empirical support for the validity of our proposed proxy for financial constraints.

5. Empirical results

The choice between logit and probit models is a common consideration when analyzing binary outcomes, as both methods offer robust frameworks for estimating probabilities. In this study, the logit model was chosen due to its interpretability and widespread use in the literature for high-growth firm analysis. To ensure robustness, probit model results were also estimated and different Birch defined firm growth, falling into the 20 percent interval according to the highest growth are included in Table B. The results from both models were consistent, with no significant differences observed, reinforcing the reliability of the logit model. In addition, it was seen that the results for 25 percent, 50 percent and 75 percent did not change and the linear probability model results contained similar results, but they were not shared for brevity of the study.

For the main analysis, two types of high-growth firms were examined: those within the top 10 % of growth in terms of turnover and employment. A logit model was employed to predict the likelihood of firms achieving high-growth status. Initially, the model included firm fixed effects to account for unobserved heterogeneity across firms. Subsequently, a logit model with both firm and time fixed effects was used to capture variations over time while controlling for firm-specific characteristics. This approach ensures a comprehensive understanding of the determinants of high-growth firms and provides robust empirical insights into their growth dynamics.

The selection of subgroups (SMEs vs. large firms, exporters vs. non-exporters, and high vs. low indebtedness) is motivated by theoretical and empirical literature indicating differential exposure to financial frictions. SMEs and heavily indebted firms typically face higher borrowing constraints due to limited collateral and higher information asymmetries (Beck et al., 2005; Diamond & He, 2014), while exporters may benefit from enhanced liquidity access and diversification opportunities through global market exposure (Manova, 2013). Sectoral splits further reflect variation in capital intensity and financing needs, justifying a disaggregated analysis to capture meaningful heterogeneity in the impact of financial constraints.

The primary model result (Table 4), which incorporates both firm and time fixed effects, provides a robust framework for analyzing the determinants of high-growth firms (HGFs) in terms of employee growth (Employee HG) and turnover growth (Turnover HG). The results from these fixed-effects logit regressions are presented in the second column under each category. By controlling for both firm-specific heterogeneity and time-specific dynamics, these models ensure that the estimated

Table 2
Average and median growth of sample.

Year	Employee High Growth		Employee NonHigh Growth		Turnover High Growth		Turnover NonHigh Growth	
	Average Growth	Median Growth	Average Growth	Median Growth	Average Growth	Median Growth	Average Growth	Median Growth
2012	99.59	27.86	9.58	1.9	69.26	18.18	23.27	3.85
2013	102.1	25	5.77	0	69.96	15.22	18.14	0
2014	99.95	25	6.08	0	71.63	16.13	16.55	0
2015	110.08	25	6.73	0	72.39	13.36	16.82	0
2016	128.96	23.81	6.14	0	88.52	11.11	14.01	0
2017	124.55	27.27	11.58	0	73.31	13.33	21.45	0
2018	129.73	25	4.27	0	73.55	11.11	13.18	0
2019	94.97	23.08	-0.14	-2.7	48.9	10	7.07	-2.86
2020	123.34	29.41	10	0	78.07	16.67	19.11	0
2021	120.8	33.33	14.34	2.94	66.89	18.18	25.32	2.66

Table 3
Descriptive statistics.

Year	Employee High Growth		Employee Non High Growth		Turnover High Growth		Turnover Non High Growth	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Financial Constraint	0.13	0.25	0.12	0.25	0.14	0.25	0.12	0.25
Age	2.19	0.62	2.53	0.61	2.37	0.66	2.55	0.58
Tangibility	0.20	0.23	0.20	0.23	0.19	0.23	0.20	0.24
Size	14.51	1.85	14.20	2.02	14.70	1.96	13.87	1.95
Cash	0.90	5.18	1.78	8.25	1.17	6.10	2.01	8.98
Leverage	0.40	0.32	0.34	0.33	0.38	0.32	0.33	0.34
Profitability	-0.02	0.50	-0.02	0.53	0.04	0.45	-0.07	0.57
Export	0.07	0.22	0.06	0.20	0.08	0.23	0.05	0.19

coefficients reflect the true impact of the independent variables on high-growth probabilities.

To provide a clearer interpretation of the economic magnitude of our findings, we calculate the marginal effects of the short-term debt ratio. A one standard deviation increase in the short-term debt ratio (0.13) reduces the probability of a firm being classified as high-growth by approximately 4.6 percentage points in employment growth models and by approximately 7.6 percentage points in turnover growth models.

Table 4
Fixed effect logit regression result (main results).

Dependent Variable	Employee HG Logit	Employee HG Logit	Turnover HG Logit	Turnover HG Logit
Financial Constraint	-0.062*** (0.010)	-1.402*** (0.245)	-0.015* (0.008)	-2.337*** (0.214)
Leverage	0.307*** (0.008)	0.308*** (0.007)	0.338*** (0.006)	0.380*** (0.006)
Age	-2.465*** (0.007)	-2.048*** (0.011)	-1.620*** (0.005)	-2.968*** (0.009)
Tangibility	0.393*** (0.014)	0.390*** (0.012)	-0.083*** (0.011)	-0.123*** (0.011)
Size	0.144*** (0.002)	0.165*** (0.002)	0.204*** (0.002)	0.120*** (0.002)
Cash	-0.009*** (0.000)	-0.009*** (0.000)	-0.009*** (0.000)	-0.010*** (0.000)
Profit	0.067*** (0.005)	0.048*** (0.005)	0.247*** (0.004)	0.259*** (0.004)
Export	0.114*** (0.018)	0.112*** (0.017)	0.229*** (0.014)	0.230*** (0.014)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	Yes	No	Yes
Pseudo R2	0.24	0.24	0.26	0.26
-2 log-likelihood	72,247	71,354	70,355	70,255
Observations	2,414,017	2,414,017	3,065,698	3,065,698
Number of firm	330,237	330,237	426,707	426,707

Note: The standard errors are clustered at firm level and reported in parentheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

These effects are economically meaningful, indicating that reliance on short-term debt significantly hampers firms' growth potential.

While the negative relationship between financial constraints (measured by the share of short-term debt in total assets) and firm growth has been examined in the literature (Chen et al., 2019; Johnson, 2003), short-term debt introduces significant rollover risks, usually with higher borrowing costs, requiring firms to frequently refinance their liabilities, which further exacerbates financial instability (Diamond & He, 2014). This instability is particularly detrimental to firms aiming for high growth, as it limits their ability to invest in long-term projects and scale operations. Firms with a high proportion of short-term debt face a mismatch between their financial structure and their growth needs, which ultimately reduces their chances of achieving high growth status. These findings highlight the important role of financial flexibility in supporting firm growth and underscore its critical role in the high-growth firm literature. Besides maturity; leverage, the ratio of total debt over assets, has a positive and significant effect on the probability of becoming a high growth firm. This suggests that firms that can use debt effectively are better positioned to take advantage of growth opportunities.

In contrast, firm age is found to have a significant negative relationship with high-growth status, indicating that younger firms are more likely to achieve rapid growth. This aligns with the idea that younger firms tend to be more dynamic, innovative and adaptable than their older counterparts. Tangibility, another influential variable, shows mixed effects: it positively influences employee growth but negatively impacts turnover growth. This dichotomy suggests that while tangible assets may support workforce expansion, they may not directly contribute to revenue growth, likely reflecting differences in resource allocation or sectoral dynamics.

Firm size, on the other hand, has a consistently positive effect on the likelihood of high growth in both employee and turnover dimensions. Larger firms may benefit from economies of scale, stronger market positioning and better access to resources, all of which enhance their growth potential. Conversely, cash holdings exhibit a weakly significant negative effect, implying that higher cash reserves might reflect financial conservatism, potentially limiting aggressive investments required

for rapid growth. Finally profitability and export intensity stand out as significant positive drivers of high-growth status. Profitability enhances internal funding capacity and operational efficiency, while export intensity provides access to global markets, enabling firms to diversify revenues and sustain growth trajectories.

The divergent effects of asset tangibility on turnover and employment growth can be theoretically explained. Higher asset tangibility facilitates access to external finance by improving firms' collateral value, enabling firms to expand production and turnover more easily. However, tangible assets often involve higher fixed costs and reduce operational flexibility, which can constrain labor force adjustments and limit employment growth. Thus, while firms with higher tangibility may achieve faster sales growth, their employment expansion may lag behind. This interpretation aligns with theories emphasizing the dual role of tangible assets as both financing enablers and sources of adjustment rigidity (Almeida & Campello, 2007).

The financial constraint variable, measured as the intensity of short-term debt, plays a pivotal role in shaping the likelihood of achieving high-growth status, with nuanced effects across different firm sizes and growth dimensions (Table 5). For SMEs, financial constraints have a strongly negative and statistically significant impact. SMEs with a higher proportion of short-term debt are less likely to achieve rapid employee growth, as liquidity pressures force them to prioritize debt repayment over operational investments, such as hiring and workforce retention. The impact on turnover growth is even more pronounced, reflecting the limitations short-term financing imposes on production capacity, market expansion and revenue generation. This finding reinforces the importance of financial flexibility for SMEs seeking to sustain growth in both workforce and sales.

For large firms, financial constraints also negatively and significantly affect employee growth, with a stronger magnitude than observed for SMEs. This demonstrates that even large firms with greater access to financial markets remain vulnerable to the pressures of short-term debt. High short-term debt burdens restrict their ability to allocate resources effectively toward workforce expansion. Similarly, financial constraints hinder turnover growth in large firms, although the effect is slightly less

Table 5
Fixed effect logit regression result (firm size-SMEs-large).

Dependent Variable	SME		Large	
	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit
Financial Constraint	-1.269*** (0.249)	-2.316*** (0.218)	-3.222* (1.890)	-2.108* (1.020)
Leverage	0.308*** (0.007)	0.380*** (0.006)	0.399*** (0.142)	0.526*** (0.105)
Age	-2.055*** (0.011)	-2.968*** (0.009)	-4.923*** (0.229)	-4.167*** (0.142)
Tangibility	0.387*** (0.012)	-0.119*** (0.011)	0.742*** (0.213)	-0.884*** (0.167)
Size	0.163*** (0.002)	0.119*** (0.002)	0.086 (0.056)	-0.291*** (0.042)
Cash	-0.009*** (0.000)	-0.010*** (0.000)	-0.054*** (0.019)	-0.102*** (0.020)
Profit	0.049*** (0.005)	0.258*** (0.004)	0.055 (0.118)	0.887*** (0.114)
Export	0.117*** (0.017)	0.232*** (0.014)	0.222 (0.244)	0.093 (0.169)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	2,393,560	3,037,095	20,457	28,603
Number of firm	326,724	422,232	3513	4475

Note: The standard errors are clustered at firm level and reported in parentheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

pronounced than on employee growth. While large firms may have better mechanisms to manage short-term debt, overreliance on it still curtails their ability to scale operations, meet growing market demand and achieve high turnover growth.

These findings collectively highlight the restrictive nature of financial constraints, particularly the burden of short-term debt, across both SMEs and large firms. The results underscore the critical importance of financial flexibility in enabling firms to pursue and sustain high-growth trajectories, regardless of their size or sector.

Financial constraints consistently exhibit a negative relationship with high growth across both SMEs and large firms, whether measured by employee growth or turnover. This finding highlights the restrictive nature of short-term debt, which limits firms' ability to reach their growth potential. For SMEs, the negative impact of financial constraints is more pronounced on turnover growth than employee growth, suggesting that short-term debt restricts their capacity to scale operations, invest in production and meet market demand. In contrast, for large firms, employee growth is more heavily affected, indicating that short-term debt pressures hinder their ability to expand their workforce and scale their operations effectively. These nuanced effects reflect the different ways financial constraints influence growth dynamics depending on firm size. The logit results illustrating the impact of financial constraints on the likelihood of high growth for micro, small and medium-sized firms within the SME category are presented in Table C.

The role of financial constraints in determining high-growth firm status also varies significantly across sectors (Table 6). Industry-specific factors such as capital intensity, market dynamics, and growth opportunities shape how financial constraints impact firm performance. For instance, capital-intensive sectors like construction and energy are particularly vulnerable to financial constraints, as they require substantial upfront investments to fund projects and maintain operations. In these industries, restricted access to financing can severely limit growth potential. On the other hand, less capital-intensive sectors, such as trade and tourism, are less sensitive to short-term financial pressures but still rely on adequate liquidity to support operational stability and facilitate expansion. These sectoral differences underscore the importance of tailoring financial strategies to the specific needs and challenges of different industries when addressing financial constraints and fostering firm growth.

Financial constraints have a positive, albeit not statistically significant, impact on employee growth but show a negative association with turnover growth in the Agriculture, Forestry and Fishing sector. This finding suggests that firms in this sector may be less dependent on financial flexibility for generating revenue, likely due to seasonal dynamics or subsidy-driven income streams that mitigate the immediate effects of financial constraints. In contrast, the Energy and Mining sector experiences a significant and negative impact of financial constraints on both employee and turnover growth. These sectors, characterized by high fixed costs and lengthy payback periods, are particularly vulnerable to short-term debt pressures, emphasizing the critical need for financial flexibility in their operations.

In the construction sector, financial constraints significantly decrease the likelihood of achieving high growth in both employee and turnover dimensions. This result aligns with the sector's dependence on financing for large-scale, long-term projects, where liquidity challenges can severely hinder progress and limit growth potential. Similarly, the trade sector is not immune to the effects of financial constraints, with significant negative impacts observed for both employee and turnover growth. Even in this less capital-intensive sector, reliance on short-term debt can restrict firms' ability to invest in inventory and expand into new markets, curbing their growth potential.

The tourism sector, on the other hand, shows a relatively smaller and statistically insignificant effect of financial constraints on both employee and turnover growth. This may reflect the sector's reliance on seasonal demand and service-based revenue streams, which provide a buffer

Table 6
Fixed effect logit regression result (firm sector).

Dependent Variable	Agriculture, Forestry Fishing		Energy and Mining		Construction		Trade		Tourism	
	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit
Financial Constraint	1.52 (2.50)	-0.31 (2.13)	-5.16*** (1.83)	-0.81 (1.35)	-1.28** (0.60)	-2.27*** (0.53)	-0.99** (0.42)	-2.22*** (0.38)	0.05 (1.02)	-1.18 (0.91)
Leverage	0.37*** (0.08)	0.38*** (0.06)	0.25*** (0.07)	0.25*** (0.05)	0.21*** (0.01)	0.17*** (0.01)	0.31*** (0.01)	0.42*** (0.01)	0.17*** (0.02)	0.29*** (0.02)
Age	-1.94*** (0.12)	-2.83*** (0.09)	-2.18*** (0.11)	-3.18*** (0.09)	-1.71*** (0.02)	-2.35*** (0.02)	-2.02*** (0.01)	-2.97*** (0.01)	-1.94*** (0.04)	-3.71*** (0.04)
Tangibility	0.22* (0.12)	-0.12 (0.10)	0.38*** (0.11)	0.51*** (0.09)	0.04* (0.02)	-0.46*** (0.02)	0.50*** (0.02)	-0.22*** (0.02)	0.35** (0.04)	0.20*** (0.04)
Size	0.24*** (0.03)	0.19** (0.02)	0.18*** (0.02)	0.15*** (0.02)	0.11*** (0.00)	0.21*** (0.00)	0.17*** (0.00)	0.10*** (0.00)	0.19*** (0.01)	0.10*** (0.01)
Cash	-0.00 (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.00*** (0.00)	-0.01*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Profit	0.11 (0.07)	0.19*** (0.05)	0.02 (0.06)	0.18*** (0.05)	0.02* (0.01)	0.11*** (0.01)	0.06*** (0.01)	0.38*** (0.01)	-0.00 (0.01)	0.20*** (0.01)
Export	0.15 (0.21)	0.28 (0.18)	0.02 (0.15)	0.07 (0.12)	0.03 (0.04)	0.02 (0.03)	0.15*** (0.02)	0.20*** (0.02)	0.06 (0.07)	0.23*** (0.06)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,435	30,954	25,583	36,607	451,795	548,653	1,346,876	1,649,014	131,891	172,868
Number of firm	3234	4604	4021	5929	67,848	84,925	176,550	221,012	19,344	26,235

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

against the pressures of short-term debt. The sector's lighter reliance on fixed capital investments compared to manufacturing or construction may also contribute to its relative resilience. Moreover, the increase in short-term debts due to the lagged effect of the exchange rate and the fact that they are paid before the customer arrives are considered to contribute positively to firms' high growth.

A key distinction in the analysis is the comparison between the manufacturing and service sectors, as well as the broader differentiation between manufacturing and non-manufacturing industries (Table 7).

This distinction is critical, as these sectors operate under differing capital intensities, production cycles and financing requirements. Manufacturing firms typically require substantial fixed capital investments and operate with longer production cycles, making them particularly sensitive to financial constraints. A lack of financial flexibility in this sector can delay production, limit capacity expansion and curtail innovation. In contrast, service firms rely more heavily on human capital and operational liquidity. This reliance shapes how financial constraints affect their growth, with a greater emphasis on maintaining

Table 7
Fixed effect logit regression result (firm sector service-manufacturing-NonManufacturing).

Dependent Variable	Service		Manufacturing		Non Manufacturing	
	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit
Financial Constraint	-1.591*** (0.549)	-3.562*** (0.511)	-2.583*** (0.588)	-2.273*** (0.457)	-1.118*** (0.273)	-2.427*** (0.246)
Leverage	0.254*** (0.016)	0.444*** (0.014)	0.552*** (0.022)	0.516*** (0.017)	0.263*** (0.008)	0.357*** (0.007)
Age	-2.350*** (0.026)	-3.367*** (0.023)	-2.301*** (0.028)	-2.934*** (0.022)	-2.016*** (0.012)	-2.978*** (0.011)
Tangibility	0.398*** (0.024)	0.141*** (0.022)	0.721*** (0.036)	-0.171*** (0.029)	0.344*** (0.013)	-0.110*** (0.012)
Size	0.230*** (0.006)	0.054*** (0.005)	0.117*** (0.007)	0.060*** (0.005)	0.176*** (0.002)	0.131*** (0.002)
Cash	-0.009*** (0.000)	-0.009*** (0.000)	-0.011*** (0.001)	-0.011*** (0.000)	-0.009*** (0.000)	-0.010*** (0.000)
Profit	0.004 (0.009)	0.264*** (0.007)	0.226*** (0.021)	0.497*** (0.018)	0.03018*** (0.005)	0.237*** (0.005)
Export	0.154*** (0.041)	0.301*** (0.034)	0.051 (0.035)	0.268*** (0.027)	0.137*** (0.019)	0.197*** (0.016)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,435	30,954	413,002	596,648	2,001,015	2,469,050
Number of firm	3234	4604	56,006	79,398	274,231	347,309

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

cash flow and workforce stability to sustain operations.

These findings underscore the varying effects of financial constraints across sectors and emphasize the importance of sector-specific financial strategies. While capital-intensive industries like energy, mining and manufacturing face pronounced challenges from short-term debt reliance, service-oriented and seasonal sectors like tourism and trade exhibit more nuanced dynamics. Tailored financial policies and improved access to long-term credit are essential to support growth across diverse industries, particularly in capital-intensive sectors where liquidity constraints can be especially restrictive.

Financial constraints have a significant and negative impact on both employee and turnover growth in the service sector. Despite the lower capital intensity of service firms compared to manufacturing, these findings highlight the sector's high sensitivity to short-term financial pressures. Service firms rely heavily on liquidity for day-to-day operations and the scaling of customer-facing services, making financial flexibility essential for achieving high growth.

In the manufacturing sector, financial constraints exert an even more pronounced negative effect on both employee and turnover growth. Manufacturing firms depend heavily on external financing to meet the demands of capital expenditures and long-term production cycles. The reliance on short-term debt creates a misalignment between their long-term investment needs and short-term repayment obligations, severely restricting their growth potential. These significant negative impacts emphasize the critical importance of stable, long-term financing options for manufacturing firms. For non-manufacturing sectors, financial constraints also negatively affect employee and turnover growth, though the magnitude of the impact is generally smaller than in manufacturing. This suggests that while non-manufacturing firms are not immune to short-term financial pressures, they may possess slightly more operational flexibility to mitigate their effects.

Specifically, in the manufacturing sector, short-term debt reliance significantly reduces the likelihood of achieving high-growth status. Manufacturing firms are inherently capital-intensive, requiring substantial investments in fixed assets such as machinery, equipment and facilities. These long-term investments are poorly matched with short-term financing, creating cash flow misalignments and increasing debt repayment pressures (Stulz, 2000; Almeida et al., 2009). The rollover risk associated with short-term debt exacerbates this issue, as firms must frequently refinance their obligations, often at higher costs. These pressures divert resources away from growth-oriented investments and hinder firms' capacity to expand or innovate. Coad and Hözl (2012) underscore that manufacturing firms' reliance on external financing makes them particularly vulnerable to financial constraints, stifling their ability to scale production and drive innovation. In developing economies, these challenges are further amplified by underdeveloped financial markets and limited access to long-term credit, creating additional barriers to growth. Tailored financial policies are thus essential to unlocking the growth potential of manufacturing firms and addressing these systemic constraints.

Table D provides an analysis of financial constraints across manufacturing and non-manufacturing sectors, further categorized into SMEs and large firms. This classification highlights key differences in how financial constraints affect firms of varying sizes and sectors. SMEs, across both sectors, are disproportionately impacted by financial constraints compared to large firms. This is largely due to SMEs' limited access to credit markets and their greater reliance on short-term debt for operational and growth needs. Policies that improve SMEs' access to affordable, long-term financing could significantly alleviate these constraints and support their growth potential.

Manufacturing firms, regardless of size, face stronger negative impacts from financial constraints compared to non-manufacturing firms. Given the capital-intensive nature of manufacturing, access to stable financing is critical for investment in production capacity and long-term growth. In contrast, non-manufacturing firms may have more flexibility in adjusting operations to mitigate the effects of financial constraints,

though they are still affected by short-term debt pressures.

The analysis also examines the differential impact of financial constraints on exporting versus non-exporting firms and on firms with high versus low levels of indebtedness (Table 8). Exporting firms often benefit from access to international markets and financing opportunities, which can help offset the negative effects of financial constraints. Non-exporting firms, by contrast, are more reliant on domestic financial markets and therefore face heightened sensitivity to short-term debt pressures. Additionally, firms with high indebtedness encounter amplified growth challenges due to the increased burden of debt servicing. These firms are less able to allocate resources toward expansion, further limiting their growth potential. Conversely, low-indebtedness firms demonstrate greater flexibility in directing resources toward growth-oriented initiatives, positioning them to achieve higher growth despite financial pressures.

Financial constraints have a clear and significant negative effect on both employee high growth and turnover high growth. Non-exporting firms, which lack access to international financing and broader markets, are particularly vulnerable to the restrictive nature of short-term debt. These financial pressures limit their ability to invest in scaling operations, making it less likely for them to achieve high-growth status. While exporting firms benefit from greater market access and more diversified revenue streams, they are not immune to the challenges posed by financial constraints. The negative and significant impact observed among exporters highlights that, despite the advantages of accessing international markets, short-term debt pressures remain a critical barrier to their growth.

For firms with low levels of indebtedness, financial constraints still exhibit a negative and significant effect on both employee and turnover high growth. This suggests that even firms with relatively lower debt burdens are constrained in their growth potential due to limited financial flexibility. However, the magnitude of the effect is smaller compared to that observed in highly indebted firms, reflecting the moderating influence of lower leverage. In contrast, the impact of financial constraints is considerably more pronounced for high-indebtedness firms. The compounding effect of short-term debt pressures and high leverage severely restricts these firms' ability to achieve high growth. High-indebtedness firms are forced to prioritize debt servicing over investment in expansion, limiting their ability to scale operations or capitalize on growth opportunities. This finding underscores the critical importance of managing debt levels and securing access to stable, long-term financing to mitigate the restrictive effects of financial constraints.

One of the key concerns in estimating the relationship between financial constraints and firm growth is the issue of endogeneity. Endogeneity in this context arises due to two primary factors: reverse causality and omitted variable bias. First, firm growth (measured through employment or turnover) may influence the financial constraint variable, rather than the other way around. High-growth firms might have better access to external financing due to their stronger future prospects, thereby reducing financial constraints. Conversely, financially constrained firms might exhibit lower growth due to limited investment capacity. Second there may be unobserved firm-specific characteristics that simultaneously affect both financial constraints and firm growth. For instance, managerial ability, innovation capabilities, or access to informal financing channels might impact both variables but remain unobserved in a standard regression framework.

To address these endogeneity concerns, we employ a dynamic panel model using the Blundell-Bond System GMM estimator. This approach effectively mitigates endogeneity issues through two key mechanisms. One of them is to include lagged dependent variables. The inclusion of lagged dependent variable (previous period firm growth) helps control for persistence in firm growth and absorbs some of the unobserved heterogeneity. And the other one is to instrument potentially endogenous variables. The GMM framework instruments endogenous regressors using their past values, assuming that deeper lags are exogenous to current-period shocks.

Table 8
Fixed effect logit regression result (exporter-Nonexporter-low-high Indebtness).

Dependent Variable	Non-Exporter		Exporter		Low Indebtness		High Indebtness	
	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit
Financial Constraint	-1.100*** (0.283)	-2.469*** (0.253)	-2.826*** (0.573)	-2.539*** (0.455)	-1.325** (0.593)	-2.115*** (0.512)	-1.501*** (0.305)	-2.497*** (0.266)
Leverage	0.293*** (0.008)	0.368*** (0.007)	0.354*** (0.025)	0.478*** (0.020)	0.773*** (0.035)	0.664*** (0.031)	0.182*** (0.014)	0.426*** (0.012)
Age	-1.974*** (0.012)	-2.940*** (0.011)	-2.504*** (0.032)	-3.169*** (0.026)	-1.769*** (0.018)	-2.636*** (0.015)	-2.252*** (0.017)	-3.268*** (0.015)
Tangibility	0.325*** (0.013)	-0.117*** (0.012)	0.917*** (0.043)	-0.197*** (0.034)	0.183*** (0.019)	-0.239*** (0.017)	0.627*** (0.020)	-0.059*** (0.018)
Size	0.147*** (0.002)	0.119*** (0.002)	0.311*** (0.008)	0.100*** (0.006)	0.095*** (0.004)	0.066*** (0.004)	0.217*** (0.004)	0.157*** (0.003)
Cash	-0.009*** (0.000)	-0.010*** (0.000)	-0.010*** (0.001)	-0.012*** (0.001)	-0.007*** (0.000)	-0.009*** (0.000)	-0.005*** (0.001)	-0.006*** (0.001)
Profit	0.036*** (0.00585)	0.226*** (0.005)	0.171*** (0.022)	0.633*** (0.020)	0.040*** (0.008)	0.279*** (0.006)	0.072*** (0.009)	0.260*** (0.008)
Export					0.130*** (0.026)	0.180*** (0.021)	0.099*** (0.026)	0.279*** (0.022)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,084,899	2,593,177	329,118	472,521	1,281,831	1,655,247	1,132,186	1,410,451
Number of firm	276,043	350,700	54,194	76,007	135,681	181,478	194,556	245,229

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

To address potential endogeneity concerns raised in the literature — including reverse causality and omitted variable bias — we employ a dynamic panel estimation strategy using the Blundell-Bond System GMM estimator. This framework is particularly appropriate given our short T, large N dataset structure and allows us to control for firm fixed effects, growth persistence, and instrument potentially endogenous regressors (such as the financial constraint proxy) with their own lagged values. This identification strategy enhances the credibility of our causal interpretation.

The results from the System GMM estimation are presented in **Table 9**. The key findings shows us that the lagged dependent variable is positive and statistically significant across all models, confirming the persistence of firm growth. Second financial constraints negatively affect firm growth, with coefficients consistently negative and statistically significant. This supports the hypothesis that firms with higher short-term debt-to-total debt ratios face growth limitations. Third the AR(2) test results indicate no second-order autocorrelation in the error terms, supporting the validity of the instruments. Finally, the Sargan test p-values suggest that the overidentifying restrictions are valid, implying that the instruments are not correlated with the error term. So by employing the Blundell-Bond System GMM estimator, we effectively address endogeneity concerns and obtain more reliable estimates of the impact of financial constraints on firm growth. Our results provide strong evidence that financial constraints significantly hinder firm expansion, highlighting the importance of financial accessibility for high-growth firms. Also, the positive and significant lagged dependent variable confirms that firm growth is not purely random, but rather exhibits a certain level of persistence over time in **Table 10**.

To ensure robustness and address potential endogeneity between financial constraints and firm growth, we additionally estimate a model using the Instrumental Variable Logit (IV-Logit) approach, as developed by **Rivers and Vuong (1988)**. This method is suitable when the dependent variable is binary and one or more regressors are endogenous.

In our context, financial constraints may be endogenously determined with firm growth, as firms expecting high growth may anticipate their financing needs and preemptively adjust their capital structure. Moreover, omitted variables such as management quality or access to informal financing may simultaneously affect both financial constraints

Table 9
Fixed effect logit regression result (GMM).

Dependent Variable	Employee HG Logit	Employee HG Logit	Turnover HG Logit	Turnover HG Logit
HG (t-1)	0.066*** (0.003)	0.080*** (0.003)	0.129*** (0.008)	0.100*** (0.006)
Financial Constraint	-0.049*** (0.006)	-0.018*** (0.004)	-0.032*** (0.009)	-0.017** (0.007)
Leverage	0.146*** (0.005)	0.192*** (0.003)	0.227*** (0.008)	0.112*** (0.006)
Age	-0.470*** (0.003)	-0.666*** (0.001)	-0.726*** (0.004)	-0.656*** (0.003)
Tangibility	0.102*** (0.007)	0.172*** (0.004)	0.381*** (0.011)	-0.005 (0.008)
Size	0.164*** (0.001)	0.020*** (0.000)	0.130*** (0.001)	0.115*** (0.001)
Cash	-0.010*** (0.000)	-0.005*** (0.000)	-0.010*** (0.000)	-0.009*** (0.000)
Profit	0.263*** (0.005)	0.075*** (0.002)	0.186*** (0.008)	0.178*** (0.006)
Export	0.264*** (0.008)	0.040*** (0.005)	0.028** (0.012)	0.192*** (0.009)
Firm Time	Yes No	Yes Yes	Yes No	Yes Yes
AR(1)	0.012	0.028	0.008	0.026
AR(2)	0.632	0.485	0.587	0.355
Sargan	0.421	0.592	0.287	0.673
Observations	2,124,860	2,124,860	2,748,065	2,748,065
Number of firm	302,246	302,246	386,784	386,784

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5%, and 1% respectively.

and growth outcomes. To address this, we use an external instrument: sector-level credit growth rates, calculated at the 2-digit NACE level and matched by year. This variable captures exogenous variation in credit supply due to macro-financial or regulatory conditions, and is plausibly uncorrelated with firm-specific shocks to growth.

The IV-Logit model is estimated in two stages. In first stage, the endogenous regressor (financial constraint) is regressed on the

Table 10
IV logit estimation.

Dependent Variable	Employee HG Logit	Turnover HG Logit
Financial Constraint (IV)	−0.394*** (0.036)	−2.277*** (0.304)
Leverage	0.240*** (0.009)	0.371*** (0.007)
Age	−1.685*** (0.013)	−2.709*** (0.011)
Tangibility	0.295*** (0.015)	−0.102*** (0.013)
Size	0.141*** (0.003)	0.071*** (0.002)
Cash	−0.007*** (0.000)	−0.008*** (0.000)
Profit	0.022*** (0.006)	0.244*** (0.005)
Export	0.166*** (0.020)	0.239*** (0.016)
Firm	Yes	Yes
Time	Yes	Yes
Observations	2,077,898	2,448,684
Pseudo R-squared	0.19	0.20

Note: The standard errors are clustered at firm level and reported in parentheses. *, **, *** denotes the statistical significant at the level of 10%, 5%, and 1% respectively.

instrument and control variables. And in second stage, the predicted values from the first stage are included in a logit model for high-growth probability.

Some of the empirical findings, such as the differential impact of asset tangibility on turnover versus employment growth, merit closer theoretical consideration. While higher asset tangibility positively influences turnover growth by enabling easier access to collateralized financing and facilitating physical investment, it may simultaneously impose higher adjustment costs and reduce labor market flexibility, thereby limiting employment expansion. Furthermore, the limited significance of certain firm characteristics across subsamples suggests that financial frictions may dominate traditional internal factors in explaining high-growth outcomes under severe credit constraints, an insight that extends existing theories developed largely in developed market contexts.

6. Conclusion

This study investigates the determinants of high-growth firms by examining the interplay between financial constraints, firm characteristics and sectoral differences. Leveraging a comprehensive dataset and employing logit models with firm and time fixed effects, the analysis provides robust evidence on how financial constraints and other critical factors influence the likelihood of firms achieving high-growth status. Furthermore, the use of dynamic panel estimations provides additional assurance that our findings are not driven by endogeneity or omitted variable bias.

Based on the estimated marginal effects, a one standard deviation reduction (0.13) in the short-term debt ratio would increase the likelihood of high employment growth by approximately 4.6 percentage points, and high turnover growth by approximately 7.6 percentage points. These findings imply that credit market interventions aimed at improving firms' access to longer-term financing could have substantial aggregate effects on firm dynamism and economic growth. Facilitating the shift from short-term to long-term debt structures may thus be a highly effective policy lever in emerging markets.

To assess the aggregate implications of easing short-term debt

dependency, we simulate a policy scenario where the average short-term debt ratio is reduced by 10 percentage points. Based on our marginal effect estimates, this reduction would increase the probability of high employment growth by 3.5 percentage points and high turnover growth by 5.9 percentage points. With approximately 400,000 firms in our sample, this translates into 14,000 to 24,000 additional high-growth firms. These gains underscore the substantial benefits of credit market interventions that enhance access to longer-term finance in emerging economies.

The findings reveal that financial constraints, as measured by the intensity of short-term debt, have a consistently significant and negative impact on the probability of firms achieving high growth. This effect is particularly pronounced in highly indebted firms and capital-intensive sectors such as manufacturing, where reliance on short-term financing severely limits growth potential. SMEs are disproportionately affected by financial constraints, as they often lack sufficient access to affordable financing and face higher borrowing costs. Exporters, despite their access to international markets, are not immune to financial pressures, while non-exporting firms face even greater constraints due to their dependence on domestic financing options.

Sectoral differences further shape the impact of financial constraints. Manufacturing firms, with their high capital intensity and long production cycles, are significantly more affected than non-manufacturing firms. Among non-manufacturing sectors, service firms are particularly sensitive to liquidity pressures, as their growth depends heavily on operational cash flow rather than fixed capital investments. High levels of indebtedness exacerbate the negative effects of financial constraints, as repayment burdens restrict the ability of highly leveraged firms to allocate resources toward growth-oriented activities. Conversely, firms with lower leverage experience less severe but still notable growth limitations.

This study makes a significant contribution to the literature by offering a comprehensive analysis of financial constraints and their impact on firm growth across various dimensions, including firm size, sectoral classifications and export orientation. By identifying how financial constraints interact with these factors, the study provides actionable insights for policymakers and practitioners seeking to foster high-growth firms in diverse economic contexts.

While the empirical setting of this study is Türkiye, the core mechanisms identified — namely, the constraints imposed by liquidity risk and short-term refinancing needs — are relevant for a broader set of emerging and developing economies characterized by underdeveloped capital markets. Nevertheless, the magnitude and precise nature of these effects may vary depending on country-specific factors such as the depth of bond markets, access to equity financing, and regulatory environments. Future research could explore the comparative relevance of financial constraints across different institutional settings.

Author contributions

Aykut Şengül, Sermet Pekin, Ufuk Alkan: Conceived and designed the analysis. Collected the data. Contributed data or analysis tools. Performed the analysis. Wrote the paper.

Conflict of interest

There is no conflict of interest.

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Appendix

Table A
Investment Cash Sensitivity Analysis

Dependent Variable	Investment/Asset	Investment/Capital
Cash flow	0.020**	0.011*
	0.008	0.006
Financial Constraint	0.015***	0.017***
	(0.000)	(0.000)
Cash flow* financial Constraint	-0.090*	-0.080**
	-0.017	-0.013
Age	-0.050***	-0.008***
	(0.000)	(0.000)
Size	-0.005***	-0.001***
	(0.000)	(0.000)
Leverage	0.003***	0.004***
	(0.000)	(0.000)
Export share	-0.004***	-0.003**
	(0.001)	(0.001)
Observations	3,465,365	3,465,365
R-squared	0.45	0.42
Firm fixed effect	Yes	Yes
Time fixed effect	Yes	Yes

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5%, and 1% respectively.

Table B
Robust Regression Results

Dependent Variable	Probit Employee HG Probit	Probit Turnover HG Probit	Employee HG Logit (%20)	Turnover HG Logit (%20)
Financial Constraint	-0.018***	-0.049***	-0.050***	-0.270***
	-0.004	-0.006	-0.010	-0.015
Leverage	0.192***	0.146***	0.354***	0.959***
	-0.003	-0.005	-0.008	-0.015
Age	-0.666***	-0.470***	-2.639***	-3.654***
	-0.001	-0.003	-0.015	-0.027
Tangibility	0.172***	0.102***	0.377***	-0.294***
	-0.004	-0.007	-0.014	-0.0244
Size	0.020***	0.164***	0.514***	0.729***
	0.0	0.001	0.003	0.006
Cash	-0.005***	-0.010***	-0.019***	-0.010***
	0.0	0.0	0.003	0.001
Profit	0.075***	0.263***	0.238***	2.39***
	-0.002	-0.005	-0.005	0.0
Export	0.040***	0.264***	0.001	0.***
	-0.005	-0.008	0.018	0.029
Observations	3,607,953	3,607,953	2,414,017	2,414,017
Number of firm	624,991	624,991	330,237	330,237

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

Table C
Fixed Effect Logit Regression Result (Firm Size-SMEs)

Dependent Variable	Micro		Small		Middle	
	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit
Financial Constraint	-0.361*	-2.237***	-1.159**	-2.020***	-1.052**	-1.552**
	-0.215	(0.312)	(0.514)	(0.405)	(0.470)	(0.736)
Leverage	0.234***	0.370***	0.400***	0.388***	0.433***	0.430***
	(0.009)	(0.008)	(0.020)	(0.016)	(0.053)	(0.042)
Age	-1.637***	-2.679***	-3.635***	-3.977***	-4.248***	-4.560***
	(0.013)	(0.012)	(0.031)	(0.023)	(0.084)	(0.060)
Tangibility	0.293***	-0.100***	0.694***	-0.032	0.750***	-0.476***
	(0.015)	(0.013)	(0.033)	(0.026)	(0.084)	(0.066)
Size	0.140***	0.067***	0.153***	0.251***	0.232***	0.270***
	(0.003)	(0.002)	(0.007)	(0.006)	(0.026)	(0.016)
Cash	-0.007***	-0.008***	-0.012***	-0.018***	-0.046***	-0.042***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.005)	(0.004)
Profit	0.020***	0.243***	0.207***	0.359***	0.261***	0.581***

(continued on next page)

Table C (continued)

Dependent Variable	Micro		Small		Middle	
	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit
Export	(0.006) 0.169***	(0.005) 0.241***	(0.016) 0.152***	(0.014) 0.296***	(0.047) 0.008	(0.044) 0.287***
Firm fixed effect	(0.020) Yes	(0.017) Yes	(0.045) Yes	(0.034) Yes	(0.102) Yes	(0.073) Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,732,827	2,178,111	545,445	712,527	115,288	146,457
Number of firm	206,507	276,518	98,685	120,313	21,532	25,401

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

Table D

Fixed Effect Logit Regression Result (Firm Type-Firm Size)

Dependent Variable	Manufacturing-Large		Manufacturing-SME		Non-Manufacturing-Large		Non-Manufacturing-SME	
	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit	Employee HG Logit	Turnover HG Logit
Financial Constraint	-1.844 (2.919)	-3.000 (1.867)	-2.453*** (0.617)	-2.196*** (0.480)	-4.067 (2.533)	-2.541 (1.992)	-1.036*** (0.276)	-2.406*** (0.249)
Leverage	0.162* (0.282)	0.670*** (0.183)	0.560*** (0.022)	0.513*** (0.017)	0.453*** (0.166)	0.431*** (0.135)	0.263*** (0.008)	0.358*** (0.007)
Age	-4.597*** (0.426)	-2.835*** (0.207)	-2.326*** (0.028)	-2.939*** (0.022)	-5.029*** (0.282)	-4.599*** (0.204)	-2.019*** (0.012)	-2.982*** (0.011)
Tangibility	1.836*** (0.439)	-0.101 (0.292)	0.699*** (0.037)	-0.165*** (0.030)	0.396 (0.248)	-0.973*** (0.213)	0.345*** (0.013)	-0.106*** (0.012)
Size	0.097 (0.138)	-0.168** (0.085)	0.110*** (0.007)	0.061*** (0.005)	0.112* (0.063)	-0.166*** (0.051)	0.174*** (0.002)	0.129*** (0.002)
Cash	-0.189** (0.074)	-0.232*** (0.048)	-0.011*** (0.001)	-0.011*** (0.000)	-0.044*** (0.016)	-0.065*** (0.020)	-0.009*** (0.000)	-0.010*** (0.000)
Profit	0.472 (0.390)	1.967*** (0.307)	0.240*** (0.022)	0.496*** (0.018)	-0.029 (0.131)	0.520*** (0.124)	0.031*** (0.005)	0.237*** (0.005)
Export	-0.487 (0.373)	-0.369* (0.223)	0.063* (0.03641)	0.280*** (0.028)	0.578* (0.335)	0.374 (0.273)	0.139*** (0.020)	0.201*** (0.016)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,691	21,628	399,311	575,020	52,868	56,342	1,948,147	2,412,708
Number of firm	1998	3048	54,008	76,350	3814	3016	270,417	344,293

Note: The standard errors are clustered at firm level and reported in parantheses. *, **, *** denotes the statistical significant at the level of 10%, 5% and 1% respectively.

Table E

Correlation Matrix

	Financial Constraint	Leverage	Age	Tangibility	Size	Cash	Profit	Export
Financial Constraint	1							
Leverage	0.05	1						
Age	0.10	-0.01	1					
Tangibility	0.17	-0.06	0.05	1				
Size	0.02	0.17	0.28	-0.01	1			
Cash	0.01	-0.20	-0.02	-0.04	-0.11	1		
Profit	0.02	-0.08	0.07	0.00	0.29	0.03	1	
Export	-0.01	0.03	-0.02	-0.04	0.11	-0.01	-0.37	1

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