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Testing the Efficiency of Classic Theories of Capital Structure in Bank-oriented Financial Systems

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Abstract: *This paper tests the empirical power of the trade-off and pecking order theories in explaining the financial behaviour of companies in bank-oriented financial systems. These theories, developed and tested mainly in market-oriented, highly developed countries, are evaluated for their relevance in different environments. In this study, panel data analysis was performed on 16,881 companies from Bosnia and Herzegovina, Croatia, Macedonia, Serbia, and Slovenia over the period 2009–2016, using the Shyam-Sunder and Myers (1999) methodology. The findings suggest that the pecking order theory partly explains the financial policies of companies in EU countries (Croatia and Slovenia), while companies in non-EU countries (Bosnia and Herzegovina, Macedonia, Serbia) exhibit target-adjustment behaviour. Subsample analysis reveals that unquoted and medium-sized firms tend to follow the pecking order in financing, whereas quoted and large firms focus on maintaining target leverage levels. However, the results show that neither the coefficients nor the* R^2 *values align with theoretical predictions or comparable empirical studies, particularly those on U.S. companies. This raises doubts about the applicability of classical capital structure theories to firms in varying contexts, highlighting the need for further research into additional influencing factors.*

Keywords: financial leverage; trade-off theory; pecking order theory; debt-equity optimization; target-adjustment behaviour

JEL Classification: G30, G32

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Introduction

Modern theory of capital structure began with Nobel laureates Franco Modigliani and Merton H. Miller and their famous paper *The Cost of Capital, Corporate Finance, and the Theory of Investment* (1958). In the paper the authors proved that under the perfect market assumptions, the choice between debt and equity financing has no effect on the firm's value. Although these conditions were not applicable to the real market conditions, their model became a starting point in capital structure research. By abandoning the perfect market assumptions, i.e. by introducing the real market imperfections in the frictionless world, several useful theories arose (Pecina, 2018). Among them, there are two theories that have dominated in empirical studies: the trade-off and the pecking order theory. These theories differ strikingly in many aspects in explaining firm's capital structure decisions. According to the trade-off theory, there is an optimal financial leverage (Myers S. C., 1993) that is reached when the present value of interest tax shields is just offset by the loss of value due to agency costs of debt (Jensen & Meckling, 1976) and the possibility of financial distress (Kraus & Litzenberger, 1973), caused by financial leverage. This theory predicts moderate borrowing by tax-paying firms (Myers S. C., 2001), and relatively high debt ratios for safe, profitable firms with plenty of taxes to shield and a high portion of assets that could serve as protection in financial distress (Shyam-Sunder & Myers, 1999). On the contrary, there is no optimal debt ratio in the pecking order theory. Rather, changes in capital structure are driven by the need for external funds when internally generated cash flow is not sufficient to finance investment opportunities. Due to information asymmetry between the firm and the market, there is a hierarchical order preference for financing: when internal financing is exploited, the firm will first borrow and then issue equity, as a last resort. Highly profitable firms with limited investment opportunities will have less requisite for external financing and consequently lower their leverage, while firms with investment opportunities higher than internally generated funds will borrow more.

These two theories provide different explanations of how firms choose their financing mix. However, they are considered classical theories of capital structure, and as such are predominantly tested in empirical studies. These theories are tested within the literature in three main ways. First and the most common approach is to examine the impact of key determinants of capital structure on the firm's debt level; mostly firm-specific characteristics such as profitability, firm size, growth opportunities, asset structure, liquidity etc. Since previously mentioned theories have the opposite expectations about the sign of the above mentioned factors' influence on the level of corporate debt, the obtained sign might reveal a theory more appropriate to explain the financing decisions of the analysed firms. The second approach involves testing the theories by estimating a specific econometric model. The first paper that enabled simultaneous testing of the trade-off and pecking order theory was the work

of Shyam-Sunder & Myers (1999). Despite the criticism, most researchers approve and emphasise the strong explanatory power of these models. Finally, these theories can be tested by conducting interview or survey research. These methods are poorly applied due to high costs and usually low response rates, which makes generalized conclusions harder to obtain.

Capital structure theories were developed for and mostly researched on samples of large, publicly listed U.S. companies. There are two important points to highlight here. First, the U.S. is highly developed in all economic aspects, including the level of its financial system development. It is a market-oriented financial system with equally represented equity and debt securities markets, characterized by high liquidity and depth. Companies that operate in market-oriented financial systems have the broadest menu of financing choices and can adjust their capital structures relatively fast and at low cost (Myers S. C., 2001). On the other hand, many other developed and developing countries are bank-oriented with underdeveloped capital markets and usually inefficient institutional governance structures, resulting in the use of bank credit as the primary source of debt financing for most companies, even publicly traded ones. Economic and financial uncertainty in these countries is higher and more persistent (Mertzanis, 2019), often lacking adequate investor protection and legal rules. Due to lack of competition in financial funds supply, financial transaction costs tend to be too high. Additionally, in those circumstances the financial system is more sensitive to any financial or other type of crisis causing fund supply to shrink more rapidly.

In such bank-oriented economies, the explanatory power of traditional capital structure theories becomes less predictable. The trade-off theory, which assumes that companies weigh the benefits of debt against financial distress costs, presumes stable access to credit markets and efficient financial intermediation. However, in countries where regulatory restrictions, bank concentration, or political influence affect credit allocation, many companies (especially SMEs) cannot borrow to maintain or adjust toward an optimal capital structure. Credit is often rationed or tied to collateral availability and banking relationships rather to the company's fundamentals. As a result, even if companies aim to follow a target capital structure, they may be unable to do so consistently, leading to what can be described as a weak or constrained form of the trade-off theory.

Similarly, the pecking order theory, which predicts a financing hierarchy based on information asymmetry, faces specific constraints in these systems. While the reliance on internal funds may appear consistent with the pecking order theory, in bank-oriented and financially constrained economies this reliance is often not driven by managerial preference to avoid information asymmetry. Instead, it results from limited or unreliable access to external debt, caused by systemic frictions in the financial system. These frictions include factors such as weak legal enforcement, lack of credit information infrastructure, high collateral requirements, credit rationing practices, and regulatory lending constraints. All of the above limits companies'

abilities to obtain debt financing, even if it would be the next logical step in the financing hierarchy. Furthermore, underdeveloped equity markets, high costs of public offerings, and lack of investor trust can make equity issuance practically infeasible. This may force companies into non-standard financing behaviour that deviates from both theories. As a result, the actual financing patterns may be shaped more by institutional and regulatory constraints than by theoretically assumed factors.

Second, the samples that capital structure theories have been tested on so far mostly include large, listed companies (of highly developed countries). These companies, whose securities are listed on the stock exchange, have better financing opportunities than private companies. Therefore, such firms face significantly less constraints in fundraising, and can more easily adjust capital structures according to their financing policy. Similarly, but to a lesser extent, the same applies to large companies compared to small and medium-sized enterprises. Namely, for the group of small and medium-sized enterprises, which are mostly excluded from capital structure research, the problems of information asymmetry between companies and the investor public are more pronounced, resulting in higher transaction costs and larger restrictions on access to formal forms of external financing.

In bank-based economies, these asymmetries are even more acute for unlisted companies, as disclosure standards are lower, and financial reporting may not meet investor or lender requirements. SMEs often lack the transparency and bargaining power needed to secure bank loans on favourable terms. This drives them to rely more on internal resources or informal financing. Regulatory frameworks also play a crucial role. Loan approval processes, capital requirements for banks, and interest rate caps or subsidies influence the availability, cost, and structure of debt. These institutional constraints challenge the assumptions of capital structure theories, highlighting the need for contextual analysis.

Since most research is conducted on listed companies of market-oriented countries, the aim of this paper is to expand the capital structure research in two directions by: (1) exploring the relationship between theoretical models and empirical findings by applying the models to different situations and company's characteristics, and (2) incorporating the institutional differences between countries in the analysis. Specifically, we are applying the Shyam-Sunder & Myers (1999) models to test how medium and large, both listed and private companies operating in different countries and environmental conditions choose their capital structures.

Namely, the aim of this paper is to test the trade-off and the pecking order theory outside the U.S. market and to evaluate the performance of these theories on a broader sample of firms – both private and public companies operating in developed but mutually different countries and very different from U.S. market. Theory review suggests that companies in countries with less developed financial systems should prefer internal financing over the external financing because of greater information asymmetry between managers and investors. Since debt has less information

asymmetry issues than new equity, financial behaviour of these companies should be better explained by the pecking order theory. Nevertheless, other important characteristics, such as higher economic instability, higher corruption risk, lower levels of investors' rights protection etc., influence business environment and conditions, and consequently cause greater financial constraints and higher financing costs to firms, all potentially leading to slower adjustments to the optimal capital structure. Therefore, if the firms follow the trade-off theory and have set target capital structure, they may deviate from it more often due to financing limitations indicating weak form of the trade-off theory.

This research contributes to reducing the research gap in the area of capital structure respective to the status of economy and in the sample of underrepresented companies, such as SMEs and private companies. Therefore, the paper is organized as follows: after the introduction, there is a review of theoretical and empirical literature, followed by the specification of the data and applied methodology, and presentation of the final results. At the end there is a conclusion with the reflection to some limitations and suggestions for further research.

Theoretical and empirical literature review

The modern capital structure theory began with Modigliani & Miller (1958) and their capital structure irrelevance model. Under the perfect market assumption, capital structure has no impact on the company's value, meaning that the value of leveraged company is equal to the value of unleveraged company. Once these strict propositions were relaxed, several theories arose trying to explain debt-equity choices in the real world, with the trade-off theory and the pecking order theory as the two dominant capital structure theories.

The trade-off theory of capital structure argues that companies form their financing mix by balancing the benefits and costs of debt. By including debt in their financing scheme, companies exploit tax benefits and control free cash flow problems. Accordingly, these are the most important benefits of using debt that encourage debt financing. On the other hand, as the company uses more debt, the higher the interest burden a company has to pay from its earnings and consequently, the probability of financial distress increases. Namely, in case of high debt, in order to fully utilise a tax shield from interest expenses, a company should have high positive earnings to cover higher interest expenses and reduce corporate taxes. However, while tax shields are valuable, excessive debt may offset these benefits, as it increases the risk of financial distress. Therefore, as the level of debt increases, the risk of exploiting tax shield increases thus reducing benefits of using debt. If the company fails to cover the accrued expenses, the benefits of using debt will be lost and risk of default will be increased. Consequently, this theory predicts there is an optimal capital structure that equates

the aforementioned benefits and costs of using debt. In static version of the trade-off theory, the optimal capital structure is defined as a specific level, while in the dynamic version, there is an optimal interval of financial leverage that the companies aim to maintain. If a certain level (static model) or interval endpoints (dynamic model) are violated, the company will revise its capital structure. This means that both underleveraged and overleveraged firms will move toward their leverage targets in order to equal the costs and benefits of debt (Fama & French, 2002).

Unlike the trade-off theory that was grounded in theoretical reasoning, the pecking order theory has its roots in observing practice. Donaldson (1961) analysed the patterns of financial behaviour of large American companies, and his findings later served as the foundation for the pecking order theory developed in Myers S. C. (1984) and Myers & Majluf (1984). According to the theory, there is a hierarchy of financing choices with internally generated funds at the top, followed by debt, and external equity at the bottom. This order is based upon different costs of issuing new securities arising from asymmetric information between managers and investors. Since a specific form of equity can be found on the top and at the bottom of the hierarchy, there is no optimal capital structure. Rather, the existing company's financial leverage is only a reflection of the cumulative need of the firm for financial resources (Pecina, 2021).

Until the work of Shyam-Sunder & Myers (1999) the simultaneous testing of the capital structure theories was possible only through survey or by analysis of selected determinants whose direction and strength of influence on financial leverage would indicate the power of the aforementioned theory in explaining the financing choice. Shyam-Sunder & Myers (1999) introduced a simple empirical model of the pecking order theory that enabled additional way of simultaneous testing of these two predominant capital structure theories. Using a sample of 157 U.S. firms with continuous reporting for the period 1971 – 1989, they provided evidence that analysed firms fund their financing deficits mostly with debt, giving the pecking order theory high credibility in explaining their financial behaviour. Namely, for their full sample, the results for the pecking order theory were $b_{PO} = 0.85$ and R^2=0.86, while for the trade-off theory these parameters were noticeably lower, $b_{TA} = 0.33$ and R^2=0.21. However, subsequent studies have raised questions about the universality of these findings across different institutional and financial contexts.

Fama & French (2002) and Frank & Goyal (2003) extended the testing to broader samples and periods, demonstrating that the strength of the pecking order theory varies significantly across firm characteristics and is influenced by market conditions. Namely, using the two-step cross-section regression on different subsamples based on firms' characteristics, Fama & French (2002)[l] concluded that debt is used to cover investment and earnings shortfalls in the short run, but that small, high-growth firms issue more equity, which contradicts the pecking order theory. Similarly, Frank & Goyal (2003) used an unbalanced panel of 768 listed U.S. companies for the period 1971 – 1998 to test robustness of the Shyam-Sunder & Myers (1999)

results, and concluded that the strength of the theory depends on the specifications of the model and sample composition. On an overall sample of companies (data with no gaps in the reporting), for time period 1971-1989, the b_{PO} coefficient was 0.601 and R^2=0.296; and for time period 1990-1998, the b_{PO} coefficient was 0.234 and R^2=0.048. However, when using data with gaps in reporting, the results changed dramatically: for time period 1971-1989, the b_{PO} coefficient was 0.267 and R^2=0.159; and for time period 1990-1998, the b_{PO} coefficient was 0.152 and R^2=0.046. They also ran the tests for other different subsamples and found that the theory proves effective for large (b_{PO}=0.675-0.753; R^2=0.626-0.74, depending on time frame) companies, while the power of the theory decreases by including larger number of smaller (b_{PO}=0.087-0.164; R^2=0.075-0.096; depending on time frame), high-growth companies (b_{PO}=0.127; R^2=0.096) in the sample, which is actually contrary to the initial assumptions of that theory. All in all, their findings showed considerably lower explanatory power compared to Shyam-Sunder & Myers (1999), particularly when small or high-growth firms were included. This divergence of results highlights that company characteristics influence the validity of the theory.

Similarly, Adedeji (2002) found limited support for the pecking order theory among companies listed on the London Stock Exchange for the period 1994 - 2000. He concluded that only 20 - 30% of financial deficit is financed with new debt (with R^2 =0.1396-0.1508), and that the pecking order theory efficiently explains financial behaviour of highly levered companies ($b_{PO(high\ l.)}$=0.347 vs. $b_{PO(low\ l.)}$=0.148; R^2=0.2742 and R^2=0.1818 respectively), contradicting the findings in Shyam-Sunder & Myers (1999). Lemmon & Zender (2010) used modified version of Shyam-Sunder & Myers (1999) test of the pecking order theory and found that, after controlling for debt capacity, the pecking order theory provides a good description of financial behaviour for a broad sample of firms[2]. They showed that when firms exploit their internal funds and need external financing, those unconstrained by debt capacity, measured by higher credit rating, use debt to cover their financial deficit (b_{PO}=0.755; R^2=0.75). On the other hand, firms with limited debt capacity (generally small, young, high-growth firms) will have a lower portion of deficit financed by debt (b_{PO}=0.297; R^2=0.286), meaning these companies would rather issue new equity. This explained the contradictory results obtained in aforementioned papers and proved that pecking order theory works well when controlled by limits to the use of debt in financing. Similarly, Halov & Heider (2011) tested the pecking order theory on an unbalanced panel of publicly traded U.S. firms from 1971 to 2001. While the results for the overall sample provided only relatively weak support for the pecking order theory (b_{PO}=0.375; R^2=0.68), the analysis of different subsamples revealed that the pecking order theory works extremely well for firms with smallest adverse selection cost of debt[3] irrespective of firm's age, size and time period (b_{PO}=0.87; R^2=0.84). On the other hand, firms where risk plays a larger role in the adverse selection problem, issue more equity and less debt to cover the financial deficit (b_{PO}=0.145; R^2=0.126).

In contrast to previous relevant studies on market-oriented markets, which generally support the pecking order theory, Lemmon, Roberts, & Zender (2008) examined publicly traded American companies from 1965 to 2003 and found evidence supporting the trade-off theory. They concluded that companies have a target capital structure to which they stream (b_{TA}=0.36; R^2=0.72) and most adjustments to that threshold are conducted with new debt issues.

Further, on a sample of American companies from 1980 to 2001, Cotei & Farhat (2009) concluded that the trade-off and the pecking order theory are not mutually exclusive in shaping the capital structure; companies have a defined target range of the financial debt level, whereby deviations are the result of taking advantage of market opportunities or the consequence of information asymmetry problems. They found that both theories coexist: companies have a target range of leverage but may deviate from it due to market conditions or information asymmetries.

Completely contrary to all previous studies, Rahman & Arifuzzaman (2014) concluded that neither of the two theories is suitable for providing a conclusive explanation of the financial behavior of the analyzed firms. Specifically, by applying a modified version of Shyam-Sunder & Myers (1999) to U.K. firms, and using panel data regression for two sample sizes and periods ((a) 60 and (b) 51 firms; 1992–2012 and 1995–2012), they found that neither theory could conclusively explain the financial behaviour of the firms under study (their results were as follows: (a) b_{PO}=0.29 and R^2=0.07; b_{TA}=-0.26 and R^2=0.18; (b) b_{TA}=0.005 and R^2=0.00007; b_{TA}=-0.31 and R^2=0.15).

The testing of the trade-off and pecking order theories using the models proposed by Shyam-Sunder & Myers (1999) on samples of companies from countries with less developed capital markets is, to the authors' knowledge, relatively limited. Furthermore, publicly available research suggests that the applicability of these theories may be constrained in bank-oriented or less developed markets. Studies conducted in such financial systems, including those in Japan (Voutsinas & Werner, 2014), Portugal (Serrasqueiro & Nunes, 2010), and Croatia (Šestanović, Horvat, & Tomić, 2018; Pecina, 2018), further highlight the significance of both macroeconomic and institutional conditions, alongside company characteristics, in influencing financial behaviour.

Voutsinas & Werner (2014) used a dataset of 1528 public and 2143 private Japanese firms for the period from 1980 to 2007 and concluded that the pecking order theory works best during the economic expansion (example: b_{PO}=0.4202 (R^2=0.26) > b_{TA}=0.3063 (R^2=0.17) for public; and b_{PO}=0.5250 (R^2=0.47) > b_{TA}=0.2026 (R^2=0.09) for private firms), while the trade-off theory performs better in the stagnation and economic recession (example: b_{PO}=-0.533 (R^2=N/A) < b_{TA}=0.8301 (R^2=0.51) for public; and b_{PO}=0.3773 (R^2=0.24) < b_{TA}=0.4662 (R^2=0.13) for private firms), confirming that economic cycles significantly impact theory applicability. They also found that there are differences in explanatory power of these companies for different firm samples: trade-off theory better explains financing behaviour of low leveraged companies, while the pecking order theory is better for private and highly leveraged firms.

Serrasqueiro & Nunes (2010) came to a similar conclusion as Cotei & Farhat (2009) about simultaneous influence of the theories on a sample of Portuguese companies in a bank-dominated system (they obtained the next results for individual testing of the theories: b_{PO}=0.7422; R^2=0.1354 for the pecking order, vs. b_{TA}=0.2673; R^2=0.1593 for the trade-off theory). However, running a joint model, they emphasized that the impact of the financial deficit is greater than the impact of adjustments to the target capital structure (b_{PO}=0.7045 > b_{TA}=0.2679), thus giving higher ground to the pecking order theory.

Šestanović, Horvat, & Tomić (2018) tested the pecking order theory on the sample of 17 non-financial firms listed on Zagreb Stock Exchange for the period from 2008 to 2016. Pooled OLS results indicate that analysed firms mostly use debt to finance their deficits, but to a lesser extent than the theory assumes (b_{PO}=0.69266; R^2=0.78354). Accordingly, they reject the strong form of the pecking order theory. Pecina (2018) tested trade-off and pecking order theory on selected Croatian (private and public) companies for the period from 2004 to 2015. Results of fixed effects panel data models show that the pecking order theory better describes financial choices for most period and firm samples and therefore shows higher explanatory power than the trade-off theory (for example, across the entire sample and time period, the pecking order theory demonstrated greater explanatory power, with a higher R^2 value (b_{PO}=0.2270 and R^2=0.2897) compared to the trade-off theory (b_{TA}=0.4090; R^2=0.1096)[4]). However, she concluded that these predominant theories individually are not sufficient to completely and exclusively explain capital structure of analysed companies. Instead, as concluded in Cotei & Farhat (2009) for U.S. companies and Serrasqueiro & Nunes (2010) for Portuguese companies, the trade-off and the pecking order theory should be used complementary to better explain the financial behaviour. To the authors' knowledge, there is no other similar research on samples of companies from countries covered in this research.

To conclude, evidence from different countries suggests that the applicability and explanatory power of capital structure theories are significantly influenced by institutional context, macroeconomic conditions, the specific time period analysed, and the characteristics of the companies included in the study. Factors like capital market development, access to external financing, credit constraints, and regulatory efficiency can all shape corporate financing behaviour. Depending on these external and internal conditions, companies may deviate from traditional theoretical predictions, not necessarily due to managerial preferences, but as a response to environmental limitations and opportunities. These insights emphasize the need for broader empirical testing across diverse economic settings and firm types to better understand the dynamics underlying real-world capital structure decisions.

Based on the noticeable divergence of the empirical results mentioned above, a unified expectation about the financial behaviour of the companies in our sample cannot be drawn. This paper thus tests these theories' assumptions on different

samples of companies based on their characteristics as well as countries they operate in with an aim of determining explanatory power of either of these theories on a broader sample.

Data and methodology

The study uses firm-level data from Amadeus database for the period from 2009 to 2016. The data covers medium, large and very large non-financial companies from the following countries: Croatia (HR), Slovenia (SI), Bosnia and Herzegovina (BA), Serbia (RS), Macedonia (ME). Financial firms and regulated utilities are excluded from the analysis. Following prior work, companies with negative value of assets, revenues and capital are excluded. This leads to the sample of 16,881 active companies, both private and public, for which all relevant data necessary to calculate defined variables are available. The estimation is conducted using Stata 11 software.

Following the work of Shyam-Sunder & Myers (1999), we use two simple models to test the efficiency of the trade-off and the pecking order theory on a previously defined sample. According to the trade-off theory, changes in financial leverage ($\Delta D_{i,t}$) are caused by deviations of the company's current debt ratio from its optimal ($D^*_{i,t} - D_{i,t-1}$). This is expressed through the partial adjustment model[5] specified as (1):

$$\Delta D_{i,t} = a_i + b_{TA}\left(D^*_{i,t} - D_{i,t-1}\right) + \varepsilon_{i,t}, \tag{1}$$

where $\Delta D_{i,t}$ is the annual change in debt, $D^*_{i,t}$ is the optimal debt level for firm i at time t and $D_{i,t-1}$ realized debt level of the firm i at time t-*1*. The trade-off theory predicts that $a_i = 0$ and $b_{TA} > 0$ because companies should be moving towards their optimal capital structure, but also $b_{TA} < 1$ implying positive adjustment costs. The higher extent to which a company follows the trade-off theory, the closer b_{TA} will be to 1, indicating immediate adjustments towards their optimal capital structure. On the contrary, if b_{TA} is closer to 0 it implies high transaction costs and consequently slower adjustments to the optimal capital structure. Since the optimal debt level is unobservable, following a common approach in literature, optimal capital structure is defined as the historical mean of the debt level for each firm i in the observed period. In order to control for different firm sizes in the sample, all variables are scaled by the book value of their assets.

The pecking order theory states that when a company's internal cash flows are inadequate for planned investment and commitments, it issues debt, and equity is almost never issued (only as a last resort) (Shyam-Sunder & Myers, 1999). This theory is tested using the following form (2):

$$\Delta D_{i,t} = a_i + b_{PO} DEF_{i,t} + \varepsilon_{i,t}, \tag{2}$$

where ΔD_{it} is the annual change in debt and $DEF_{i,t}$ is the financial deficit of a firm i at period t. In this paper the funds flow deficit ($DEF_{i,t}$) is defined as (3):

$$DEF_{i,t} = X_{i,t} + \Delta W_{i,t} - C_{i,t}, \quad (3)$$

where $X_{i,t}$ are capital expenditures, $\Delta W_{i,t}$ net increase in working capital, and $C_{i,t}$ operating cash flow after interest and taxes. In comparison with the original financial deficit specification, due to data unavailability, dividend payments ($DIV_{i,t}$) and current portion of long-term debt at the start of period ($R_{i,t}$) are excluded. The strong form of pecking order theory suggests that $a_i = 0$, and $b_{PO} = 1$, indicating that any financial deficit should be financed exclusively by issuing new debt. In the semi-strong model b_{PO} should be very close, but not equal to 1, allowing rare equity issues in small amounts. Again, in order to reduce the impact of size, all variables are scaled by the book value of assets.

We use two leverage statistics: (1) total debt (TD) and (2) long-term debt (LTD). Although the capital structure term, by its definition, should reflect only the use of long-term financing resources, in case of transition economies many companies rely largely on short-term financing due to various financing constraints (Tasić & Valev, 2010). Recognizing this, this paper examines whether there really is a noticeable difference when short-term debt is included. Table 1 depicts the variables used in analysis, together with their symbols and methods of calculation.

Table 1: Variables used in the analysis

Variable	Symbol	Calculation Method
Dependent variable		
Annual change in debt	$\Delta D_{i,t}$	Debt in time *t* minus debt in time *t-1*
Independent variables and variables for their calculation		
Deviation from optimal debt level	$D^*_{i,t} - D_{i,t-}$	Optimal debt level minus debt level in time *t-1*
Optimal debt level	$D^*_{i,t}$	Historical mean of the debt level for each firm *i* in the observed period
Financial deficit	$DEF_{i,t}$	Capital expenditures plus net increase in working capital minus operating cash flow after interest and taxes
Capital expenditures	$X_{i,t}$	Fixed assets in time *t* minus fixed assets in time *t-1* plus depreciation in time *t*
Net increase in working capital	$\Delta W_{i,t}$	Net working capital in time *t* minus net working capital in time *t-1*
Net working capital	W	Current assets minus current liabilities
Operating cash flow after interest and taxes	$C_{i,t}$	Net income plus depreciation

Source: authors

To analyse the relationship of interest, following the Shyam-Sunder and Myers (1999) approach, we employ a static panel fixed effects model. The empirical model is specified as:

$$y_{i,t} = x'_{i,t}\beta + \alpha_i + \delta_t + u_{i,t}$$

where $x'_{i,t}$ is the vector of the time-varying, company-specific variables, α_i is time invariant, the so-called fixed effect or an individual effect, δ_t is the time-specific intercept, and $u_{i,t}$ is the error term. The fixed effects model captures unobserved heterogeneity by accounting for individual-specific and time-specific effects, thus controlling for potential biases arising from omitted variables that are constant over time or specific to each unit[6].

To address issues of heteroscedasticity and autocorrelation, which can distort standard error estimates and lead to unreliable inference, we use the nonparametric covariance matrix estimator proposed by Driscoll & Kraay (1998). This estimator is robust to general forms of spatial and temporal dependence and is particularly useful in panel data settings where conventional assumptions of independence and identically distributed errors may be violated. Driscoll and Kraay's (1998) estimator adjusts for heteroscedasticity, autocorrelation and spatial dependence. In addition, Hoechle (2007) provides an adjustment for unbalanced panels, ensuring that the estimator remains consistent even when the panel data is not balanced. This adjustment modifies the covariance matrix to account for the differing number of observations across firms.

By employing this estimation technique, our analysis provides robust standard errors, enhancing the reliability of our inference regarding the relationship between the variables of interest. This approach also yields an R^2 in the output tables denoted as "r2_w". Additionally, in order to add another layer of comparison of our R^2 results with those of earlier papers, we include the R^2 ("r2") and adjusted R^2 ("r2_a") results based on the simple OLS estimation.

Finally, to address potential endogeneity, we conducted Arellano-Bond two-step GMM estimations for both theories on the total sample. The results (available upon request) revealed: first, autocorrelation was detected in the first lag but generally not in the second, suggesting a dynamic panel model might be appropriate in some specifications. However, some specifications showed no first-order autocorrelation, indicating weak or irrelevant instruments (supported by the Sargan test), suggesting these theory-based model specifications may be inappropriate for the Arellano-Bond estimator. Second, the lagged dependent variable was mostly not statistically significant, weakening the case for a dynamic panel model. Finally, the Sargan test rejected the null hypothesis of instrument validity, indicating potential instrument issues that can bias estimates.

These issues are consistent with the theoretical underpinnings of the pecking order and trade-off theories. The pecking order theory posits that capital structure

reflects future financing needs, not past decisions; firms prioritize debt financing when internal funds are insufficient and issue equity only as a last resort. Similarly, the trade-off theory asserts that firms target an optimal leverage level based on future needs and market conditions. Thus, capital structure is primarily future-oriented, influenced by expectations rather than past decisions (though past debt has a limited role due to commitments).

These results question the reliability and necessity of a dynamic panel approach in our context. We therefore justify using the static fixed effects model based on our primary goal to replicate and compare our results with Shyam-Sunder and Myers (1999). The static model allows for direct comparison of R-squared values and coefficients. It informs us about the models' performance across different contexts and enables the assessment of generalizability.

Results

The results of the entire sample

Table 2 shows the results of empirical tests for the trade-off and pecking order theory for the entire sample. Results for the trade-off theory are given in the first two columns. As in Shyam-Sunder & Myers (1999) we find constants close to zero. However, target adjustment (or trade-off) coefficients (b_{TA}) are not statistically significant meaning companies in sample do not show target reverting behaviour. Final two columns give results for the pecking order theory. Again, constants are close to zero (and now significant). The coefficient b_{PO} is significant for both leverage statistics: total (b_{PO}=0.158) and long-term (b_{PO}=0.121) and values of R^2 are similar for both debt metrics (0.2681 and 0.2546 respectively). This indicates companies in sample use both long- and short-term debt to finance their deficits. However, the values of the pecking order coefficients (b_{PO}) are much lower than predicted by the theory (b_{PO} should be equal or close to 1), regardless of the leverage metrics used. Also, the values of both, b_{PO} and R^2, are much lower than those obtained in Shyam-Sunder & Myers (1999) (b_{PO}=0.85, R^2=0.86). These results indicate that neither of the tested theories is effective in explaining financing behaviour of the companies in sample, at least not when observing all countries and companies together.

Table 2: Results of empirical testing of the trade-off and pecking order theory for the entire sample

VARIABLES	(1) TD	(2) LTD	(3) TD	(4) LTD
b_{TA}	0.117 (0.0608)	0.170 (0.129)		
b_{PO}			**0.158*** ** (0.0389)	**0.121*** (0.0512)
a_i	-0.0004 (0.0014)	-0.0009 (0.0012)	0.0096*** (0.002)	0.0074** (0.0020)
Observations	119,257	119,257	119,257	119,257
No. of groups	17,037	17,037	17,037	17,037
r2_w	0.0562	0.0821	0.157	0.150
r2	0,1809	0,1352	**0,2681**	**0,2546**
r2_a	0,0443	0,0611	0,1462	0,1303

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
TD – total debt; LTD – long-term debt

Source: authors

Table 3 shows the results of testing the trade-off theory (Panel A) and the pecking order theory (Panel B) for each country individually. There are some differences in explanatory power of the competing theories between the countries. When we take only long-term debt, as the capital structure dictates, we can notice several things. The trade-off theory seems to be better in explaining financing (long-term debt) policy of Macedonian and Bosnian companies, however the b_{TA} coefficients and R^2 are relatively small (b_{TA}=0.102 and R^2=0.1841 for ME and b_{TA}=0.207 and R^2=0.1681 for BE). On the other hand, for Serbian companies, this theory explains the largest share of long-term debt changes (b_{TA}=0.929 and R^2=0.5626) indicating that these changes are the result of adjusting their capital structure towards the optimum. On the contrary, for Croatian companies the prevailing theory seems to be the pecking order theory with statistically significant coefficient b_{PO}=0.372, and R^2=0.4239. For Slovenian companies the results are somewhat inconclusive. Both theories' coefficients are statistically significant and very similar in size (b_{TA}=0.456; b_{PO}=0.411), with a slightly higher advantage in favour of the pecking order theory (R^2=0.4769 for the pecking order vs. R^2=0.3568 for the trade-off theory). These results may point to the complementarity of theories in explaining the financial behaviour of Slovenian companies in the sense that they finance most of the deficit with long-term debt, while at the same time they have established a target capital structure to which they adjust relatively quickly.

When short-term debt is included, we obtain somewhat different results. For total debt, the trade-off theory now shows higher explanatory power for Serbian and Slovenian companies than the pecking order theory, with statistically significant coefficients (b_{TA}) of 0.828 and 0.384, and R^2 values of 0.4813 and 0.3319, respectively.

Table 3: Results of empirical testing of the trade-off (Panel A) and the pecking order theory (Panel B) differentiated by country

	Long-term debt					Total debt				
PANEL A	**HR**	**ME**	**RS**	**SI**	**BA**	**HR**	**ME**	**RS**	**SI**	**BA**
b_{TA}	0.0781 (0.0593)	**0.102***** (0.0368)	**0.929***** (0.266)	0.456*** (0.162)	**0.207***** (0.0713)	0.0384 (0.0311)	0.334 (0.428)	**0.828***** (0.201)	**0.384***** (0.135)	0.164* (0.0908)
a_i	-0.0019 (0.0024)	0.0016 (0.0030)	-0.0077 (0.0067)	-0.0059*** (0.0021)	0.0007 (0.0031)	-0.0010 (0.0026)	-0.0249** (0.0110)	-0.0129 (0.0096)	-0.0116** (0.0051)	0.0029 (0.0056)
Observations	44,814	203	40,033	11,704	22,503	44,814	203	40,033	11,704	22,503
No. of groups	6,402	29	5,719	1,672	3,215	6,402	29	5,719	1,672	3,215
r2_w	0.0325	0.0634	0.499	0.276	0.0983	0.0161	0.0824	0.402	0.225	0.0906
r2	0.1569	**0.1841**	**0.5626**	0.3568	**0.1681**	0.1449	0.2326	**0.4813**	**0.3319**	0.2074
r2_a	0.0164	0.0474	0.4897	0.2496	0.0295	0.0023	0.1040	0.3948	0.2205	0.0753

	Long-term debt					Total debt				
PANEL B	**HR**	**ME**	**RS**	**SI**	**BA**	**HR**	**ME**	**RS**	**SI**	**BA**
b_{PO}	**0.372***** (0.0077)	-0.0002 (0.0001)	0.191*** (0.0735)	**0.411***** (0.154)	0.0393*** (0.0139)	**0.357***** (0.0032)	**0.0224***** (0.0001)	0.195** (0.0790)	0.322** (0.149)	**0.236***** (0.0084)
a_i	0.0188*** (0.0044)	0.0032 (0.0031)	0.0138*** (0.0040)	0.0062*** (0.0011)	0.0050* (0.0027)	0.0182*** (0.0042)	-0.0095 (0.0129)	0.0151*** (0.0038)	-0.0017 (0.0022)	0.0161*** (0.0018)
Observations	44,814	203	40,033	11,704	22,503	44,814	203	40,033	11,704	22,503
No. of groups	6,402	29	5,719	1,672	3,215	6,402	29	5,719	1,672	3,215
r2_w	0.339	0.0002	0.321	0.390	0.0335	0.291	0.465	0.185	0.193	0.281
r2	**0.4239**	0.1291	0.4069	**0.4579**	0.1083	**0.3834**	**0.5525**	0.2934	0.3042	**0.3735**
r2_a	0.3279	-0.0169	0.3081	0.3676	-0.0403	0.2806	0.4775	0.1756	0.1882	0.2691

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: authors

There are two things to notice here: (1) when short-term debt is included, the trade-off theory seems to better explain financing behaviour of Slovenian companies (than in the case of long-term debt when the pecking order theory showed slightly higher explanatory power); (2) on the other hand, both b_{TA} and R^2 of Serbian companies are reduced when short-term debt is included (although it remains the dominant theory).

For other countries, the pecking order theory seems to better explain company's financial behaviour, having higher R^2 than in the case of the trade-off model. More precisely, next to Croatian companies, this theory becomes more efficient in explaining capital structures of both Macedonian and Bosnian companies when the short-term debt is included. The highest R^2 (0.5525) is obtained for Macedonian companies, however b_{PO} is quite small (0.0224) although statistically significant. On the other hand, b_{PO} and R^2 for Bosnian companies increased significantly (b_{PO} from 0.0393 to 0.236 and R^2 from 0.1083 to 0.3735), meaning these companies use both short and long-term debt to finance its deficits. For Croatian companies there is slightly downturn in the values of b_{PO} and R^2 (b_{PO} from 0.372 to 0.357 and R^2 from 0.4239 to 0.3834), indicating Croatian companies use primary long-term debt to finance its deficit. Finally, based on observed differences depending on leverage metrics used, we can conclude that short-term financing has important role in covering the financial deficit of Macedonian, Serbian and Bosnian companies, as b_{PO} are increasing when we observe total instead of only long-term debt.

In the next step, we divided the sample into EU and non-EU countries. Table 4 presents the obtained results. For EU countries, in general, the trade-off theory seems not to be relevant regardless of the debt measure used. On the contrary, the pecking order theory coefficients are statistically significant for EU countries indicating these countries rely on debt to finance their deficits. Results suggest that they rely slightly more on long-term debt (b_{PO}=0.376 and R^2=0.4272) than on total debt (b_{PO}=0.354 and R^2=0.3736). For non-EU countries, the trade-off theory seems to have prevalence in explaining their financial decisions. The trade-off coefficients are statistically significant for both long-term and total debt, with higher explanatory power (R^2=0.4146) and greater target reverting coefficient (b_{TA}=0.635) for long-term debt financing. The pecking order coefficient for non-EU countries is statistically significant for total debt (b_{PO}=0.132) indicating these companies also use short-term debt to finance their deficits.

The observed difference in results between EU and non-EU countries can be explained by institutional, financial market, and regulatory differences, as well as differences in access to financing sources. It is reasonable to assume that EU companies generally operate in a more stable and advanced financial system with easier access to financing sources. Higher environmental stability, predictable interest rates and supportive monetary policies reduce the need for continuous capital structure optimization. These companies can afford to be more flexible and reactive in their financing: to rely on debt when needed rather than constantly rebalancing toward an

optimal capital structure. In contrast, non-EU companies generally operate in more volatile environments and less developed financial markets and consequently face greater financing constraints and higher costs of financial distress. These circumstances incentivize companies to actively manage their leverage levels and use capital structure as a strategic tool to signal financial discipline to investors and lenders, hoping to reduce financing costs and improve creditworthiness.

Table 4: Results of empirical testing of the trade-off and the pecking order theory differentiated by membership in EU

	EU countries				**non-EU countries**			
VARIABLES	**(1) LTD**	**(2) TD**	**(3) LTD**	**(4) TD**	**(1) LTD**	**(2) TD**	**(3) LTD**	**(4) TD**
b_{TA}	0.0892 (0.0706)	0.0451 (0.0383)			**0.635**** (0.219)	**0.365***** (0.0723)		
b_{PO}			**0.376***** (0.0149)	**0.354***** (0.0150)			0.0869 (0.0474)	0.132*** (0.0355)
a_i	-0.0022 (0.0023)	-0.0027 (0.0031)	0.0162*** (0.0036)	0.0140** (0.0039)	-0.0044 (0.0046)	-0.0028 (0.0076)	0.0081** (0.003)	0.0122*** (0.0021)
Observations	56,518	56,518	56,518	56,518	62,739	62,739	62,739	62,739
No. of groups	8,074	8,074	8,074	8,074	8,963	8,963	8,963	8,963
r2_w	0.0389	0.0198	0.344	0.278	0.335	0.184	0.135	0.144
r2	0.1608	0.1492	**0.4272**	**0.3736**	**0.4146**	**0.2910**	0.2387	0.2570
r2_a	0.0210	0.0074	0.3317	0.2692	0.3170	0.1729	0.1118	0.1332

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
TD – total debt; LTD – long-term debt

Source: authors

When differentiated by size (Table 5), results indicate that large companies mostly show behaviour consistent with the pecking order theory's assumptions, with b_{PO} and R^2 being quite high. Values of b_{PO}=0,490 for long-term debt and b_{PO}=0,525 for total debt suggest that these companies around half of their financial deficit finance by issuing debt, primarily long-term. However, the coefficients b_{TA} are not of negligible values, although R^2s are somewhat lower than for the pecking order model. It seems that large companies have target debt ratio to which they stream and are able to adjust to the desired level at high speed. This could indicate that both theories, the trade-off and the pecking order theory, are complementary in explaining the financial behaviour of large-sized companies. In other words, they might have a target debt ratio, on the one hand, but also keep financial flexibility in order to finance the deficit with debt when necessary, on the other hand. Namely, large companies typically enjoy easier and cheaper access to the debt market due to their size, creditworthiness, and established relationships with financial institutions. This allows them to issue debt at relatively low cost when internal funds are insufficient. At the same time, these companies

are often more sophisticated in financial planning and might have well-defined target capital structures based on long-term optimization of the cost of capital and can adjust quickly to this target due to easier access to external funds. Therefore, these mixed results may indicate that large companies do not operate under strict adherence to a single theory. Rather, they adopt a hybrid financing strategy that balances the desire for financial flexibility (pecking order) with the goal of minimizing the weighted average cost of capital (trade-off). This is rational from a strategic standpoint: maintaining flexibility to respond to investment opportunities and macroeconomic conditions, while still managing leverage within a preferred range to benefit from tax shields.

The values of R^2s are much lower for medium-sized companies, but also slightly in favour of the pecking order theory. It seems that the trade-off theory's assumptions are not in focus for medium-sized companies, which is in line with theoretical predictions. Namely, it might be too expensive for them to make fast adjustments to the target capital structure (if they have set such a level). Namely, it might be that costs of adjustments towards target debt level to exploit tax benefits are higher than potential benefits. At the same time, the pecking order theory achieved higher values of R^2 indicating higher explanatory power. However, the values of coefficients are medium-low indicating that these companies finance around 10 and 15% of deficit with long-term and total debt respectively. The reasoning behind these mixed results might lie in the challenges and limitations these companies face in capital markets, financing planning and resource allocation. Namely, these companies often face restricted access to capital markets and higher borrowing costs (compared to larger firms). They may lack established credit histories, collateral, or market visibility, making external financing—especially long-term debt—more expensive and less reliable. Moreover, medium-sized companies typically operate with limited financial personnel and constrained managerial capacity, leading to reduced ability to actively manage and optimize capital structure over time. Their financial decisions are more likely to be reactive than strategic, resulting in less focus on actively adjusting toward a target capital structure. Finally, it is assumed that these companies likely prioritize retained earnings and only resort to debt when internal funds are exhausted. However, the relatively low use of debt to cover financial deficits (only 10–15%) indicates financial conservatism and a tendency to minimize risk exposure given their lower capacity to absorb shocks.

Same as for medium-sized companies, the values of R^2 are the highest for extra-large companies for the pecking order theory model, when used total debt. However, the value of coefficient is quite small, indicating that these companies finance only around 2,6% of financial deficit with debt. Coefficients for the trade-off theory (both long-term and total debt) are significant and higher than those obtained for the pecking order theory. Still, moderately small values indicate relatively slow adjustments towards the target debt values. Again, this is in line with theoretical explanations that very large companies use debt to exploit tax benefits while not worrying about the possibility of bankruptcy, which usually tends to be relatively low for these

Table 5: Results of empirical testing of the trade-off and the pecking order theory differentiated by the size of the company

	medium				Large				extra-large			
VARIABLES	**(1) LTD**	**(2) TD**	**(3) LTD**	**(4) TD**	**(1) LTD**	**(2) TD**	**(3) LTD**	**(4) TD**	**(1) LTD**	**(2) TD**	**(3) LTD**	**(4) TD**
b_{TA}	0.103 (0.0734)	0.0907* (0.0430)			1.071** (0.323)	0.818* (0.405)			0.184* (0.0804)	0.176** (0.0530)		
b_{PO}			**0.106**** (0.0349)	**0.157**** (0.0546)			**0.490***** (0.0249)	**0.525***** (0.0366)			0.005 (0.0039)	**0.0261***** (0.0033)
a_i	-3.23e-05 (0.0008)	-0.0005 (0.0014)	0.007*** (0.0015)	0.0094** (0.0026)	-0.0125 (0.0075)	-0.0150* (0.007)	0.0211*** (0.001)	0.0255*** (0.0017)	-0.0013 (0.0008)	-0.0017 (0.0014)	0.0002 (0.0011)	0.001 (0.0024)
Observations	95,766	95,766	95,766	95,766	17,254	17,254	17,254	17,254	6,237	6,237	6,237	6,237
No. of groups	13,681	13,681	13,681	13,681	2,465	2,465	2,465	2,465	891	891	891	891
r2_w	0.0454	0.0469	0.0962	0.110	0.588	0.334	0.869	0.802	0.0734	0.0515	0.0065	0.104
r2	0.1589	0.1716	**0.2035**	**0.2266**	0.6419	0.4242	**0.8859**	**0.8289**	0.1715	0.1718	0.1116	**0.2176**
r2_a	0.0187	0.0335	0.0708	0.0977	0.5822	0.3282	0.8669	0.8003	0.0334	0.0338	-0.0365	0.0872

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TD – total debt; LTD – long-term debt

Source: authors

companies. Namely, extra-large companies face relatively low bankruptcy risk due to their size, diversification, and market dominance. This allows them to use debt more strategically to exploit tax advantages without significant concern for financial distress. However, their lower reliance on debt for deficit financing (as shown by small pecking order coefficients) suggests that internal funds may dominate, and debt is used more selectively and conservatively.

Finally, Table 6 summarizes the results of empirical testing of the trade of and the pecking order theory for quoted and unquoted companies. Results for unquoted companies are in favour of the pecking order theory as only these coefficients are statistically significant and values of R^2 for both long-term and total debt are around 0.32. According to the size of b_{PO} coefficients, they finance around 19% of financial deficit with long-term debt, or around 23% of deficit with total debt. On the other hand, results for quoted companies are more in line with the trade-off theory, as the model for long-term debt achieved the highest value of R^2 (0.2786), and statistically significant coefficient b_{TA}=0.416. The size of the coefficient indicates that these companies return their financial leverage to target values moderately quickly. Although R^2 reached similar value (0.2554) for the pecking order theory for total debt, the coefficient b_{PO} is quite small, indicating quoted companies finance around 2.6% of financial deficit with total debt, whereby short-term debt is dominantly used. A moderately high speed of adjustment towards the target capital structure for listed companies is to some extent expected due to their easier access to the widest sources of financing, less restrictions on financing and consequently lower transaction costs quoted companies have.

Table 6: Results of empirical testing of the trade-off and the pecking order theory differentiated by the quotation on stock exchange

	unquoted				**quoted**			
VARIABLES	**(1) LTD**	**(2) TD**	**(3) LTD**	**(4) TD**	**(1) LTD**	**(2) TD**	**(3) LTD**	**(4) TD**
b_{TA}	0.169 (0.129)	0.116 (0.0608)			**0.416*** ** (0.0592)	0.311*** (0.0494)		
b_{PO}			**0.188** ** (0.0634)	**0.234*** ** (0.0574)			0.0042 (0.0036)	**0.0260*** ** (0.0033)
a_i	-0.0008 (0.0012)	-0.0003 (0.0015)	0.0107*** (0.0023)	0.0134*** (0.002)	-0.0023*** (0.0006)	-0.0038* (0.0017)	-0.001 (0.0009)	-0.0015 (0.0023)
Observations	114,742	114,742	114,742	114,742	4,515	4,515	4,515	4,515
No. of groups	16,392	16,392	16,392	16,392	645	645	645	645
r2_w	0.0817	0.0563	0.232	0.220	0.195	0.0840	0.00706	0.145
r2	0.1950	0.1809	**0.3267**	**0.3234**	**0.2786**	0.2021	0.1099	**0.2554**
r2_a	0.0609	0.0444	0.2144	0.2106	0.1583	0.0691	-0.0385	0.1313

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
TD – total debt; LTD – long-term debt

Source: authors

Conclusion

In this paper, the aim was to test the two prevailing theories of capital structure, the trade-off and the pecking order theory, on different samples of countries and companies, in order to inference about the explanatory power of these theories in settings different from economies in which capital structure theory had its genesis (i.e. listed companies in market-oriented developed countries). As the results show, no unique conclusions can be drawn since different sub-samples deliver different outcomes.

In general, results indicate that EU companies (Croatian and Slovenian) dominantly show behaviour consistent with the pecking order theory, while non-EU companies (Macedonian, Serbian and companies from Bosnia and Hercegovina) mostly show target-adjustment behaviour. Furthermore, when company characteristics are considered, it seems that the unquoted companies follow the pecking order in financing, while quoted companies are trying to maintain the target debt-to-equity ratios. When segmented by size, medium-sized companies to some extent follow the pecking order theory. Large companies mostly adjust to target debt levels respecting the pecking order of sources of financing. The results for extra-large companies do not indicate either one of the theories to be applicable to explain their financing policy.

The estimated coefficients and the explanatory power of the models generally deviate considerably from theoretical predictions and differ significantly from findings reported in some prior empirical studies. This leads to the conclusion that, although the trade-off and pecking order theories are to some degree suitable for describing the capital structures of companies in the sample, they are insufficient for fully explain their financing behaviour. However, we can try to offer some arguments why these theories did not prove successful in explaining capital structure behaviour of real-world companies in selected countries.

Most notably, the companies in our sample operate in countries with bank-oriented financial systems and underdeveloped, illiquid and shallow capital markets. Therefore, they have limited availability of financing instruments that they could use to fund their businesses. In other words, most of them do not have access to appropriate instruments to meet their diverse funding needs but are instead dependent on bank loans. These circumstances result in high bargaining power of banks, thereby restricting their ability to behave according to the assumptions of either theory.

Additional institutional weaknesses, such as higher macroeconomic instability, corruption risk, weaker investor protection, and limited market transparency, create pronounced financial constraints. All of this raises the cost of financing and limits companies' ability to freely optimize their capital structures. With this in mind, it is understandable that both, deficit financing and target reverting behaviour, could not be fully supported. It is thus unrealistic to expect that the theoretically assumed unit values (or empirically high values obtained for highly developed countries) of the coefficients will be achieved.

Moreover, it might be that these companies are not even interested in debt-equity optimization, i.e. focused on balancing the benefits and drawbacks of using leverage. Namely, as they operate in a moderately unstable economic environment, their primary focus could be on establishing reliable access to funding instead of insisting on a target capital structure, in order to ensure the financial stability of operations and investments in time.

There is also a possibility that firms tend to preserve or rebuild their debt capacity and therefore choose not to follow a strict pecking order or trade-off theory. Namely, they may have incentives to maintain their financial flexibility by avoiding using up all of their capacity, in order to be able to leverage up when needed to finance future needs. Therefore, they might try to maintain a financial policy that ensures them a reliable access to funding, without which they would not be able to undertake investment activities. The importance of financial flexibility has been emphasized by Graham & Harvey (2001), Bancel & Mittoo (2004), and Pecina (2024), and appears to be particularly relevant in the contexts studied.

Finally, there is a possibility that managers face informational difficulties in choosing a capital structure as stated in DeAngelo (2022). This might arise from the lack of or limited knowledge about the consequences a particular financial policy might result in, and/or noise in the available data based on which a manager could analyse a firm's value under different capital structure choices.

Despite our expectation that the pecking order theory would be more effective in explaining the capital structure behaviour of the companies in our sample, our findings did not support this hypothesis. Although the results suggest a somewhat higher explanatory power of the theory, the R^2 values and coefficient magnitudes are relatively low. This further supports the argument that existing theories, though helpful, do not capture the full complexity of real-world financing decisions in these institutional environments. Consequently, we find the previously discussed arguments to be quite plausible and potentially useful in understanding real-world capital structure behaviour, at least to some extent.

Finally, we acknowledge that our research has limitations. To maintain comparability with the Shyam-Sunder and Myers (1999) study, one limitation is potential endogeneity from unobserved or omitted variables. Future capital structure research should consider this, incorporating additional internal and external factors to better depict financing behaviour in bank-oriented systems. A second minor limitation is the 2009-2016 timeframe. While more recent data could offer further insights, it does not prevent us from addressing our research questions. Future research could explore more recent data to assess the stability of our findings and the impact of evolving financial and regulatory conditions in these countries.

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Conflicts of interest/Competing interests

There is no conflict of interest/Competing interests

Availability of data and material

The data that support the findings of this study are openly available within the article.

Code Availability

The computer program results are shared through the tables in the manuscript.

Authors' Contributions

Ena Pecina: conceptualization, investigation, methodology, data curation, writing – original draft, writing – review and editing, supervision
Irena Raguž Krištić: methodology, data curation, formal analysis, writing – review and editing
Andrija Sabol: data collection, visualization, writing – review and editing.

NOTES

1 Sample "… that covers the 1965 – 1999 period and on average includes more than 3000 firms".
2 Firms in the Center for Research in Security Prices and Compustat databases) for the period from 1971 to 2001.
3 They ranked firms each year into deciles according to their asset volatility in the previous year.
4 Due to the extensive nature of the analysis, it is not possible to present the results for the different sub-samples.
5 This paper uses panel data so the regression specification is slightly different from the original using cross-sectional data.
6 Formal Hausman testing also suggested the use of the fixed effects model, the results of which are available from the authors upon request.

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