THE IMPACT OF CAPITAL
STRUCTURE ON FIRM
PERFORMANCE: EVIDENCE FROM
UKRAINE

by

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Abstract

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This study investigates relationship between the capital structure and firm performance. The main hypothesis is that financial leverage positively affects firm activity through disciplining managers, tax shield and signaling effects. Using the sample of 16.5 thousand Ukrainian firms over 2001-2010 we found that relationship between the leverage and firm performance is actually negative. Conclusions seem to be robust to various performance measures and subsamples, as well as to alternative estimation methods. This result is not consistent with the free-cash-flow or trade-off theories of capital structure. However, the validity of the pecking-order theory is supported.

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GLOSSARY

ROA. Return on Assets

EBIT. Earnings before interest and taxes

EBITDA. Earnings before interest, taxes, depreciation and amortization

TFP. Total factor productivity

INTRODUCTION

This paper investigates the effect of capital structure on firm performance. More specifically, we test the direct effect of leverage on firm performance, following the agency cost theory introduced by Jensen and Meckling (1976) and the free-cash-flow theory proposed by Jensen (1986). Those theories predict that the choice of capital structure may affect firm performance.

Classical Modigliani-Miller theorem (1958) asserts irrelevance of debt-to-equity ratio for firm value. However, since the authors considered Arrow-Debreu environment (complete markets, no taxes, absence of transaction and bankruptcy costs), the theory about the debt irrelevance is hardly realistic. Later, Modigliani and Miller (1963) relaxed a no-tax assumption and developed a theory about tax benefits of debt. That paper gave rise to a serious academic discussion on the theory of capital structure.

There are two main benefits of debt for a company. The first one is the tax shield: interest payments usually are not taxable, hence the debt can increase the value of the firm. Another benefit is that debt disciplines managers (Jensen, 1986). Managers use free cash flows of the company to invest in projects, to pay dividends, or to hold on cash balance. But if the firm is not committed to some fixed payments such as interest expenses, managers could have incentives to "waste" excess free cash flows. That is why, in order to discipline managers, shareholders attract debt. Besides, it is a popular practice in debt agreements between banks and borrowers to introduce some financial covenants for firms (minimal level of the free cash flow, debt-to-EBITDA ratio, EBITDA-to-interest expenses ratio etc.). Managers cannot break these covenants, and hence are

bound to be more effective. In addition, the law usually guarantees a right of partial information disclosure to the company's debt holders, which serves as additional managers' supervision tool. As a result, actions of managers become more transparent, and they have more incentives to create higher value for the owners. This is the essence of "Free Cash Flow Theory" of capital structure (Jensen, 1986).

Extravagant investments is one of the ways in which managers may not behave in the owners' best interests. This is called "hazard problem". A standard example is huge exploration spending by oil industry managers in the late 1970s, when it was cheaper to buy oil on the Wall Street than to drill for it or to pump it. Besides, managers of the oil industry companies invested a large part of their excess cash into non-core activities (Jensen, 1988). Blanchard et al. (1994) showed that managers of firms who received cash windfalls often spent them on acquisitions of unrelated firms and other activities which did not create any value for shareholders. These and other facts prove that conflict of interest between managers and owners exists.

The agency cost hypothesis (Jensen and Meckling, 1976) predicts that higher level of debt is associated with better firm performance. Agency costs are costs which arise in agency conflict. There are several mechanisms through which high leverage may reduce agency costs and as a result increase firm value:

1. Monitoring activities of debt holders

2. Managers' fear of firm bankruptcy and liquidation, following misuse of funds, which may lead to losses of reputation and salaries

3. Reduction of overinvestments.

Undoubtedly, there are other ways for shareholders to discipline managers. For example, owners may commit managers to pay dividends, leaving less free cash flow at managers' disposal. As a result, firms with clear separation of managers and owners should pay higher dividends (Damodaran, 2010). However, in this study we concentrate only on debt as a disciplining mechanism.

Since the value of the firm is directly related to its performance (the better a firm performs, the higher its value is), economists study the relationship between leverage and firm performance in order to check Jensen's (1986) theory. Empirical studies have not reached an agreement about the relationship between leverage and firm performance yet. Coricelli et al (2011) in their EBRD study of Central and Eastern European companies showed hump-shaped relationship between the level of debt and productivity growth. At the same time, Majumdar and Chhibber (1999) found significantly negative effect of level of debt on firm performance, showing the failure of western corporate governance mechanisms in transitions countries. Two classical empirical studies of Harris and Raviv (1991) and Titman and Wessel (1988) lead to different empirical results even in basic facts about capital structure. Therefore, an empirical evidence of the relationship between leverage and firm performance is still not conclusive.

Ross (1977) applied "lemons and cherries" intuition of Akerlof (1970) to a corporate structure puzzle. He considered the choice of debt within the signaling theory framework. Firms with lower expected cash flows find it more costly to attract new debt. So, when the firm attracts new debt, it commits itself to future interest payments and signals about its stable financial position and ability to make these payments in the future.

There could also be inverse causality between firm performance and leverage. According to *efficiency-risk hypothesis*, higher efficiency of the firm reduces expected

costs of bunkruptcy, and such firms may attract more debt. On the other hand, according to *franchise value hypothesis*, more efficient firms would like to protect economic rent derived from their efficiency, and might choose lower leverage (Demsetz, 1973; Berger and Bonaccorsi di Patti, 2006).

Moreover, we may expect, that relations between leverage and firm performance will not be instantaneous and time lags could be present. Pecking order theory confirms this expectation and explicitly states that past rather than current firm performance could have an effect on capital structure.

In particular, we will explore the following questions: Does higher leverage results in better firm performance? Is debt a disciplinary mechanism of the decrease of agency costs and thus in the improvement of firm performance. Underdeveloped financial system makes Ukraine an interesting study case. Besides, answers to this question are particularly important for Ukraine, where corporate governance is quite weak (World Bank, 2006; Foo and Witkowska, 2011) and interest rates are high. There were several studies about the relationship between capital structure and firm performance in Ukraine (Myroshnichenko, 2004; Zheka, 2010; Talavera et al., 2011). However, all these authors considered leverage as a dependent variable and studied various aspects of the capital structure. Instead, the aim of this paper is to test whether capital structure affects firm performance in Ukraine.

Due to the homogeneous accounting standard, single-country study is preferable over multi-country studies. That is why we concentrate on a panel of 16.5 thousand Ukrainian. The period analyzed is 2001-2010, during which Ukraine felt economy stabilization (starting from 2001), large inflow of foreign capitals into Ukrainian banking system (2004-2008), and global financial crisis (starting from 2008).

Understanding the relationship between the company debt and value could provide useful insights for investors for two reasons. Firstly, shareholders would be able to target optimal debt-to-equity ratios, which may improve discipline of the managers, but does not overburden a firm with extraneous interest payments. Secondly, debt holders would have a tool in hand to identify overleveraged and underleveraged firms. This may help them allocate their funds more effectively.

The remainder of the paper is organized as follows. The next Chapter reviews the literature on the topic. Chapter 3 describes the methodology and the data. Further, Chapter 4 and Chapter 5 describe empirical results and Chapter 6 sum up the research and explain the results of the analysis.

LITERATURE REVIEW

In this chapter I will first show the evolution of capital structure theories (Modigliani and Miller, trade-off, pecking-order end others) and then present the most influential empirical papers.

2.1 Theoretical studies

One of the first works about the role of debt is Modigliani and Miller (1958). They claim that owners of the firms are indifferent about its capital structure, because the value of the firm does not depend on debt-to-equity ratio. Authors consider "an ideal world" without taxes and any transaction costs. Later Modigliani and Miller (1963) introduce taxes into their model and show that the value of a firm increases with more debt due to the tax shield.

Modigliani and Miller's work initiated further discussions about optimal capital structure. Since their theory predicts 100% debt financing (due to substantial corporate tax benefit), which is not observed in practice[1], there should be some trade-off costs against the tax shield. The actual level of debt is determined by tax advantage and these costs. Economists consider bankruptcy costs, personal tax, agency costs, asymmetric information and corporate control considerations as possible trade-off options against tax shield. This is the essence of the trade-off theory, according to which higher profitability is related to higher leverage due to the tax shield, but is not at the level of 100% of assets due to trade-off costs.

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[1] One possible reason of not observing full debt financing could be statutory requirements to the debt level.

Myers and Majluf (1984) developed a "pecking order" theory of capital structure, according to which firms initially use internal funds, then debt, and, if a project requires more funding, equity. Therefore, firms which are very profitable and generate sufficient cash flows will use less debt.

Further studies of the relationship between leverage and firm performance can be divided into two groups. The first one is based on the information asymmetries and signaling. Ross (1977) came up with a model that explained the choice of debt-to-equity ratio by a willingness of a firm to send signals about its quality. The core idea of Ross (1977) is that it is too costly for a low-quality firm to abuse the market and signal about its *high* quality by issuing more debt. As a result, low quality firms have low amount of debt, and the leverage increases with the value of a firm. A similar model was developed by Leland and Pyle (1977): the higher is the quality of the project manager wants to invest in, the higher is the willingness of the manager to attract financing. That is why a risky firm will end up with lower debt.

The second group of studies explains the relationship between capital structure and firm performance through the agency costs theory, developed by Jensen and Meckling (1976) and Myers (1977). Agency costs are related to conflicts of interest between different groups of agents (managers, creditors, stockholders). There could be two types of agency problems.

- **An agency problem between managers and shareholders**. It arises whenever managers own less than 100% of shares of firm's assets due to unwillingness of managers to do their best in order to maximize firm value (which is preferable for shareholders). Jensen (1986) considered benefit of debt as a restriction of managerial discretion and stated that "the problem is how to motivate managers to disgorge the cash rather

than invest it below the cost of capital or waste it on organizational inefficiencies". Managers of low-indebted firms are inclined to spend free cash flows more freely, thus taking less effective projects and generating lower return. In the opposite situation, when a company has debt in its capital structure, managers are committed to make interest payments, thus having less free cash flow left and choosing a more effective way to distributing these cash flows. An alternative point of view is that shareholders delegate some part of their control over managers to debtholders, giving possibility to evaluate firm performance to capital markets.

A similar idea, but from a slightly different point of view, was suggested by Grossman and Hart (1982). Firms, which are mostly equity financed, have very low risk of bankruptcy. Managers of such firms are not penalized in case of low profits and have no incentives to be more effective. Besides, bankruptcy implies some personal costs for managers, such as loss of reputation etc. Thus, the addition of debt disciplines managers, as the incentive effect arises from the desire to avoid bankruptcy. To sum up, an increase of leverage is followed by better corporate performance according to this type of agency problem.

Another theory about managers acting in their own interests was proposed by Harris and Raviv (1988). They explain higher leverage as an antitakeover instrument: – firms with a large amount of debt will be less likely to become a target for acquisition. That is why managers, who are afraid to lose their job after takeover, may be willing to accumulate higher than necessary amount of debt.

- **An agency problem between stockholders and debt holders**. This type of a problem is rooted in the conceptual difference between stockholders and debt holders. The former take more risks and demand higher return, whereas the latter take less risk and agree with lower return. Hence, shareholders may want to take projects with higher risk than debt holders would prefer. In the case of success of these projects stockholders will earn extra return, while in the case of failure all losses will be between debt holders and stockholders (Jensen and Meckling, 1976). As a consequence, more indebted firms take lower-risk projects. On the other side, Myers (1977) showed that discrepancies in goals between debt holders and shareholders could lead to underinvestment. As a result, higher leverage might as well lead to poorer corporate performance.

Summary of all capital structure theories is shown in Table 1:

Table 1. Summary of capital structure theories.

Theory	Relationship	Causality
Modigliani and Miller (1963)	Positive	Performance affects debt
Trade-off	Positive	Performance affects debt
Pecking-Order	Negative	Performance affects debt
Free-cash-flow	Positive	Debt affects performance
Signaling	Positive	Performance affects debt
Agency problem	Negative	Debt affects performance

Thus, theories provide quite alternative views on the relationship between leverage and firm performance. This is when empirical studies are appealed to decide between them.

2.2 Empirical evidence

All empirical studies on the relationship between leverage and firm performance can be divided into two groups. Researchers from the first group consider leverage as the dependent variable and try to seek for its determinants, including indicators of firm performance. The second one looks at determinants of the firm performance, including leverage as one of explanatory variables. We will design this study in accordance with the second group, considering leverage as the choice variable for maximizing the firm value.

Berger and Bonaccorsi di Patti (2006) examined the dualistic relationship between leverage and firm performance for the U.S. banking industry, using a parametric measure of profit efficiency as an indicator to measure agency costs. They confirmed the agency cost theory: higher leverage is associated with better firm performance. Margaritis and Psillaki (2007) considered a similar relationship for a sample of New Zealand small and medium sized enterprises using distance functions as a measure of firm performance, and also found support for the agency cost theory.

Many recent studies addressed influence of leverage on firm performance for developing markets. Majumdar and Chhibber (1999) showed, that in India leverage was negatively related to firm performance measured as profitability. Pushner (1995) found negative effect of leverage on firm performance measured as the total factor productivity (TFP) in Japan. Nickell et al (1997) and Nickell and Nikolitsas (1999) in their studies for the United Kingdom observed some positive relationship between indebtedness and TFP. Booth et al. (2001) in their

study of 10 developing countries found negative relation between leverage and firm performance. Onaolapo and Kajola (2010) found a significant negative impact of leverage on financial measures of firm performance in Nigeria.

The idea that high leverage disciplines managers was initially associated with leveraged buy-out (LBO) procedures, where it was noted that an increase in debt increases productivity. The boom of LBO in the USA was followed be several studies on the post-LBO firm performance (Lichtenberg and Siegel, 1990). Since LBO procedure implies an increase in debt-to-equity ratio, researchers appealed to performance of firm after LBO. Palepu (1990) showed the increase in operational efficiency of firms involved in leveraged buyouts. Kaplan (1989) and Smith (1990) also considered leveraged buyouts and discovered the increase in return on equity after LBO. Denis and Denis (1993) found the increase in return on equity in the firms after leveraged recapitalization.

There were several empirical papers regarding Ukrainian practice. Myroshnichenko (2004), Zheka (2010), and Talavera et al. (2011) considered leverage as dependent variable and studied its determinants. They found that in Ukraine, the pecking order theory holds for short-term financing, and the trade-off theory holds for long-term financing (Myroshnichenko, 2004); observed leverage is not a desired leverage (Zheka, 2010), and financial frictions and access to capital markets strongly affect the choice of debt maturity. Zheka (2010) also showed that profitability has no effect on leverage. Grechaniuk (2009) studied the influence of CEO gender on firms leverage controlling on ROA and discovered that ROA negatively affects debt-to-equity ratio. All these studies aim to find out which factors affect a particular choice of debt level. Still, to the author's knowledge, there are no studies about the effect of leverage on firm performance controlling for other performance determinants. Besides, it is worth differentiating long- and short-term debt as those with different risk-return

profiles, as well as investigating the relationship between leverage and firm performance across different industries.

To sum up, there is no consensus on the relation of leverage and firm performance, and further research is called for. This paper provides empirical evidence for existing capital structure theories and thus contributes to the abovementioned literature.

METHODOLOGY

In this study we rely upon the dynamic model of the relationship between debt accumulation and company's performance. Here we mainly follow Berger and di Patti (2006) as well as Margaritis and Psillaki (2007, 2010).

Managers are assumed to have zero shareholding in the firm. Otherwise managers will have no incentives to take a low value projects, as they maximize their own wealth. Besides, we assume that managers want to avoid firm liquidation and prefer not to pay dividends to shareholders.

The literature suggests many ways of measuring performance of the firm. Smith (1986) empirically observed that firms, which attract debt and repurchase shares, demonstrate a stock price increase, while firms, which issue stock and repurchase debt, demonstrate a decline in the stock price. Harris and Raviv (1990) also studied share price performance after changes in debt. Morck, Shleifer, and Vishny (1988), Mehran (1995) and others used Tobin's Q (ratio of the firm market value to the book value of total assets) as a measure of firm performance which combines market and accounting values. All these approaches require the market price of the stock of the company and are suitable only for countries with efficient and liquid stock market.

Since Ukrainian market is illiquid and hardly reacts to information about firms through price changes[2] (Serdyuk et al, 2012), these measures of firm performance were not suitable for this research. As possible alternatives, Gleason et al (2000)

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[2] Additional information about Ukrainian stock market liquidity may be found here:

http://go.worldbank.org/BLCA5JENS0

and Hammes and Chen (2004) used ROA as a measure of firm performance. Other authors claimed that basic accounting ratios are not proper indicators of firm performance, and more sophisticated tools, such as TFP (Pushner, 1995; Nickell et al, 1997; Nickell and Nikolitsas, 1999) or Data Envelopment Analysis (Berger and di Patti, 2006; Margaritis and Psillaki, 2007, 2010) should be used. Finally, some researchers propose to use indicators of firm performance which are less common for developed countries but specifically designed for emerging and transition countries. They include share of export sales (Bevan et al., 1999), changes in earnings divided by lagged value of assets, or growth in sales (Gibson, 2003).

Taking into account that each performance variable has its own advantages and disadvantages, we used 3 measures of firm performance: return on assets, return on sales (or EBIT margin), and Total Factor Productivity (TFP). Return on Assets is defined as operating income (EBIT) divided by the average book value of assets, and EBIT margin is defined as operating income divided by net revenue. TFP was estimated using Olley and Pakes (1996) approach.

The main variable of interest is **leverage.** According to Rajan and Zingales (1995) and Michaelas et al (1999), we defined leverage as interest bearing debt-to-assets ratio. Although the agency costs theory predicts a positive effect of leverage on firm efficiency, it may not be true for highly indebted firms. Such firms meet strong financial constraints which may negatively affect performance (Berger and di Patti, 2006). Besides, linear relationship between leverage and firm performance is not consistent with the trade-off theory. According to this theory, a firm tends to the optimal capital structure, and it is impossible to optimize the firm value if the relationship between the leverage and the firm performance is linear. To address these issues, we also included a squared **leverage** term. In addition to that, we will distinguish between total leverage (total interest bearing

debt-to-assets ratio) and long-term leverage (long-term interest bearing debt to total ratio. The main reason for this is that short-term debt is attracted to finance operational activity and usually does not imply periodic interest payments. On the other hand, long-term debt commits managers to fixed payment and could be considered as a disciplining mechanism.

We also control for other variables that affect firm performance:

Size. A number of studies showed that the firm size is an important performance determinant. Size has an ambiguous effect on firm performance. Larger firms are usually more diversified, benefit from the economy of scale, have more capacities and resources (Frank and Goyal, 2003). Larger firms may also have economy of scale in monitoring top management (Himmelberg et al, 1999). On the other hand, a large firm could be less efficient because it becomes harder for managers to control the efficiency of operational activities with the firm growth (Himmelberg et al, 1999; Sarkar and Sarkar, 2000). Besides, small firms are more likely to be managed by owners, and in this case there is no conflict of interest, and associated agency costs. That is why, we allow for nonlinearities by including **lnSales** and **lnSales^2** as controls for the firm size.

Industry. Firm performance may differ across industries. We account for the industry effect by including a set of dummy variables for industries using Ukrainian Classification of Economic Activities.

EXIT / ENTRY. Two more important variables are dummies EXIT (indicates whether a firm ended its activity this year) and ENTRY (indicates whether a firm started its activity this year). We expect a negative sign for EXIT dummy, since one of the reasons for a firm exit from the market is its poor performance. Also we expect a positive sign for ENTRY dummy, since newcomers usually have newer technologies.

In order to capture the effect of business cycles and all external factors on firm performance, we included a set of year dummies.

Since our dataset is an unbalanced panel, we have individual fixed effects for each firm. This may lead us to upward biased results (Bond, 2002), while using pooled OLS estimation. Instead, we use Least Square Dummy Variable regression with robust standard errors in order to capture fixed effects and address possible heteroskedasticity issues. The final equation is:

$$\text{PERF}_{i,t} = \beta_0 + \beta_1 \text{LEV}_{i,t} + \beta_2 \text{LEV\_SQ}_{i,t} + \beta_3 \text{lnSALES}_{i,t} + \beta_4 \text{lnSALES\_SQ}_{i,t} + \beta_5 \text{EXIT} + \beta_6 \text{ENTRY} + \beta_7 \mathbf{X}_{i,t} + \beta_8 \mathbf{Y}_{i,t} + u_i + \varepsilon_{it} \tag{1}$$

where $\text{PERF}_{i,t}$ is a variable which measures firm performance (ROA, EBIT_margin, logarithm of TFP), $\text{LEV}_{i,t}$ is leverage, $\mathbf{X}_{i,t}$ – set of industry dummies, and $\mathbf{Y}_{i,t}$ – set of annual dummies.

We expect a positive sign for β_1 and a negative sign for β_2 (inverse U-shaped relation between firm performance and leverage) according to agency cost theory and particularly free-cash-flow hypothesis.

Empirical studies also show the effect of other variables (R&D expenditures, age of the firm, ownership, corporate governance) on firm performance, but it is hard to control for it due to the data limitations.

DATA DESCRIPTION

To estimate the relationship between leverage and firm performance we used the firm-level financial data set provided by National Statistics committee of Ukraine and available from KSE data center. It includes balance sheets and income statements of the sample of companies with different forms of incorporation for the period of 2001-2010, as well as other firm-specific information (industry, organizational type etc.). The initial dataset is an unbalanced panel of 21,595 enterprises and 115,762 observations.

From all possible organizational structures available in Ukraine we keep open joint-stock companies, closed joint-stock companies and limited liability companies to preserve a homogeneous incorporation form in the sample. Firms with other forms of incorporation constitute only 6.5% of the sample, but in its majority represent non-market entities (state-owned enterprises, consumer cooperatives, trusts, holdings, commodity exchanges, pension funds etc.) and could distort the results of our study. After dropping such companies we are left with the 20,184 firms and 109,254 observations.

9.5% (10,593) of observations have negative value of equity at the beginning or at the end of the year. It means that during some period of time such firms accumulated large losses, but did not go bankrupt. As a result, these firms have abnormally high (above unity) level of debt. Such a situation is possible in emerging markets, but is somewhat unusual. That is why we excluded such firms from the analysis, as there could not be rational behavior with regard to capital structure decisions for them. Besides, we dropped observations with higher than

1 EBIT margin (as such a situation is not possible) and extreme outliers for ROA (±0.1% of observations).

We also excluded companies from the finance and insurance industry as their ways of financing are significantly different from those of firms from other industries. After all cleaning procedures the data set consists of 16,495 firms and 86,446 observations.

Ukrainian firms prepare their financial reports according to Ukrainian accounting standards rather than International Financial Reporting Standards (IFRS). Despite the fact that all open joint-stock companies are required to be audited, it is sometimes possible to have accounting errors in financial statements for all types of firms. But since we cannot reveal these mistakes and the size of the sample is quite large, we can neglect accounting errors.

The dataset is unbalanced panel. Only 2,794 (15.6%) firms have observations for all ten years. Total annual number of firms is shown at Figure 1.
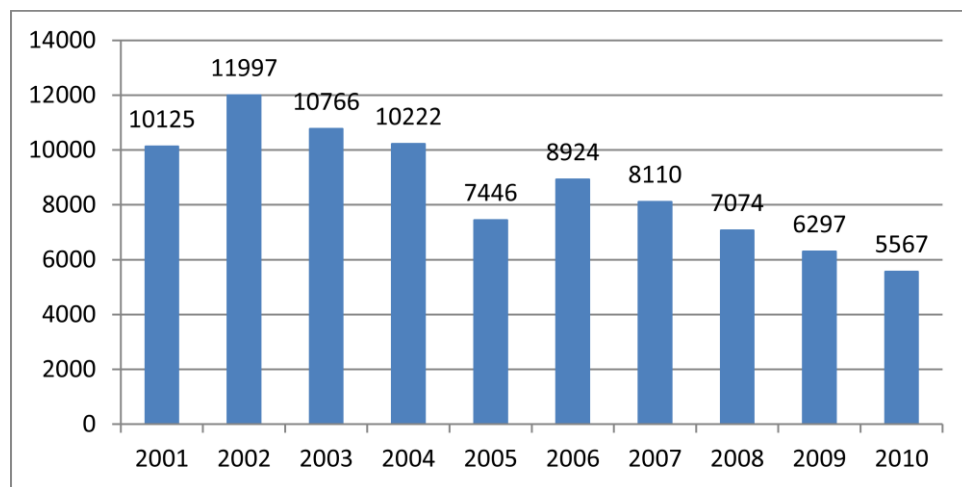

Figure 1: Annual number of firms

One interesting finding is that in 49% of observations firms don't have debt at all. Due to this fact the average ratio of interest-bearing debt to total assets is 0.071. This observation is consistent with the finding of Caprio and Demirguc-Kunt (1998) and Shmukler and Vesperoni (2006), who explained low leverage in emerging countries by low profitability and limited access to capital markets. In particular, 12693 firms never had debt on their balance during 2001-2010. As a result, there is a huge amount of observations with leverage equal to 0 (Figure 2).
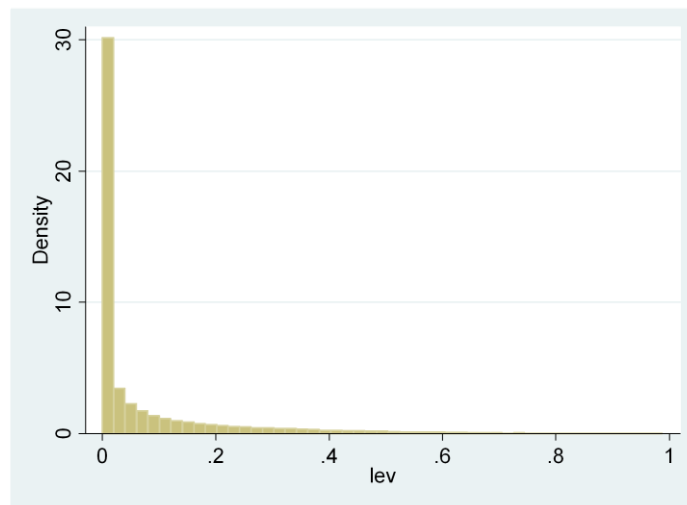
Figure 2: Density of leverage

Table 2 shows descriptive statistics of the variables included into regression in (1). Figure 3 depicts the distributions of two variables from Table 3: ROA and EBIT margin.

Table 2. Summary Statistics (2001-2010)

Variable	Mean	Std.Dev.	Min	Max
ROA	0.0177	0.1370	-0.9912	0.9922
EBIT margin	-0.0780	0.3249	-2	1
Lev	0.0713	0.1363	0	0.9875
Sales, UAH	729,446	7,521,004	1	913,000,000
Exit	0.0835	0.2767	0	1
Entry	0.0594	0.2365	0	1

Total number of observations is 86,528
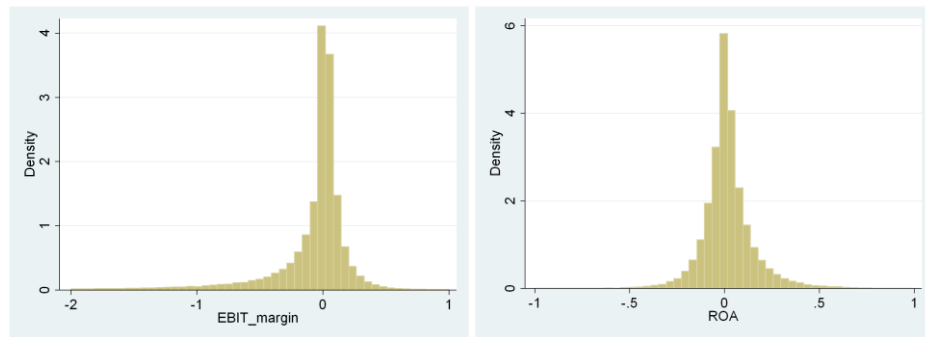
Figure 3: Distribution of return on assets and EBIT margin

On average Ukrainian firms have negative operating income margin with slightly left-skewed distribution (Figure 3), but positive and very low return on assets (ROA). Possible reasons for such poor operational performance might be the fact that firms underreport profits in order to avoid tax burden (Myroshnichenko, 2004).

Due to the large amount of completely equity-financed firms, an average firm finances only 7% of its assets through debt. During the observed period 2001-2010, 5,151 firms of the sample entered the market, and 7,294 firms of the sample left the market (Figure 4).
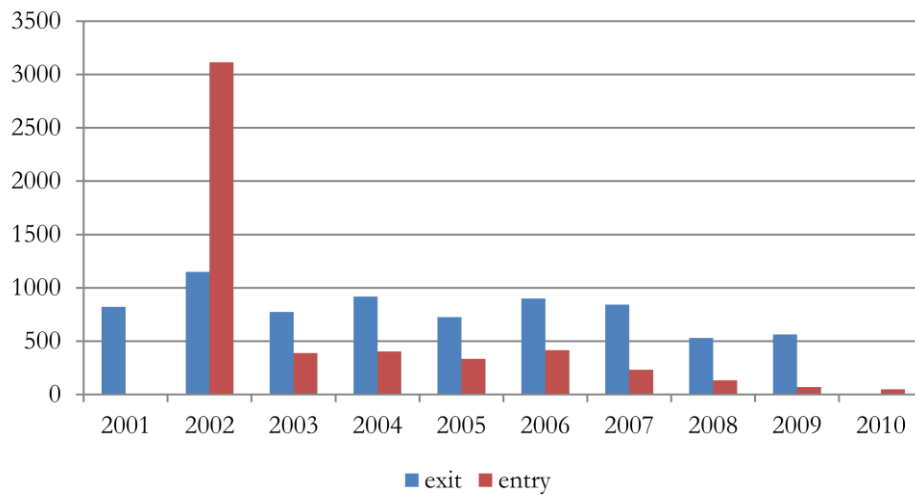
Figure 4: New entrants and exitors in the sample

Total factor productivity was estimated for the paper "Ukraine case study: Jobs and Demographic Change" (Kupets et al, 2013) using Olley and Pakes (1996) procedure and was provided by one of the authors. TFP estimations are available only for 2001-2009 years. Due to absence of data required to estimate production function for 2010, models with TFP uses smaller amount of observations than models with ROA and EBIT margin.

RESULTS

First, we present results for the whole sample of firms, and then for the sub-samples. Finally we will explore the change in results if endogeneity is assumed.

5.1 Results for the overall sample

Results of the fixed effect[3] regressions are the following:

Table 3. Regression results for the entire sample

	ROA	EBIT margin	TFP
leverage	-0.098***	-0.119***	-0.458***
	(0.015)	(0.024)	(0.084)
leverage_sq	0.102***	0.144***	0.594***
	(0.024)	(0.042)	(0.151)
ln(sales)	-0.002	0.367***	0.531***
	(0.005)	(0.019)	(0.042)
ln(sales)_sq	0.002***	-0.011***	-0.004*
	(0.000)	(0.001)	(0.002)
exit	-0.003	-0.011**	0.121***
	(0.002)	(0.005)	(0.010)
entry	0.011***	0.018***	0.072***
	(0.002)	(0.004)	(0.012)
_cons	-0.182***	-2.648***	-8.821***
	(0.027)	(0.112)	(0.224)
N	86528	86528	65072
R^2	0.094	0.177	0.345

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
(i) All equations include 53 industry dummies and 9 years dummies
(ii) Fixed effects (FE) are included with robust standard errors

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[3] We also estimated also random effect regressions, but according to Hausman test fixed effect regressions should be used

As one can see, our initial hypothesis about the inverted U-shaped relation between leverage and firm performance can be rejected. The result is stable for all measures of firm performance. We can observe a negative effect of leverage on ROA, EBIT margin and TFP. A possible explanation can be found in McConnell and Servaes (1995): negative effect of leverage on performance tends to exist for high-growth firms, whereas positive effect dominates for low-growth companies. The presence of debt binds the firm to fixed payments in the future, and managers should postpone some positive net present value projects. The opposite situation occurs for firms with low investment opportunities. Debt is an instrument that prevents managers from investing in negative net present value projects. As a developing market, Ukraine potentially provides more growth opportunities. This is a possible reason to observe negative dependence between leverage and firm performance.

In addition to that, Ukraine felt went through a credit boom in 2004-2008. It was very easy to receive a loan since requirements to the firms were very soft. But when the crysis came, firms might found it hard to repay debt. So, an increase in leverage resulted in worse performance.

The next possible explanation is related to the high level of shadow economy (Schneider, 2003). In Ukraine there exist schemes when firms attract debt, but then owner uses it for other purposes (funds are transferred away from the company). Finally the firm is left with debt burden, which certainly influence its performance (as credit fund where not used to benefit the firm).

Regarding the other variables, firms which are going to exit the market, demostrate worse financial performance on average than incumbents for EBIT margin specification. But in TFP specification exitors perform better than those firms which are on the market. So, only those firms left the market, which meet

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financial difficulties, but such firms are not necessarily the ones with poor economic productivity. As was expected, new market players on average perform better than the existing firms. The results about the effects of EXIT and ENTRY variables on firm performance are close to expected.

The hypothesis about the dualistic nature of the firm size impact on firm performance is confirmed when EBIT margin or TFP as the measure of performance is used, but is not confirmed when ROA is used.

5.2 Results for the long-term leverage

After testing the relationship between the leverage and firm performance for the entire sample, we used the long-term leverage as a variable of interest. When short-term debt is usually attracted to support operational activity and finance working capital, long-term debt is used to finance investment activity and capital expenditures. It is the long-term debt that creates future interest payments, which disciplines a manager according to the free-cash-flow hypothesis. We defined long-term leverage as the ratio of long-term interest bearing debt to total assets. The results of the regression are presented in the Table 4.

Dependence between leverage and firm performance also has U-shaped form (as in case of usual leverage) if performance is measured by ROA or TFP. The only difference is that in case of EBIT margin quadratic term of leverage is not statistically significant.

Table 4. Regression results for the long-term leverage

	ROA	EBIT margin	TFP
leverage	-0.067***	-0.063**	-0.482***
	(0.016)	(0.030)	(0.109)
leverage_sq	0.081***	0.075	0.680***
	(0.028)	(0.059)	(0.224)
ln(sales)	-0.002	0.367***	0.531***
	(0.005)	(0.019)	(0.042)
ln(sales)_sq	0.002***	-0.011***	-0.004**
	(0.000)	(0.001)	(0.002)
exit	-0.003	-0.010**	0.121***
	(0.002)	(0.005)	(0.010)
entry	0.011***	0.017***	0.072***
	(0.002)	(0.004)	(0.012)
_cons	-0.180***	-2.645***	-8.813***
	(0.027)	(0.112)	(0.225)
N	86528	86528	65072
R^2	0.093	0.177	0.345

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
(i) All equations include 53 industry dummies and 9 year dummies
(ii) Fixed effects (FE) are included with robust standard errors

5.3 Results for industry sub-samples.

Finally we divided our sample by subsamples according to industry characteristics. All firms in the sample operate in 58 sectors according to the Ukrainian Classification of Economic Activities. These activities were aggregated into 10 industry groups, one of which – financial services – was not taken into consideration. Only leverage and squared leverage regression coefficients in regressions for each industry are presented in Table 5.

For most of the industries leverage appears to have no impact on firm performance. The only difference is the manufacturing, where estimated coefficients are highly statistically significant in all specifications. Less significant

are the results for transport and energy sectors, but for both these industries the conclusion is the same: financial leverage negatively affects firm performance.

Table 5. Regression results across industries

Industry	Share of Observations	ROA		EBIT margin		TFP	
		leverage	leverage_sq	leverage	leverage_sq	leverage	leverage_sq
Food Production	12.32%	-0.08*	-0.01	-0.17*	0.06	-0.26	0.27
Mining	2.26%	-0.06	0.00	-0.10	0.35	-0.20	-0.08
Manufacturing	35.44%	-0.13***	0.14***	-0.11***	0.13**	-0.39***	0,42**
Transport/ Energy	11.23%	-0.07	0.17*	-0.16**	0.2*	-0.57***	1.30***
Construction	9.31%	-0.08	0.06	-0.04	0.02	-0.01	-0.11
Retail and Wholesale	11.99%	-0.06*	0.07	-0.08*	0.10*	-0.43*	0.16
Hotels	1.20%	0.08	-0.14	-0.17	0.17	0.61	-0.78
Services	8.48%	-0.03	0.02	0.03	0.01	-0.09	0.13
Education, health, sport	1.71%	0.14	-0.17	-0.15	0.10	-0.37	0.40

5.4 Possible endogeneity remedies

Since there could be the dualistic relationship between leverage and firm performance (as it is shown in Table 1), we performed endogeneity analysis applying Instrumental Variables approach. We used two instrumental variables: average industry leverage and tangibility of assets. The first one is calculated as the average of all other firms in the industry excluding own firm. This way of creating industry average allows creating variability in this variable. This variable should correlate with firm leverage, but should not have any direct impact on firm performance. The second instrumental variable is tangibility of assets, as proposed by Aivazian et al. (2005). Using this variable as an instrument can be

justified by the following logic: tangible assets could be used as collateral for attracting new debt, so leverage should increase with tangibility. We measure tangibility as the ratio of tangible assets to total assets.

In order to estimate the coefficient we applied IV estimation procedure, developed by Shaffer (2010) for fixed effects panel data models. The results of the estimation are presented on the Table 6:

Table 6. Instrumental Variables Regression Results

	ROA	EBIT margin	TFP
leverage	-0.808***	0.231	-5.168***
	(0.212)	(0.362)	(1.207)
leverage_sq	1.129***	-0.363	7.644***
	(0.307)	(0.525)	(1.818)
ln(sales)	-0.002	0.367***	0.485***
	(0.004)	(0.015)	(0.030)
ln(sales)_sq	0.002***	-0.011***	-0.001
	(0.000)	(0.001)	(0.002)
exit	-0.005**	-0.010**	0.109***
	(0.002)	(0.005)	(0.009)
entry	0.014***	0.016***	0.085***
	(0.002)	(0.004)	(0.011)
N	83,921	83,921	62,358
R^2	0.041	0.174	0.303
Endogeneity test (p-value)	0.0005	0.2907	0.0000
Sargan-Hansen test (p-value)	0.6275	0.6147	0.0000

Standard errors in parentheses
$^*\,p < 0.10$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$
(i) All equations include 53 industry dummies and 9 year dummies
(ii) Fixed effects (FE) are included with robust standard errors
(iii) Endogeneity test is Durbin-Wu-Hausman test. Null hypothesis is that the specified endogenous regressors can be treated as exogenous.
(iv) Sargan-Hansen test is a test of overidentification restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

Instrumental variables seem to be valid instruments in ROA specification only: we reject the null hypothesis that leverage is exogenous parameter (low p-value in the endogeneity test), and conclude that tangibility and industry average are correct instruments (according to Sargan-Hansen test we do not reject null hypothesis about the validity of instruments). After correcting for the endogeneity issue, we observe the same negative and statistically significant relationship between leverage and firm performance.

Tangibility and industry average leverage do not solve endogeneity problem in EBIT margin and TFP specifications. In the first situation we conclude that there is no endogeneity problem, but estimated coefficients are not statistically significant. So it is impossible to identify the relationship between leverage and firm's EBIT margin. In the second situation Sargan-Hansen test indicates that leverage is endogeneous variable, but tangibility of assets and average industry leverage are not valid instruments.

CONCLUSIONS

On a sample of 16.5 thousand Ukrainian firms we tested the relationship between capital structure and firm performance. We found that debt behavior of Ukrainian enterprises does not follow the free cash flow theory of capital structure. In particular, leverage is found to negatively affect firm performance, measured as the return on assets, operating profit margin, or total factor productivity. The purported relationship between leverage and firm performance remains stable with a different leverage measure, long-term interest bearing debt instead of total interest bearing debt. When the analysis was repeated for separate industry subsamples, it was revealed, though, that the only two industries in which the relationship holds are manufacturing and transport/energy.

In order to handle a possible endogeneity problem, we applied instrumental variables technique. Average industry leverage and asset tangibility were found to be good instruments for leverage in ROA specification. We found the same U-shaped relationship between leverage and ROA. In the case of TFP and EBIT margin specifications the results are not so conclusive, as we apparently failed to found valid instruments.

Nevertheless, our analysis lets us assert that company's indebtedness negatively affects firm performance. We found several possible explanations to this fact:

- Market for corporate control is not effective in Ukraine. According to Jensen (1986), free-cash-flow hypothesis holds only if there exists

efficient market for corporate control. If it is not the case, the negative relationship between leverage and firm performance should be observed.

- Developing countries have high growth potential. Debt financing in such conditions makes a firm to commit future fixed payments and thus deters investing in immediately available projects with higher returns rates

- High real interest rates jeopardize future financial stability of Ukrainian companies in case of debt financing.

- Tax shield argument is not working in Ukraine because many firms create affiliated structures abroad and shift profit centers to offshores to avoid paying taxes in Ukraine.

- Debt seems not to discipline managers due to soft budget constraints and lack of governance control.

Our results are similar to Majumdar and Chhibber (1999) for India and Booth et al (2001) for 10 developing countries. Apparently, negative relationship between productivity and leverage reflects difficulties in borrowing in developing countries. Besides, in order to attract debt to developing market, a firm must be profitable (because of information asymmetries developed in such markets).

This study will conclude with some challenges for future research. First, it might be a good idea to include ownership data into this analysis. As was shown by Himmelberg et al (1990), a large part of firm performance could be explained by ownership structure: large blocking shareholders, presence of state among the shareholders, presence of foreign investors in company's equity, etc. Besides, it is worth to control for the age of the firm, sales diversity, the share of foreign investments in the capital, and other variables which may affect firm

performance. Second, since not all firms in our sample could have an access to capital markets and therefore could have used trade credits and other kind of liabilities, it is reasonable to explore the effect of another measure of leverage, such as total liability-to-assets ratio (Coricelli et al, 2011).

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