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Impact of the information on tax burden on the
stock market

Jolana Stejskalová

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Research Centre

Faculty of Business and Economics

Mendel University in Brno

Zemědělská 1, 613 00 Brno

Czech Republic

<http://vyzc.pef.mendelu.cz/en>

+420 545 132 605

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Abstract

Jolana Stejskalová: **Impact of the information on tax burden on the stock market**

The paper investigates the relationship between the stock price returns and news about the tax burden of US companies listed on NASDAQ. Special emphasis is put on the role of perception of the news related to changes in tax burden. Using Google Search data, I show that increasing tax searches decrease stock prices. The study investigates the positive relationship between news about tax burden and stock prices, in particular, shocks. The evidence is shown by a variable which provides only the highest search intensity of the economic agents in a specific year. The OLS estimations focus on data in 2004 and in 2005. Changes took place in taxes introduced by president George W. Bush which had great impact on search intensity within the period. He enacted tax breaks for overseas corporate profits. Additionally, I differentiate between the market capitalization by using the dummy variables. Thus I trace the effects separately for the two groups. The results confirmed a higher impact of perception on large cap companies and point out the importance of sentiment analysis at liquid markets.

Keywords

Google trends, corporate tax, sentiment, stock price, search intensity, capitalization, tax burden

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Contacts

Jolana Stejskalová, Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xstejsk2@pef.mendelu.cz.

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Introduction

Taxation is one of the long-standing themes in corporate finance literature. Taxes have impact on companies' profits because of increasing their costs. Thus, there are a number of questions about how taxation affects a firm's decision-making and also a number of studies investigate for example whether corporate payout has any effect on a firm's investment choice (Becker, Jacob and Jacob, 2013). Some works have expressed the relationship between tax and dividend distribution (Alzahrani and Lasfer, 2012; Korkeamaki, Liljebloom and Pasternack, 2010; Alstadsaeter and Fjaerli, 2009). I look at a different side of the issue. My contribution is to focus on the question of how information about taxation affects an investor's decision-making.

In 2006, Amromin et al. focused on the hypothesis that a decrease in tax on dividends had an impact on stock prices in 2003. The Senate reduced the maximum tax rate on dividends from 35 % to 15 %. They substantiated their hypothesis, e.g., by comparing newspaper articles on the topic of the development of stock prices published by 15 of the greatest American newspapers. I thus presume that the market is influenced not only by the changes in taxes but also by the information from the media, with an influence being reflected in changes in stock prices.

Nowadays, taxes are a much-discussed topic, which concerns especially corporate tax. In the United States, the public wants the government to both reduce corporate tax and to focus on loopholes to ensure that American corporations pay as much on foreign profits as they do on profits made in the United States. Thus I focused on corporate taxes due to recency and related search intensity and the interest of society. The identification of market reaction on information in the media could be useful for more efficient tax policy.

The study also focuses on the differences in the processing of media information related to market capitalization. Dummy variables allow the inclusion of specific conditions. Thus the effects are traced separately for the two groups. The hypothesis is that high capitalization companies are more sensitive to tax-related information than low capitalization companies. One of the explanations is that these companies are more known. The study thus presumes the availability of more information for investors. Therefore, the study's findings could also be used to achieve more efficient business valuation.

The objective of the paper is to demonstrate that tax burden influences stock prices not only through the tax rate but also through the information that the investor receives about the tax burden using the search intensity data provided from Google trends.

1 Literature review

There are several important groups of factors which have impact on the stock market and their variables are able to explain the changes in stock prices. The fundamental factors appear to be important variables in the prediction of stock price volatility. It was proven that there is a connection between the fundamental factors (industrial production, dividend yields,...) and the stock market by Keim and Stambaugh back in 1986 and others, Fama and French (1989), Balvers et al. (1990), Chen (1991) and Lee (1992). Other studies, e.g. those conducted by Fama (1990), Schwert (1990) and Barro (1990), reported that several economic variables helped to predict future movements in stock return in the United States. According to the topic of this paper tax rates have significant influence on stock prices which was proven by a number of studies (e.g. Blouin, Raedy, and Shackelford, 2002; Ayers, Lefanowicz, and Robinson, 2003; Dhaliwal, Li, and Trezevant, 2003). The studies investigate that tax burden has an impact on stock prices (e.g. Günther and Willenborg, 1999). Thus it appears to be the right variable for investigation. I work with corporate tax which was used in several studies (Günther and Willenborg) proving the influence of taxes on corporate cost, with a reduction in tax burden leading to an increase in stock prices.

The later studies focused on the stock market sentiment related to the attitude of investors towards securities. The other important group of factors are expectations. Evans and Honkapohja (2001) used investors' expectations as one of the variables. Psychological factors have been used by many researchers; Evans and Honkapohja (2003), for instance, employed them in their study of monetary policy. Other studies include Milani (2014) and Carceles-Poveda and Giannitsarou (2008).

Thus in the case of taxes it is appropriate to focus not only on the changes in taxes but also on the perception of the news related to changes in tax burden. The studies look at the importance of salience for proving the effect of sentiment. One of the experiments shows that commodity taxes that are included in the posted prices have greater effects on demand because consumers see them during shopping (Chetty, Looney and Kroft, 2009). Another study (Finkelstein, 2009) presents evidence of two potential mechanisms by which reduced salience may contribute to increased rates (in this case toll rates). The suggestions are based on findings from a study that drivers are substantially less aware of tolls paid electronically. I work with the news and its influence on economic agents. Alstadsaeter and Jacob (2013) used informal networks to regarding the flow of information. They studied tax evasion due to the ability to process available tax information varies.

I applied the application Google Trends to analyze the sentiment of investors. It measures the search intensity by the search volume of keywords. The application has been used in several studies which proved the influence between the searching words expressed the interest and dependent variable.

Bijl, Kringhaug and Molnár (2016) investigated the impact of sentiment on dividend yields using Google Trends. High frequency of searching for relevant keywords on the Internet was found to negatively affect the yields. Using the Google Trends application, the authors of the study proposed a new business strategy, according to which investors should buy stocks when the search intensity is low and sell their stocks when it is high. A similar study conducted by Takeda and Wakao (2014) focused on sentiment using a sample of 189 Japanese companies. The study revealed a mild positive correlation between search intensity and dividend yields. The study confirmed the authors' hypothesis that an increase in online searching activity is associated with an increase in trading activity.

The studies analyzed the relationship between taxes and stock prices. Several authors have focused not only on changes in taxes but also on the information about tax burden and its impact on the market. I demonstrate these mentioned findings in the application Google Trends which provides the search intensity.

2 Data and methods

To provide a detailed analysis of stock returns I employ panel data regressions where $prices_{it}$ represents the average stock price of company i listed on the NASDAQ stock market in year t . Firstly, I use the generally known CAPM model with the additional regressors related to market sentiment:

$$prices_{it} = \sum_{m=1}^M \beta_m marketindex_{ct}^m + \sum_{g=1}^G \beta_g google_{ct}^g + \mu_i + \epsilon_{it} \quad (1)$$

where the variable $marketindex$ represents the Nasdaq Composite Index m . The last set of variables includes Google Trends' search index in the country c g (total amount of searches in the year t and maximum values of monthly searches during the year t). The country c represents different US states and the US as the federal republic. Finally, I include company fixed effects μ_i , time effects θ_t , and applied OLS robust estimator to estimate robust standard errors ϵ_{it} .

Secondly, I differentiate between the market capitalization:

$$prices_{it} = \beta_m marketindex_{ct}^m + \sum_{g=1}^G D_i \beta_g google_{ct}^g + \mu_i \quad (2)$$

where Google Trends' search index in the country c is interacted with dummy variable D for a company i . The dummy is determined by the different level of market capitalization of the company i on the NASDAQ market.

The dataset contains yearly data from the period 2004-2015 and includes 4,788 companies located in the USA (provided by the NASDAQ Stock Market). Outliers were removed below the 1st and above the 99th percentile. The data was transformed using chain indices and logs. All the data is unique because of its manual searching and processing.

To understand the relationship between tax burden and stock prices I work with a group of keywords and their search intensity using the Google Trends application. This application provides a time series index (from 0 to 100) of the volume of Internet search queries for a set of keywords or phrases. The search intensity is an indicator sentiment of economic agents towards information about changes in tax rates. I chose the following group of keywords: corporate tax/corporate taxes, corporate income tax/corporate income taxes, corporate tax rate/corporate tax rates, with all the phrases focusing on taxation of the companies. There are 4 variables representing the searching activity of investors, either pertaining to the individual states or to the whole of the USA. Two of them are composed only of maximum values of the search intensity.

3 Results

Table I. Impact of the information about tax burden on the stock market 2004-2015

VARIABLES	(1)	(2)	(3)	(4)
Market index (ln)	0.332*** (0.041)	0.260*** (0.051)	0.607*** (0.017)	0.607*** (0.017)
Index of search intensity by state (ln)	-0.023 (0.016)			
Index of max. search intensity by state (ln)		-0.133*** (0.037)		
Constant	0.255*** (0.032)	0.321*** (0.043)	0.002 (0.007)	0.002 (0.007)
Year - specific effects	yes	yes	yes	yes
Observations	27,358	27,358	39,133	39,133
R-squared	0.109	0.111	0.099	0.099
Number of id	2,704	2,704	3,390	3,390

Robust standard errors in parentheses

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

Table I contains the basic output data used to study the relationship between the index of stock prices and variables representing the market (investor) sentiment. The data reveals a positive correlation between the index of stock prices and market index, meaning that an increase in the

market index is accompanied by an increase in stock prices. The results were found to be significant at the 1 % significance level. With respect to the independent variables representing the market sentiment, a negative correlation was found between the index of stock prices and impact of the information on tax burden, regardless of the nature of the information, with 1 % significance level. A significant explanatory variable *Index of max. search intensity by state* reflects the limits of using the Google Trends application for the study of the behavioural response of economic agents. The above results follow from the character of the data. The category only includes search frequency peaks where the search intensity was the greatest.

Table II. Impact of the information about tax burden on the stock market in 2004

VARIABLES	(1)	(2)	(3)	(4)
Y2004	0.041*** (0.014)	-0.001 (0.013)	0.045* (0.027)	0.020 (0.029)
Market index (ln)	0.461*** (0.021)	0.480*** (0.021)	0.486*** (0.023)	0.492*** (0.023)
Index of search intensity by USA (ln)	-0.172*** (0.019)			
Index of max. search intensity by USA (ln)		0.041** (0.017)		
Index of search intensity by state (ln)			-0.018 (0.015)	
Index of max. search intensity by state (ln)				0.043* (0.026)
Constant	0.207*** (0.008)	0.198*** (0.008)	0.179*** (0.009)	0.174*** (0.009)
Observations	39,133	39,133	27,358	27,358
R-squared	0.065	0.064	0.073	0.073
Number of id	3,390	3,390	2,704	2,704

Robust standard errors in parentheses

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

Table III. Impact of the information about tax burden on the stock market in 2005

VARIABLES	(1)	(2)	(3)	(4)
Y2005	0.143*** (0.019)	0.142*** (0.019)	0.102*** (0.010)	0.101*** (0.009)
Market index (ln)	0.499***	0.500***	0.482***	0.496***

	(0.023)	(0.022)	(0.020)	(0.020)
Index of search intensity by state (ln)	-0.013			
	(0.016)			
Index of max. search intensity by state (ln)		0.005		
		(0.025)		
Index of search intensity by USA (ln)			-0.100***	
			(0.023)	
Index of max. search intensity by USA (ln)				0.011
				(0.024)
Constant	0.168***	0.166***	0.192***	0.184***
	(0.009)	(0.009)	(0.008)	(0.007)
Observations	27,358	27,358	39,133	39,133
R-squared	0.076	0.076	0.067	0.066
Number of id	2,704	2,704	3,390	3,390

Robust standard errors in parentheses

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

The information about tax burden does not always have a negative impact. A closer look at the individual shocks reflected by an increase in search intensity (or in the frequency of keyword appearances) reveals some positive impacts. The above is clear from Table II. and Table III. These shocks are characterized by the max. search intensity of the economic agents in the selected time interval. The activity is represented by variables Index of max. search intensity by USA and Index of max. search intensity by state.

These variables can be related to the economic policy of George W. Bush, who enacted tax breaks for overseas corporate profits. The idea was to cut taxes on the profits returned to the US and thus to induce multinational corporations to transfer their profits “back home”. It was supposed to boost the economy through increasing domestic employment, research and development. Congress prohibited the use of overseas profits for repurchasing the companies’ own stock and paying higher dividends to their shareholders. The tax break made it possible for the companies to pay a tax rate of 5.25%, instead of the normal 35% corporate tax rate.

A liberal Monetary policy is indeed likely to bring the profits back to the USA. It will either boost production and employment, or it will result in the money returning to shareholders in the form of increased dividends (in spite of the prohibition). This implies a positive correlation between the abovementioned economic shocks and investors’ attitude. An increase in the index of maximum search intensity for the USA was accompanied by a 0.041 % increase in the index of stock prices. It

can be concluded from the above that the tax policy of George W. Bush had a positive influence on the stock market.

The positive impact of information concerning the tax break is also obvious in 2005 (see the max. search intensity variable in Table III.).

Table IV. Impact of the tax burden on the stock market (with capitalization division) 2004-2015

VARIABLES	(1)	(2)	(3)	(4)
Market index with high capitalization (ln)	0.791*** (0.043)	0.726*** (0.041)	0.815*** (0.038)	0.791*** (0.037)
Index of search intensity by state with low capitalization (ln)	-0.026 (0.019)			
Index of search intensity by state with high capitalization (ln)	-0.024 (0.024)			
Index of max. search intensity by state with low capitalization (ln)		-0.077** (0.039)		
Index of max. search intensity by state with high capitalization (ln)		-0.324*** (0.041)		
Index of search intensity for USA with high capitalization (ln)			-0.295*** (0.048)	
Index of max. search intensity for USA with high capitalization (ln)				-0.440*** (0.051)
Constant	0.371*** (0.021)	0.411*** (0.027)	0.248*** (0.015)	0.251*** (0.015)
Observations	27,358	27,358	39,133	39,133
R-squared	0.136	0.138	0.127	0.127
Number of id	2,704	2,704	3,390	3,390

Robust standard errors in parentheses

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

Table IV. investigates the possible difference in the behaviour of economic agents depending on the share of the company on the stock market. According to the assumption the data confirms the negative relationship between economic subjects and tax burden. The division by capitalization enabled the study of differences in investors' behaviour, as reflected by the decrease in the index of stock prices. High capitalization companies were found to be affected by tax burden information to a greater extent than low capitalization companies, with the results being statistically significant at the 1 % significance level. The expressions of investors' behaviour affect them more sensitively than

companies with a lower proportion on the market. In addition, the companies with high capitalization are more likely to be known by non-professional investors who tend to react more sensitively to economic shocks. On the other hand, companies with low capitalization and less public visibility tend to attract investors well-acquainted with a given company and those regularly searching for new information and studying profit--and-loss statements. In a financial crisis, the stability of smaller companies is more volatile than that of high capitalization companies; therefore, these companies need investors with clear strategies and thorough knowledge, who do not overreact to information about tax burden. Another explanation is the greater liquidity of high capitalization companies, which means that they can better incorporate information into stock prices.

The above explains why a 1 % increase in the *index of search intensity by state* caused a decrease of as much as 0.324 % in the index of stock prices (as reflected by the index of max. search activity) of high capitalization companies, but at the same time caused a decrease of only 0.077 % in relation to low capitalization companies (see Table IV.).

Discussion and Conclusions

The perception of information about tax burden is generally negative, regardless of the nature of the information, thus, an increase in investor awareness decreases the values of stock prices. The relationship can be positively related to the specific shock representing great search intensity in a given year. This is the case of the policy of George W. Bush in 2004. It had a positive impact on stock prices, leading to their increase. In 2005 the effect was weaker but significant despite the fact that news concerning the tax break was accompanied by negative comments from opponents, who warned that it would deepen the deficit, disadvantage domestic firms and push even more corporate dollars offshore (Dharmapala, Fritz, Forbes, 2009).

The study investigates the limits of using the data from Google Trends for the study of the behavioural response in terms of information about tax burden. Only the variable representing the maximum search intensity was found to be significant, which implies that the application is useful for identification of the impact of information about tax burden only in economic shocks.

The results confirm a negative correlation between the variables of search intensity divided by capitalization and between the index of stock prices, thus it shows that companies with high capitalization displaying greater volatility and generally increasing sentiment cause reduction in stock prices. These companies are more likely to attract non-professional investors overreacting to changes

in economics and a further factor could be the higher liquidity of stock, meaning that they are better at absorbing information from the market.

The main contribution is to obtain sentiment via Google Trends. In comparison to Amromin et al. (2006), this application provides more accurately the interest of investors. In the above study individuals do not have to buy newspapers by reason of interest in tax issues. In the case of the application there is the interest of the investor directly captured by active searching for keywords on the subject.

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