Evaluating Impact of Tax Burden on State Financial Stability: Empirical Research of EU Countries

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Abstract

The available literature on the relationship between the tax burden and financial stability is mixed, although some consensus exists on the negative effects of some taxes on economic growth. Since 2008, policymakers have striven to identify the financial vulnerabilities and to avoid the mistakes that led to the Great Financial Crisis. Various scholars studying the impact of tax burden focus on different aspects and generate controversial conclusions therefore a comprehensive methodology for assessing all types of factors and testing this methodology in the European Union (EU) context is lacking. Based on the analysis of scientific sources this paper presents a theoretical model that causally combines the components of tax burden and state financial stability. The newly constructed index was used to assess tax burden and the applicability of the index was verified by assessing the impact of tax burden on state financial stability in the 28 EU countries during the 2005-2019 period. According to the results of the empirical study (regression analysis), the increase in tax burden strengthened state financial stability in three country groups (High Tax Burden/Low Financial Stability; Low Tax Burden/High Financial Stability; Low Tax Burden/Low Financial Stability), while decreased in the High Tax burden/High Financial stability country group.

Keywords

Financial Stability, Tax Burden, Impact, Index Calculation Methodology

1. Introduction

The implications of the degree of taxation on financial equilibrium have been

analysed in many recent studies. It is often considered, that the impact of tax burden is implicit on economic growth, on the capacity to provide the necessary resources for public finance and on the quality of financial system services. The international scientific community is actively researching the factors influencing state financial stability and agrees that an evaluation should be based on a macroeconomic and systemic approach. Assessing the impact of the tax burden on the state's financial stability is particularly relevant in shaping a country's tax policy, and its significance has become apparent in the context of the recent financial crisis. The European Union's ambitious goals for economic and social development are closely linked to the process of reforming the tax system. EU is made up of countries in different stages of economic development that calculate taxes on the basis of differing principles. This provides real opportunities for researchers to study the interrelations between tax burden parameters and national economic development trends. The optimal tax burden is seen as an important condition for social development, the quality of public welfare, business growth, while the efficiency of the tax system is one of the most important factors determining the potential of the national economy (Abuselidze, 2012). Modern economists argue that reducing tax burden effectively influences state financial stability and stimulates the economy (Alstadsaeter et al., 2017; Tamai & Myles, 2019; Celikay, 2020), but there is no consensus among scholars on how tax cuts affect economic development in the long run (Vasiliauskaitė & Stankevičius, 2009). In addition, the empirical evidence is clearly mixed, depending on several characteristics of each study, such as countries, period, methodology or explicative variables. The existing models do not give a clear answer about the impact of the tax burden, as some results are contradictory to others. A comprehensive methodology for assessing all types of factors and testing this methodology in the European Union context is lacking.

In this paper, we studied the relationship between taxation and state financial stability for European Union in 2005-2019 through a regression approach to detect different patterns along with countries groups. A clustering of the EU countries according to the differing tax rate policies and financial stability level was performed using the Ward method of hierarchical clustering. This methodology enhanced the possibility to analyse the phenomenon taking into account differences in the distribution as countries with high/low level of tax rate and high/low financial stability can exhibit variance of results. The major contribution of the paper is the development of the complex relationship model between tax burden and state financial stability and verification of the model in 28 EU countries during the 2005-2019 period. By designing the model, the assumptions that create the conditions for the state financial stability were examined and identified, the analysis of the tax burden and the components and indicators of the state financial stability was performed, and an index assessing the impact of the tax burden was constructed and tested.

2. Theoretical Aspects of Financial Stability and Its' Conceptual Model

Financial stability is widely studied in the scientific literature and the concept differs depending on the scientist's approach. The international scientific community is actively researching the factors influencing state financial stability (Adam et al., 2015; Roosma et al., 2015; Cural & Cevik, 2015; Flood et al., 2016; Bischof et al., 2019). However, as Schinasi (2006: p. 1) points out, "the practice of financial-stability analysis is still in its infancy when compared with, for example, the analysis of monetary stability or macroeconomic stability", meaning there is a lack of a commonly used model or an analytical system to assess financial stability. By some authors financial stability is perceived as the absence of fluctuations (Gadanetz et al., 2012; Das et al., 2019); as the absence of crises and tensions (Haldane et al., 2017; Bischof, Laux, & Leuz, 2019; Ozili, 2020). A broader approach to financial stability is promoted (Houben & Kakes, 2004; Schinasi, 2006; Fell & Schinasi, 2005) and it is argued that financial stability is an extensive concept encompassing various aspects of finance and financial systems. Financial stability manifests itself through the ability to reallocate resources, manage risk and overcome financial imbalances. According to these authors, financial stability can be assessed in terms of the consequences to the real sector of the economy and is perceived as a continuum. Modern economists (Levine & Corbae, 2018; Akins et al., 2016; Ozili & Thankom, 2018; Jiang & Levine, 2019) place emphasis on the interplay between financial system stability and sustainable economic growth, fiscal policy and financial system (Boyd et al., 2005; Kroszner et al., 2007; Dell'Ariccia et al., 2008; Amadeo, 2013; Caner et al., 2010; Staniuliene, 2015). Financial stability could also be assessed through sets of macro indicators covering the various sectors of business, household, financial and finance markets (Schakeldorf et al., 2011; Hawkins & Klau, 2000; Nelson & Perli, 2007; Gray et al., 2007).

Although narrower approaches to financial stability are characterized by simplicity such as the absence of certain phenomena (Gadanetz et al., 2012; Haldane et al., 2017; Das et al., 2019) a broader assessment, encompassing public finance, financial systems, economic growth and fiscal policy, provides an opportunity to reveal the essence of this phenomenon more accurately and is in line with the objectives of this paper. By focusing on the broader concept of financial stability (Fell & Schinasi, 2005; Houben et al., 2005; Levine & Corbae, 2018; Akins et al., 2016; Ozili & Thankom, 2018; Jiang & Levine, 2019), the state financial stability in this paper is defined as the interaction between the stability of public finances, the stability of the financial system and balanced economic growth. Such a perception of state financial stability was chosen as a theoretical starting point for theoretical and empirical research as it creates preconditions for a complex assessment of this phenomenon, with a special focus given to the complex interrelations between these areas (Figure 1).
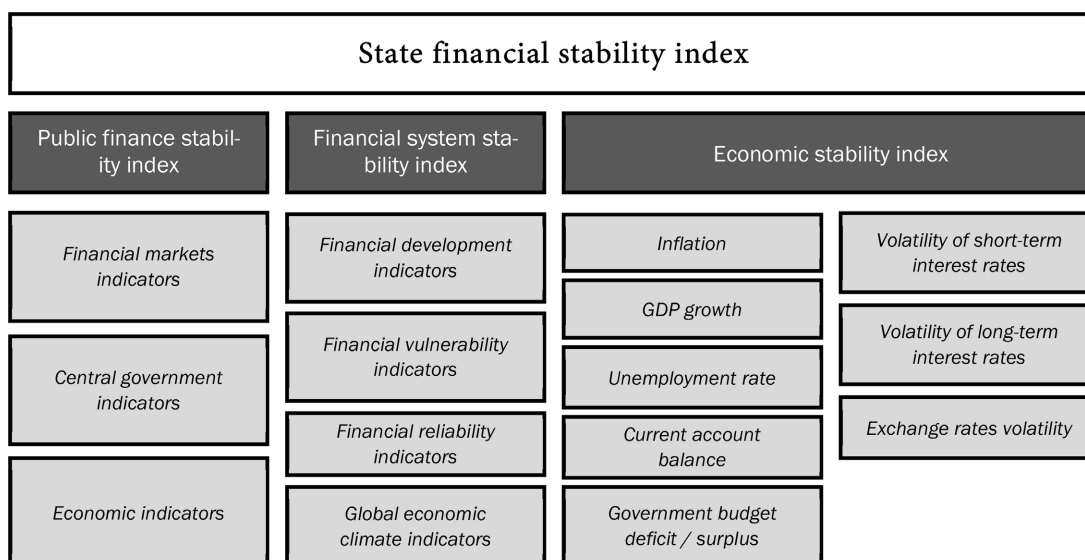
State financial stability index			
Public finance stability index	**Financial system stability index**	**Economic stability index**	
Financial markets indicators	Financial development indicators	Inflation	Volatility of short-term interest rates
Central government indicators	Financial vulnerability indicators	GDP growth	Volatility of long-term interest rates
	Financial reliability indicators	Unemployment rate	Exchange rates volatility
Economic indicators		Current account balance	
	Global economic climate indicators	Government budget deficit / surplus	

Figure 1. The structure of the State Financial Stability Index (compiled by author).

Commenting on Figure 1, the stability of public finances in this paper is treated as the totality of the stability of financial markets and economic indicators, which is decisively influenced by the actions of the central government. After analysing the valuation methods for the evaluation of public finances (Blommestein & Turner, 2012; Ilgun, 2016; Janda & Kravtsov, 2017; Birskyte, 2019; Alshubiri, 2019), the Trading Economics Index was chosen as, in the author's opinion, it corresponds the closest to the concept of public finance stability formed in this paper. The structure of the *Public Financial Stability Index* is based on the classification proposed by Trading Economics (Fedec, 2009), which consists of 1) financial market indicators, 2) central government indicators, and 3) economic indicators. The structure of the *Financial System Stability Index* was chosen based on the analysis of scientific sources (Skarzauskas, 2016) and theoretical models of such authors as Gersl and Hermanek (2006), Van den End (2006), Albulescu (2010, 2012), as well as the empirical studies evaluating the financial systems of Czech Republic, Romania, Turkey and other countries. The set of indicators proposed by Albulescu (2010) illustrates the spectrum of financial stability dimensions, which consists of 4 sub-indices such as 1) the developmental stage of the financial system; 2) financial vulnerability; 3) financial reliability; 4) the global economic climate. Each sub-index in the structure is reflected with a range of indicators. The structure of the *Economic Stability Index* is based on Daugėlienė (2012), Riley (2009, 2014), Sharuddin and Rama (2017) and others' theoretical insights, which the author has aggregated into seven key indicators (see Figure 1) reflecting the macroeconomic situation. The weight of the indicators was determined according to the analysed scientific sources and based on the factors that have the greatest impact on economic stability. This number of indicators is relatively optimal compared to other high-volume indices and the combination of indicators includes key influencing factors. Structure

of indices and weights assigned to indicators are provided in appendices. It is important to note that the factors listed are closely linked, therefore the stability of the financial system can only be ensured by the stability of all these components together. For these reasons, financial stability analysis is a particularly difficult and complex task.

3. The Problematic Aspects of Tax Burden Assessment

Research shows that international tax burden comparisons are possible, but the impact of tax burdens on a country's financial stability remains problematic primarily due to the multifaceted nature of the interaction (Salaudeen & Atoyebi, 2018; Celikay, 2020). Based on the scientific analysis performed, two channels of tax burden impact on state financial stability were identified: through tax structure (Yanikkaya & Turan, 2018; Durusu-Ciftci, Gokmenoglu, & Yetkiner, 2018; Valenduc, 2019; Bunn & Asen, 2020) and trough taxation level (Karagianni et al., 2012; Mao, 2017; Milasi & Waldman, 2018; Bösenberg, Egger, & Zoller-Rydzek, 2018). In summary, the predictions from the theoretical models are mixed, and the available empirical evidence is controversial. Hence, further empirical studies are required in this field.

The most commonly used method in research for tax burden calculation is the ratio of tax revenue to GDP (OECD, 2019; Liu & Altshuler, 2013; Celikay, 2020; Vasileva, 2020; Paientko & Oparin, 2020). The popularity of this method is based on the simplicity of the calculation and the availability of data through national statistical agencies and departments. The indicator of tax revenue to GDP can also be based on qualitative studies assessing the dependence of this indicator and GDP through economic activity. However, in this article other method of tax burden assessment was selected—construction of composite Tax burden index. This assessment approach fundamentally differs from calculation of tax burden ratio, which is mentioned before, because it includes relatively wide range of indicators, large volume of data and enables to assess influence of tax burden comprehensively. Based on literature analysis composite Tax burden index is based on three main tax groups: corporate, labor and consumption (see Figure 2). Calculation methods for subindices of these tax groups were chosen after detailed analysis during which advantages and limitations of various composite indices were identified. Corporate tax burden assessment was based on set of indicators proposed by Keller and Schanz (2013). Indicators in this set measures size of tax rates (6 indicators), quality and effectiveness of tax system (3 indicators), regulatory of taxes (5 indicators) and burden of tax administration (1 indicator). Burden from taxes on labor was calculated using set of indicators proposed by Kotlán & Machová (2012a, 2012b) which includes net personal average tax rate, top personal tax rate threshold and average wage ratio, average rate of social security contribution and burden of tax administration. Finally, taxes on consumption tax consist of consumption tax rate, consumption tax base and tax administration indicators. Mentioned set of indicators was introduced
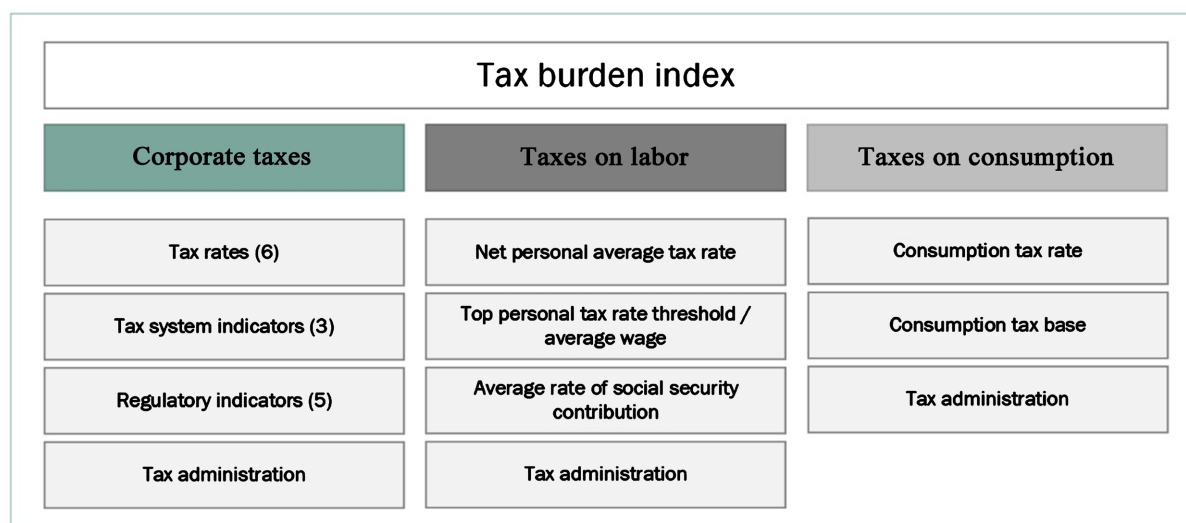
Tax burden index		
Corporate taxes	**Taxes on labor**	**Taxes on consumption**
Tax rates (6)	Net personal average tax rate	Consumption tax rate
Tax system indicators (3)	Top personal tax rate threshold / average wage	Consumption tax base
Regulatory indicators (5)	Average rate of social security contribution	Tax administration
Tax administration	Tax administration	

Figure 2. The estimation of the tax burden on the basis of the Tax burden index (compiled by author).

by Bunn and Asen (2020). The chosen valuation methodology is multicriteria and reflects the burden of different tax groups based on the EU's classification (see **Figure 2**).

After building the basics and methods for assessing the state financial stability and tax burden, a theoretical model of the impact of the tax burden on the state financial stability was constructed as presented in the next section.

4. The Methodology for Assessing the Impact of Tax Burden on State Financial Stability

The complexity of the model is revealed through different levels of state financial stability and tax burden assessment. The model has been designed for applicability in an international environment and is therefore suitable for research in individual regions or groups of countries. The impact assessment methodology uses a linear multivariate regression equation, hierarchical clustering and other econometric/statistical methods (**Figure 3**). These research methods have been chosen as reliable instruments for the purpose and scope of this paper and are generally recommended by the scientific literature for the investigation of the effects and causal relationships between variables. The interaction between the tax burden and financial stability in the 28 European Union member states was chosen as the main object of this paper. This group was chosen due to the relevance of the problem to the European Union, whose member states have differing tax systems and varying levels of financial market and economic development.

In order to determine the level of financial stability of the EU member states during the period of 2005-2019 the values of the indices assessing the stability of public finances, the stability of the financial system and the stability of the economy and their indicators were calculated. The tax burden has been determined according to the values of the tax burden assessment criteria for each member state. According to the following index values and using the hierarchical
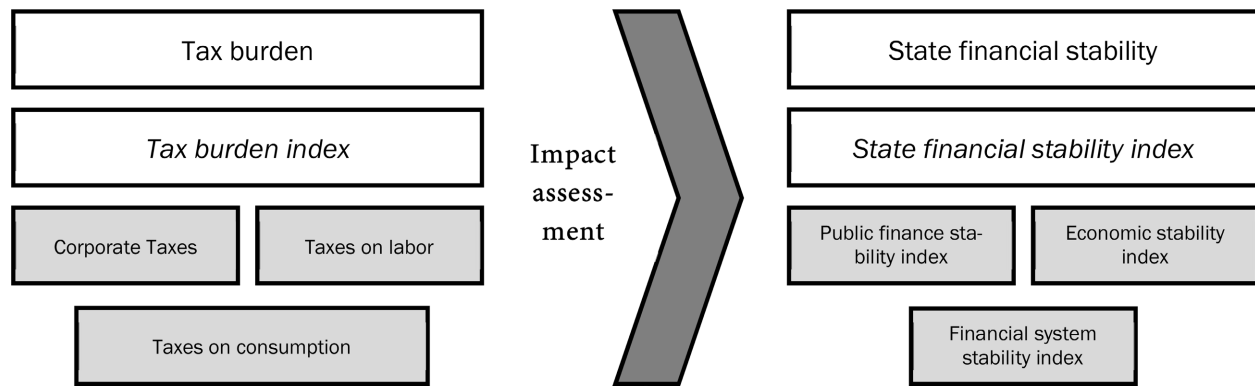
Figure 3. The model for assessing the impact of the tax burden on state financial stability (compiled by author).

Ward connection method the countries have been divided into 4 groups according to the hierarchical clustering analysis:

1) High tax burden and high financial stability (HTBHFS cluster);

2) Low tax burden and high financial stability (LTBHFS cluster);

3) High tax burden and low financial stability (HTBLFS cluster);

4) Low tax burden and low financial stability (LTBLFS cluster).

The impact of the tax burden on the state financial stability has been examined using multiple linear regression analysis (see equation provided below). During analysis regression models were formed for each indicator (dependent variable— Y_k) of public finance stability index, financial system stability index and economic stability index using time series data of each cluster. Regression models are provided in appendices of the paper (Tables A1-A3). Tax burden was used as one of the independent variables (x_k, y_k, z_k, ···), therefore coefficients (β) of tax burden variables in the regression models were selected as measure of impact. In cases when statistically significant models were formed only without independent variable of tax burden, it was considered that tax burden has no impact to the dependent variable, e.g. indicator, which is used in calculation of public finance stability, financial system stability or economic stability indexes. Using coefficients assigned to independent variables of tax burden impact to public finance stability, financial system stability and economic stability was calculated according to weights of indicators in the indices (Table A3). Finally, using data of impact to indices, tax burden impact to state financial stability was calculated (Table 1).

$$Y_k = c + \beta_1 x_k + \beta_2 y_k + \beta_3 z_k + \cdots + \varepsilon_k$$

c—constant;

x_k, y_k, z_k, …—independent variables;

Y_k—dependent variable;

β—coefficients (parameters) of independent variables;

ε_k—error term.

Publicly available data from the World Bank, the Organization for Economic Co-operation and Development (OECD), the ECB European Central Bank (2019)

Table 1. Coefficients of (independent) tax burden variable in regression models of indices indicators.

Public finance stability Index				
Indicator	HTBLFS	LTBHFS	HTBHFS	LTHLFS
Bond yields	0.01258	0.02271	−0.01241	0.01025
Central government debt	−0.00069	0.00040	0.00306	0.00039
Interest expenditure on government revenue	0.01422	0.00689	−0.00843	0.01073
GDP	–	0.00056	−0.00100	−0.00795
Reserves/imports	0.00384	−0.00044	−0.00761	−0.00221
	0.02995	0.03011	−0.02639	0.01122
Financial system stability index				
Indicator	HTBLFS	LTBHFS	HTBHFS	LTHLFS
Loans/GDP	–	0.00003	−0.00002	−0.00033
Budget deficit/surplus	0.00062	–	0.00284	0.00037
Private Sector Loans	0.00003	–	−0.00050	–
Non-performing loans	–	0.00056	−0.00053	0.00159
Z-score indicator	–	0.00015	−0.00004	0.00017
Liquidity indicators	–	0.00009	0.00045	−0.00458
	0.00065	0.00083	0.00221	−0.00279
Economic stability index				
Indicator	HTBLFS	LTBHFS	HTBHFS	LTHLFS
GDP (difference to target)	−0.00048	–	0.00143	−0.00026
Unemployment rate	−0.00140	0.00029	−0.00114	−0.00155
Budget deficit	0.00074	–	0.00341	0.00044
Bond yields	0.00140	0.00760	0.00847	0.00140
	0.00026	0.00789	0.01218	0.00005
Tax burden on state financial stability	0.03086	0.03884	−0.01200	0.00848

(ECB), Eurostat, CESIF and other internationally recognized organizations were used in the study. Data were processed with MS Excel and IBM SPSS 24.

5. The Generalised Results of the Regression Models

The regression equations for the indicators (Annexes: Tables A1-A3) of the indices of the stability of the public sector, the financial system and the economy allowed us to calculate the overall impact of the change in the tax burden on the state financial stability. Table 1 shows the changes in the state stability indices after the increase of the tax burden. It can be observed that the increase in the

tax burden would have a positive impact on the public finance stability in all groups of countries except the one with high tax burdens and high financial stability, where the negative impact would be relatively weak and would have little effect on the stability of public finance. The strongest positive impact was due to the positive developments of the bond yields and interest expenditure on government revenue, while the negative impact was strongest in conjunction with reserves/imports ratio.

The increase in tax burden has a positive effect on the stability of the financial system in all country groups except the one with low tax burdens and low financial stability. The biggest positive impact of the tax burden on the financial system stability is made through the reduction of the budget deficit ratio. The results of the study show that economic stability indicators would be positively affected by an increase in the tax burden in all country groups. The tax burden would also have the strongest impact on economic stability in a group of countries with high financial stability. The strongest negative value could be observed in conjunction with the difference to the nominal GDP, the change of which with the increase of the tax burden would have a negative impact on the stability of the economy. After assessing the impact of the tax burden on individual components of the state financial stability the total impact of the increase in the tax burden on the state financial stability could be calculated. According to the results of the empirical study the increase in tax burden strengthened state financial stability in three country groups, while decreased in the high tax stability/high financial stability country group.

The results of the empirical study allowed confirming 4 and rejecting 8 hypotheses (Table 2).

6. Conclusion

Taxation is one of the potential determinants of the state financial stability identified in the literature and in the empirical models. Regarding the methodological and socio-cultural context, the existing models differ in the expected impact of the taxation, and the results of the empirical studies are mixed and not conclusive.

We analysed the impact of the tax burden on state financial stability in 28 EU countries in the period 2005-2019. To summarize, we can say that taxation may affect state financial stability in several ways through impact on economic growth, public finance stability and financial system stability. The intensity and direction of the impact are related to several conditions and depend on countries' tax burden and financial stability level.

In general, when the taxation is measured using tax burden index, an increase in tax burden would have a positive impact on the state financial stability in all country groups except the group with high tax burden and high financial stability. More concretely, the strongest positive impact is identified in high tax burden/low financial stability and low tax burden/high financial stability country groups, and the weakest one is in low tax burden/low financial stability country groups.

Table 2. The confirmation and rejection of hypotheses.

	TESTED HYPOTHESIS	RESULT	ARGUMENTATION
H1	The tax burden has a significant impact on the HTBLFS (High Tax Burden/Low Financial Stability) group: $H1_1$ *has a positive* (+) *effect* $H1_2$ *has a negative* (−) *effect* $H1_3$ *significant impact not determined*	<u>Accepted</u> $H1_1$ *has a positive* (+) *effect* Rejected $H1_2$ *has a negative* (−) *effect* Rejected $H1_3$ *significant impact not determined*	The tax burden has a significant positive impact on state financial stability for the HTBLFS (High Tax Burden/Low Financial Stability) countries: A positive effect of the tax burden for this group was found in all indices. The tax burden influence to Financial system stability index has the lowest positive effect on HTBLFS (0.00026) group countries compared to other countries groups, which also have a positive effect (0.00083 in LTBHFS and 0.00221 in HTBHFS).
H2	The tax burden has a significant impact on the LTBHFS (Low Tax Burden/High Financial Stability) group: $H2_1$ *has a positive* (+) *effect* $H2_2$ *has a negative* (−) *effect* $H2_3$ *significant impact not determined*	<u>Accepted</u> $H2_1$ *has a positive* (+) *effect* Rejected $H2_2$ *has a negative* (−) *effect* Rejected $H2_3$ *significant impact not determined*	The tax burden has a significant positive impact on state financial stability for the LTBHFS (Low Tax Burden/High Financial Stability) group: This country group had the most indicators (10) with positive effects compared to other groups of countries, which was determined by the positive change in all three state financial stability indices. In the LTBHFS countries, the impact of the tax burden has the highest positive effect on public finance (0.03011) and economic stability (0.00789) between all country groups.
H3	The tax burden has a significant impact on the HTBHFS (High Tax Burden/High Financial Stability) group: $H3_1$ *has a positive* (+) *effect* $H3_2$ *has a negative* (−) *effect* $H3_3$ *significant impact not determined*	Rejected $H3_1$ *has a positive* (+) *effect* <u>Accepted</u> $H3_2$ *has a negative* (−) *effect* Rejected $H3_3$ *significant impact not determined*	The tax burden has a significant negative impact on state financial stability for the HTBHFS (High Tax Burden/High Financial Stability) countries: The negative impact of the tax burden for this country group is found only in the Public finance stability index (-0.02639). However, the negative impact is stronger than the cumulative positive impact of Financial system stability (0.00221) and Economic stability (0.01218) indices, even considering that between all countries groups both indices have the highest positive effect in HTBHFS countries.
H4	The tax burden has a significant impact on the LTBLFS (Low Tax Burden/Low Financial Stability) group: $H4_1$ *has a positive* (+) *effect* $H4_2$ *has a negative* (−) *effect* $H4_3$ *significant impact not determined*	<u>Accepted</u> $H4_1$ *has a positive* (+) *effect* Rejected $H4_2$ *has a negative* (−) *effect* Rejected $H3_3$ *significant impact not determined*	The tax burden has a significant positive impact on state financial stability for the LTBLFS (Low Tax Burden/Low Financial Stability) countries. A positive effect is found for the Public finance stability index and the Economic stability index, but a negative impact on Financial system stability (-0.00279). Tax burden positively influences Economic stability in all country groups, but the lowest effect is found in LTBLFS countries (0.00005).

According to our estimation with regards to the state financial stability index, an increase in the tax burden would have a positive effect on the economic stability in all country groups. The strongest positive impact was identified because of positive changes in bond yields and interest expenditure on government revenue indicators, the strongest negative impact was identified through the reserves/imports ration indicator. In addition, our results show a negative impact of increased taxation on public finance stability in high tax burden/high financial stability countries and positive in all other countries groups. On the contrary, the effect on financial system stability is negative only in low tax burden/low financial stability countries and positive in all remaining country groups (high tax burden/low financial stability, low tax burden/high financial stability, high tax burden/high financial stability).

These results can be also interpreted in terms of policy, as the impact of the variables differs depending on the distribution of the taxation/financial stability level. Hence, policymakers should adopt different strategies or financial stability policies to improve the design and effects of the tax burden in Europe. Finally, as future extensions of this research, it would be interesting to replicate the study using other statistical methods, for example, the quantile regression method, or with information regarding the reforms approved in the last years.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix

Table A1. Regression models for indicators of public finance stability index.

Dependent variable	Group	Constant	Coefficients of independent variables				R²	Sign. F
		C	Tax burden	Nominal GDP	Gover. debt (rev.)			
Bond yields (rev.)	HTBLFS	−4.03	6.29	0.43	0.90		0.70	0.010
	LTBHFS	−5.81	11.35	0.05	0.26		0.79	0.002
	HTBHFS	4.60	−6.21	0.16	0.12		0.54	0.060*
	LTBLFS	−1.99	5.12	0.10	0.38		0.68	0.013
		C	Tax burden		GDP			
Change of central government debt (rev.)	HTBLFS	0.79	−0.23		0.22		0.41	0.071*
	LTBHFS	0.55	0.13		0.24		0.48	0.037
	HTBHFS	0.02	1.02		0.17		0.37	0.096*
	LTBLFS	0.46	0.13		0.39		0.75	0.001
		C	Tax burden	Govern. debt (rev.)				
Interest expenditure on government revenue (rev.)	HTBLFS	−2.84	4.74	0.80			0.54	0.021
	LTBHFS	−1.07	2.30	0.71			0.77	0.001
	HTBHFS	1.71	−2.81	1.21			0.53	0.024
	LTBLFS	−1.67	3.58	0.81			0.38	0.098*
		C	Debt (rev.)	Unemploy. (+1 lag)	FDI/GDP	Loans/GDP		
GDP per capita	HTBLFS	−30.98	−0.42	0.64	3.49	31.66	0.72	0.024
	LTBHFS	0.60	−0.10	1.32	0.64	−1.04	0.60	0.084*
	HTBHFS	−26.40	−2.59	2.29	−3.89	28.53	0.64	0.062*
	LTBLFS	–	–	–	–	–	–	–
		C	Tax burden	World economic index	Nom. GDP growth			
Reserves/Import	HTBLFS	−1.61	3.84	0.09	−0.49		0.74	0.006
	LTBHFS	−0.50	−0.44	0.05	−0.09		0.56	0.050
	HTBHFS	5.82	−7.61	−0.04	−0.17		0.60	0.033
	LTBLFS	1.31	−2.21	0.22	−0.06		0.80	0.002

Table A2. Regression models for indicators of financial system stability index.

Dependent variable	Group	Constant	Coefficients of independent variables				R^2	Sign. F
		C	Unemp. (+1 lag)	Net interest margin (rev.)				
Loans/Nominal GDP (rev.)	HTBLFS	0.98	0.003	−0.013			0.47	0.043
	LTBHFS	0.82	0.10	−0.01			0.82	0.000
	HTBHFS	0.92	0.08	0.01			0.53	0.022
	LTBLFS	0.58	0.47	−0.02			0.65	0.006
		C	Tax burden		GDP			
Budget deficit (rev.)	HTBLFS	−0.57	1.12		0.48		0.61	0.009
	LTBHFS	–	–		–		–	–
	HTBHFS	−3.06	5.12		0.41		0.47	0.040
	LTBLFS	−0.28	0.67		0.57		0.43	0.062*
		C	Real GDP growth	Net interest margin (rev.)	Unempl. (+1 lag)			
Loans to private sector/Nominal GDP	HTBLFS	–	–	–	–		–	–
	LTBHFS	–	–	–	–		–	–
	HTBHFS	0.27	0.23	−0.25	0.39		0.93	0.000
	LTBLFS	−0.15	0.01	0.40	0.70		0.64	0.023
		C	Real GDP growth	Net interest margin (rev.)	Loans/GDP			
Non-performing loans (rev.)	HTBLFS	11.397	2.85	−0.77	−12.47		0.84	0.001
	LTBHFS	−5.26	1.12	−0.19	6.41		0.89	0.000
	HTBHFS	–	–	–	–		–	–
	LTBLFS	3.93	0.85	−0.78	5.60		0.81	0.001
		C	Loans/GDP	Net interest margin (rev.)	Capital/assets			
Z-score	HTBLFS	−0.12	0.35	−0.16	0.32		0.77	0.003
	LTBHFS	−4.16	4.76	0.22	0.67		0.90	0.000
	HTBHFS	−2.59	2.69	0.59	0.54		0.82	0.001
	LTBLFS	0.64	−0.50	−0.04	0.60		0.71	0.008
		C	Non-perfor. loans (rev.)	Net interest margin (rev.)	Deposits/M3	Real GDP gro.		
Liquidity ratio	HTBLFS	0.21	0.27	−0.14	−0.11	−0.13	0.72	0.024
	LTBHFS	0.72	0.50	0.15	−0.92	−0.59	0.67	0.045
	HTBHFS	–	–	–	–	–	–	–
	LTBLFS	−0.13	0.03	0.14	−0.01	1.05	0.83	0.003

Table A3. Regression models for indicators of economic stability index.

Dependent variable	Group	Constant	Coefficients of independent variables				R²	Sign. F
		C	Gover. debt (rev.)	Unempl. (+1 lag; rev.)	FDI/GDP	Loans/GDP		
Real GDP (diff. from target value, rev.)	HTBLFS	−1.79	−0.85	0.85	0.45	−2.44	0.77	0.012
	LTBHFS	−	−	−	−	−	−	−
	HTBHFS	36.86	2.35	−1.38	16.34	−40.18	0.74	0.019
	LTBLFS	−0.57	−0.43	0.34	0.55	1.46	0.59	0.099*
		C	Real GDP growth (−1 lag)	Tax burden	FDI/GDP			
Unemploy-ment (rev.)	HTBLFS	0.92	−2.11	0.75	4.44		0.79	0.002
	LTBHFS	−0.05	0.44	0.72	0.12		0.89	0.000
	HTBHFS	1.23	0.62	0.62	2.47		0.74	0.006
	LTBLFS	1.69	−2.32	0.31	−0.14		0.76	0.004
		C	Tax burden		GDP			
Budget deficit (rev.)	HTBLFS	−0.57	1.12		0.48		0.61	0.009
	LTBHFS	−	−		−		−	−
	HTBHFS	−3.06	5.12		0.41		0.47	0.040
	LTBLFS	−0.28	0.67		0.57		0.43	0.062*
		C	Tax burden	Real GDP growth	Gover. debt (rev.)			
Bond yield (rev.)	HTBLFS	−3.06	4.24	0.22	2.27		0.72	0.007
	LTBHFS	−2.08	3.80	0.08	1.05		0.54	0.061*
	HTBHFS	−0.40	0.70	0.11	0.85		0.63	0.024
	LTBLFS	0.51	0.70	0.17	0.48		0.52	0.077*