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FINANCIAL SUCCESS OF SUBSIDIZED COMPANIES BY SIZE IN THE PERIOD 2005-2015

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ABSTRACT:

The interdependence of state subsidies and financial results of companies is still under-research category. Therefore, the subject of research in this paper is to examine the impact of state subsidies on the financial performance of companies in the Republic of Croatia in the period from 2005 to 2015 according to size. In previous research, the variable of company size is often the focus of scientific research, as well as performance (Berger and Udell., 1995; Boeri and Bellmann, 1995), but research models mainly refer to the survival of companies in relation to size. In this paper, the intention is to investigate the impact of state subsidies on the performance of companies according to their size, and the economic measures of the performance of the observed companies were selected.

The sample for estimating the parameters of the linear regression consists mainly of companies that received at least one incentive from the state in the observed period and submitted annual financial reports for all years covered by the analysis (balanced panel). For the control group, a stratified sample of companies was selected that are like companies that received state subsidies in terms of size of assets, number of employees, activity, and size. In this way, it will be possible to assess whether there are significant impacts on the performance of subsidized observed companies compared to non-subsidized companies.

The research showed that subsidies had a relatively significant impact on all companies, but with different intensity.

Keywords: *state subsidies, financial performance of the business, size of enterprise*

1. INTRODUCTION

State subsidies as part of the industrial policy of each country, among other things, have the intention of encouraging the efficiency of encouraged companies or economic branches, and thus the overall economy and employment. However, little is known about whether state aid really affects the financial performance of supported companies. From the review of recent scientific literature, it can be concluded that the authors often research certain variables of the success of companies of that size, which will be discussed in more detail later in this paper. Therefore, there remains a large research space, and the intention of this work is to examine the impact of state subsidies on the success of business operations by size in the period from 2005 to 2015 through several selected indicators.

The performance of subsidized companies according to their size is observed in the mentioned period for two reasons. First, in 2005, a register of annual financial statements was established[1].

Second, the observed period ends in 2015 to avoid a structural break in the data due to the amended Accounting Act[2] and the new classification of entrepreneurs by size. The new Act brought harmonization with European rules and entrepreneurs are classified into micro, small, medium, and large entrepreneurs depending on the indicators on the last day of the business year preceding the year for which the financial statements are drawn up. The criteria for classification remained unchanged: total assets, net income (instead of total income[3]) and the number of employees, whereby satisfaction of two of the three criteria is observed:

- micro-entrepreneurs: all entrepreneurs with assets up to HRK 2.6 million, net income up to HRK 5.2 million and an average number of employees up to or equal to 10.
- small entrepreneurs: entrepreneurs who do not exceed two of the following three conditions: total assets up to HRK 30 million, net income HRK 60 million, and the average number of employees up to or equal to 50.
- medium-sized entrepreneurs: entrepreneurs who do not exceed two of the following three conditions: total assets of HRK 150 million, net income of HRK 300 million, and the average number of employees up to or equal to 250.
- large entrepreneurs: entrepreneurs who meet two of the above three conditions and banks, housing savings banks, leasing companies, insurance companies and other financial institutions.

[1] Register of annual financial statements lead by Financial Agency in the name and for account of the Ministry of finance.

[2] Narodne Novine 78/15

[3] Technically it's just a new name.

As already mentioned, in the subject research, the economic measures of business performance of the observed companies were selected: profit/loss and net profit margin as measures of profitability, the amount of income that reflects the market position of the company, and indicators of economy, liquidity, indebtedness, asset turnover and asset profitability (Zelenika and Toković, 2000). Since employment goals should have a significant place in the adoption of the economic and social policy of each state, it is to be expected that state subsidies to subsidized companies affect the creation of more significant employment, and therefore this indicator was also taken into consideration.

A working hypothesis was put forward: Revenues from state subsidies affect the financial performance of companies according to their size in the observed period.

As every business entity has for goal also and business motive - successful business, based on this hypothesis, the goal is to investigate the impact of the received subsidies amount on the success of the company's business according to the size of the company. Since there is no cohesive knowledge in the field of performance measurement[4], this paper considers the economic evaluation of performance through selected parameters. In general, in the economic literature, the following economic measures of business success are considered: labor productivity, economy, profitability, accumulation capacity and reproductive capacity of the company[5].

When talking about the success of the business, the main criteria are usually the level of income and profit. While the amount of revenue reflects the market position of the company, profit is a measure of profitability. Indicators of economy, profitability and investment are considered indicators of business success. In addition, as state subsidies are intended to stimulate economic growth and employment, the aim is to investigate the impact of subsidies on employment in subsidized companies.

As already mentioned, in previous research, the variables of company size and performance are frequent subjects of scientific research (Berger and Udell., 1995; Boeri and Bellmann, 1995), but research models mainly refer to company survival in relation to size. Many authors compared the performance of companies according to their size and determined how the size of the company affects their performance. According to a group of authors (Mata and associates, 1995), company size measured by the number of employees affects the probability of company survival. As a rule, larger companies are in a better position than small ones because they have better tax conditions and can

[4] It is researched in different areas, and different approaches to performance measurement would lead to different definitions of performance measurement systems (Performance Measurement System – PMS).

[5] Zelenika, R., K. Toković, Indicator of the success and stability of operations in transport company, Hrvatska gospodarska revija, 2000

attract a more qualified workforce. Smaller companies face more financial restrictions in capital growth, which can affect their ability to survive in certain critical moments Kovačević and Vuković (2006). However, there are also studies that have investigated the negative relationship between company size and survival (Mata and associates, 1995). According to these studies, smaller companies may have an advantage over large ones in terms of low general costs and the smaller resources needed to maintain operations. The age of the company is also an important component.

In terms of financial success, the scope of works is much wider. For example, Girma, Gorg and Wagner (2009) investigate the impact of subsidies on exports to manufacturing companies in West and East Germany and conclude that subsidies do not have a strong impact on exports. Their observations are correlated with the results of research by the authors Bernard and Jensen (2004), who investigated the impact of subsidies for export promotion at the state level in the USA and came to similar observations that subsidies do not have a significant impact on the export of companies.

In contrast, Volpe Martincus and Carballo (2009) and Helmers and Trofimenko (2009) find some positive effects of export subsidies for firms in Peru and Colombia. Furthermore, Bergstrom (1998) examines the effects of capital subsidies on the productivity of companies in Sweden, Beason and Weinstein (1996) and Lee (1996) use aggregated data with the aim of obtaining additional information on the effects of government intervention through subsidies. To study the effects of Swedish industrial policy, they collected data on subsidized and non-subsidized manufacturing firms in the period 1987 to 1993. By comparing the mentioned companies and by evaluating the production functions where they control various factors that could affect productivity, they investigate whether there are differences in productivity between companies in the years after the subsidies were granted and they concluded that there is no significant impact. Nickell and Nicolitasas (1999) observed, in addition to productivity, the increase in employment and wages, as well as the indebtedness of British companies. They found that subsidies have a positive effect, but a small effect on TFP.

One group of authors was more concerned with sectoral analyses. For example, Šimović (2008) analysed the relationship between regional aid in relation to sectoral aid and concluded that regional aid is less bad than sectoral aid, although both types significantly disrupt economic relations. Blauberger (2007) studied sector subsidies in Poland, the Czech Republic and Slovakia, and in his conclusions he apostrophes that in 2004, Poland received a negative assessment from the European Commission due to the granting of subsidies to large shipyards that were required to be restructured, and the Czech Republic due to the restructuring of the banking sector.

From a summary review of the most important recent scientific literature, it can be concluded that the authors investigated only certain performance variables and based on the set hypothesis in this paper the aim is to investigate the impact of granted subsidies on the financial performance of companies according to size through several selected indicators.

2. SAMPLE AND RESEARCH METHODOLOGY

The data used in this research are secondary and were collected from the register of annual financial statements[6], which consists of information at the level of individual companies. Thus, the sample for estimating the parameters of the linear regression consists of companies, corporate taxpayers, who received at least one incentive from the state in the observed period and submitted annual financial reports for all the years included in the analysis (balanced panel).

For the control group, a stratified sample of companies was selected that are like companies that received state subsidies in terms of size of assets, number of employees, activities, and company size. In this way, it will be possible to assess whether there are significant impacts on the performance of the observed companies compared to non-subsidized companies.

Entrepreneurs who belong to special groups of entrepreneurs and whose received subsidies many times exceed the subsidies of other entrepreneurs such as Zagrebački holding, HŽ, HRT are excluded from the balanced panel for regression purposes. In the purpose of proving the main hypothesis, a research sample was defined, and the R software package was used for data processing.

The data used in the analyses have a panel data structure. They are determined by two dimensions, one of which is the identification code of the entrepreneur (ID), and the other is time: the year of the financial report (GOD).

A balanced panel was used in the analyses, which ensures the analysis of entrepreneurs who have business continuity in the observed period, which covers about 34 percent of observations (about 49 percent of subsidized companies). Thus, the sample for estimating the parameters of the linear regression consists primarily of entrepreneurs who received at least one incentive from the state in the observed period (2005-2015) and submitted annual financial reports for all the years covered by the analysis.

Since the regression analysis assesses the impact of income from state subsidies (support) on financial results, the key auxiliary variable is the indicator of whether the entrepreneur received at least one state support in the observed period or not: INCENTIVE. If the entrepreneur in the period 2005-2015 received state support at least once, the variable INCENTIVE=1, otherwise it is

[6] Source: database from register of annual financial statements lead by Financial Agency.

0. The INCENTIVE indicator is applied at the level of the entrepreneur for all annual reports in the database.

Two main independent variables were selected that best describe the observed phenomena, that is the impact of subsidies on the financial success of companies according to their size in the observed period: POTPORE.LOG (income from subsidies in the current year) and pot.u.aktivi.w[7] (share of income from subsidies in to the total assets of the company), and as an "auxiliary variable" POTPORE_U_PRIH (subsidies in total revenues) and POTICAJ=1, a dummy variable that shows whether the company received a subsidy in a certain year (1) or not (0).

The variables income from subsidies in the current year (POTPORE.LOG) and the share of income from subsidies in the total assets of the company (pot.u.aktivi.w) are by nature in some way related to the amount of subsidies. It can even be considered that the amount of the company's total assets does not change intensively and is only a constant that represents the size of the company. On the other hand, the subsidy variable in total revenues (POTP_U_PRIH-w) is quite volatile and says two things: whether the company "lives" only on subsidies (high ratio) or subsidies are insignificant with respect to total revenue. This is precisely the reason that this independent variable was combined in the multivariate analysis with the amount of subsidies (POTPORE.LOG) and with the share of subsidies in assets (potp.u.aktivi.w)[8].

The existence of dependence of some of the measures that measure the success or failure of the business on received state subsidies is examined using linear regression, and the method of least squares (OLS - Ordinary Least Square) was used in the research.

Finding the coefficients of the model rests on the assumptions that enable solving the mathematical problem. The first assumption is the homogeneity of the model parameters, which implies that $\alpha it=\alpha$ for all i and t, which is also true for $\beta it=\beta$. The resulting panel model $yit=\alpha+\beta Txit+uit$ is a standard linear panel model (pooled OLS). By finding a linear panel regression model, it is proven first of all whether there is a dependence between measures of business efficiency and received state subsidies. The results of the model (estimators and their signs, significance tests (p-values), coefficient of determination (R2), adjusted coefficient of determination (Adjusted R2), estimated standard errors of regression (Std. Error of Estimate)) also give the answer as to whether incentives and business results significantly positively or negatively correlated and

[7] According to the formula = income from subsidies (SUPPORTS)/total assets (ASSETS)

[8] For example, HRK 100.000 of subsidies in absolute amount will not have the same effect on a company with assets of 100.000.000 HRK as on a company with assets of 10.000 HRK. The same 100.000 HRK does not have the same effect if the company has a total income of HRK 100.000.000 pr if it has a total income (including subsidies) 110.000 HRK, regardless of the size of the assets.

to what extent the model explains errors in estimation. Regression analyses were made on two samples: on balanced panel data that includes all entrepreneurs, regardless of the status of incentives received (INCENTIVE =0;1) and on balanced panel data that includes only entrepreneurs who received an incentive in the observed period (INCENTIVE=1).

This is precisely the reason that the amount of subsidies is viewed in relations to assets and in relation to activity.

Dependent and independent variables were transformed by limiting 2% of atypical variable values to both tails of the distribution: to the 1. percentile in the lower tail of the distribution and to the 99. percentile in the upper tail of the distribution. By limiting atypical values to the n-th percentile, a better adaptation of the regression parameters to the distribution and representativeness of the regression is achieved, since atypical values (outliers) in that case, whose values can be several times higher than the main distribution, will not affect the slope of the regression line as it could be the case that they are not limited.

The data analysis started by checking the form of distribution, frequency and distribution of the results and continued with a descriptive statistical analysis of the data set in order to determine the movement of the values of the observed variables.

2.1. DISTRIBUTION OF ENTREPRENEURS BY SIZE

If the distribution of entrepreneurs according to size is observed, the entire database contains 1.047.588 observations (entrepreneur-year), while subsidized entrepreneurs in the balanced panel make up to almost a third of the total number of entrepreneurs from the balanced panel (30,7 percent).

As the balanced panel includes only entrepreneurs who submitted all annual financial reports in the period from year 2005-2015, their number is therefore always the same by age (42.596).

Table 1: Number of companies in the database and balanced panel

sample	without subsidies	subsidized	total
cijela baza	**830.013**	**217.575**	**1.047.588**
2005	58.860	15.735	74.595
2006	63.987	17.502	81.489
2007	69.935	18.736	88.671
2008	74.612	19.575	94.187
2009	77.731	20.113	97.844
2010	80.546	20.752	101.298

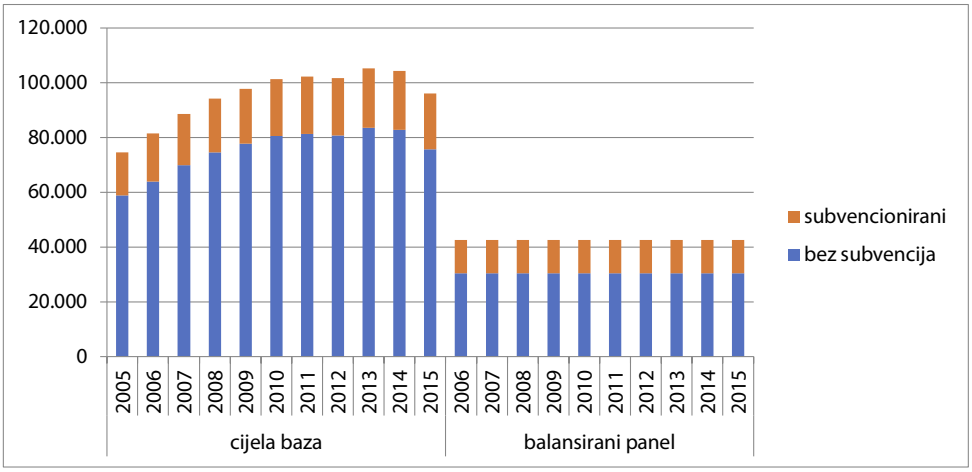
sample	without subsidies	subsidized	total
2011	81.388	20.930	102.318
2012	80.782	20.831	101.613
2013	83.530	21.686	105.216
2014	82.851	21.391	104.242
2015	75.791	20.324	96.115
balanced panel	**304.640**	**121.320**	**425.960**
2006.	30.464	12.132	42.596
2007	30.464	12.132	42.596
2008	30.464	12.132	42.596
2009	30.464	12.132	42.596
2010	30.464	12.132	42.596
2011	30.464	12.132	42.596
2012	30.464	12.132	42.596
2013	30.464	12.132	42.596
2014	30.464	12.132	42.596
2015	30.464	12.132	42.596

Source: work of the author

In the balanced data panel, the year of coverage was corrected (2005 to 2006) in order to satisfy the condition that all observed entrepreneurs in the panel submitted annual financial reports, which was not the case for 2005.

The distributions of subsidized and non-subsidized entrepreneurs in the entire base and in the balanced panel are shown in Figure 1.

Figure 1: Companies distribution



Source: work of the author

Table 2: Companies distribution by size

Number of entrepreneurs	Without incentives	With incentives	Total sum
Whole base	797.617	210.717	1.008.334
Small	786.900	199.861	986.761
Medium	8.245	8.315	16.560
Large	2.472	2.541	5.013
Bp	234.620	103.710	338.330
Small	228.639	96.475	325.114
Medium	4.560	5.599	10.159
Large	1.421	1.636	3.057
Total sum	1.032.237	314.427	1.346.664

Source: work of the author

Observing the distribution of companies by size in the balanced panel, as well as for all companies (entire database), it is clear that in both panels subsidized small entrepreneurs are the most represented (Table 2). The distribution of entrepreneurs by size in the balanced panel shows that out of a total of 338.330 entrepreneurs, small entrepreneurs make up (325.114) 69,3 percent, and 28,5 percent of small entrepreneurs in the balanced panel received subsidies. Medium-sized entrepreneurs participate with (10.159) 3 percent, and 55,1 percent received subsidies. The representation of large entrepreneurs is (3.057) 0,9 percent, and 53,.5 percent received subsidies.

However, in relative terms, over 50 percent of medium-sized and large companies received subsidies[9], while small companies accounted for a one fifth of companies.

The following shows the distribution of the values of the dependent and independent variables that were taken into consideration.

[9] The listed categories include companies from the shipbuilding, transport, and agriculture sectors.

Table 3. Distribution of the values of the dependant and independent variables

Sample	Variable	Average	St. dev.	Minimum	q1	q25	Median	q75	q99	Maximum	N	N.miss
bp	DOBGUB.LOG	8,07	5,05	0,00	0,00	4,20	9,74	11,75	15,91	21,69	338.330	0
bp	KOEF_TEK_LIK.w	5,78	22,41	0,00	0,02	0,78	1,37	2,82	187,85	187,85	338.330	0
bp	KOEF_ZADUZ.w	0,93	2,61	0,00	0,01	0,35	0,65	0,91	8,19	40,10	338.330	0
bp	KOEF_EKON_POSL.w	105,26	45,25	0,00	0,27	100,10	102,36	109,71	315,79	435,82	338.330	0
bp	KOEF_RENT_IMO.w	0,01	0,49	-7,33	-1,41	0,00	0,02	0,10	0,76	0,83	338.330	0
bp	KOEF_OBRT_IMO.w	1,68	1,92	0,00	0,00	0,57	1,23	2,10	10,40	15,84	338.330	0
bp	KOEF_NETO_MARZA.w	-19,01	200,16	-2.865,60	-368,52	0,00	0,02	0,07	0,59	0,74	338.330	0
bp	ZAP_SATI.w	9,99	21,79	0,00	0,00	1,00	3,00	8,00	123,00	123,00	338.330	0
bp	NOVA_VR.LOG	11,36	4,36	0,00	0,00	11,02	12,45	13,76	17,43	22,26	338.330	0
bp	DOB_X_ZAP.LOG	8,43	6,42	0,00	0,00	0,00	10,33	13,36	20,44	30,46	338.330	0
the whole base	DOBGUB.LOG	6,24	5,35	0,00	0,00	0,00	8,18	10,84	15,18	21,70	1.008.334	0
the whole base	KOEF_TEK_LIK	159,00	54.197,34	-0,09	0,00	0,54	1,12	2,32	187,85	52.102.740,00	1.008.334	18.365
the whole base	KOEF_ZADUZ	1.447,54	205.041,08	0,00	0,00	0,41	0,78	1,00	40,10	128.658.200,00	1.008.334	638
the whole base	KOEF_EKON_POSL	181,81	22.696,23	0,00	0,00	79,58	101,11	107,69	435,82	21.277.500,00	1.008.334	10.001
the whole base	KOEF_RENT_IMO	-225,43	111.097,10	-39.244.500,00	-7,33	-0,05	0,01	0,07	0,83	57.271.830,00	1.008.334	638
the whole base	KOEF_OBRT_IMO	446,03	108.583,32	0,00	0,00	0,20	1,00	2,03	15,84	60.151.500,00	1.008.334	638
the whole base	KOEF_NETO_MARZA	-499,29	176.848,59	-169.572.300,00	-2.865,60	-0,13	0,01	0,06	0,74	1.305,15	1.008.334	55.256

Sample	Variable	Average	St. dev.	Minimum	q1	q25	Median	q75	q99	Maximum	N	N. miss
the whole base	ZAP_SATI	9,34	104,37	0,00	0,00	0,00	1,0	4,0	123,0	14.687,00	1.008,334	0
the whole base	NOVA_VR.LOG	9,05	5,57	0,00	0,00	0,00	11,42	12,96	16,68	22,26	1.008.334	0
the whole base	DOB_X_ZAP.LOG	6,00	6,34	0,00	0,00	0,00	5,19	11,74	18,92	30,46	1.008.334	0
incentives	POTPORE.LOG	3,25	5,03	0,00	0,00	0,00	0,00	8,92	14,63	21,60	210.717	0
incentives	pot.u.aktivi	7,79	1.790,72	0,00	0,00	0,00	0,00	0,00	1,85	617.927,00	210.717	8
incentives	TROS_PLACA_REL	0,34	0,27	0,00	0,00	0,12	0,29	0,54	0,98	1,00	210.717	0
incentives	MAT_TROS.LOG	12,32	3,44	0,00	0,00	10,92	12,70	14,43	18,41	23,21	210.717	0
incentives	POTP_U_PRIH	0,09	16,78	0,00	0,00	0,00	0,00	0,00	0,95	7.500,00	210.717	0
incentives	INVEST.LOG	4,98	5,97	0,00	0,00	0,00	0,00	11,12	16,47	22,13	210.717	0
incentives	IZVOZ.LOG	8,62	6,79	0,00	0,00	0,00	11,99	14,23	18,27	23,27	210.717	0

Source: work of the author

For the purposes of analysis, on a balanced panel of data, models were tested for 11 dependent variables[10] that represent the data set and whose changes are monitored in relation to the set hypothesis:

ZAP_SATI.w – number of employees based on working hours
ZAP_SATI.wd – increase in the number of employees based on working hours compared to the previous year
NOVA_VR.LOG – newly created value
DOBGUB.LOG – profit/loss of the period
DOB_X_ZAP.LOG – period profit x number of employees based on working hours
KOEF_NETO_MARZA.w – net profit margin
KOEF_OBRT_IMO.w – coefficient of turnover of total assets
KOEF_TEK_LIKV.w – coefficient of current liquidity,
KOEF_ZADUZ.w – debt ratio
KOEF_EKON_POSL.w – business efficiency coefficient
KOEF_RENT_IMO.w – coefficient of profitability of total net assets[11].

Furthermore, independent variables were selected, for variables that are manipulated and whose influence on the measured phenomenon is monitored. In doing so, two main versions of each model were made: using as independent variables POTPORE.LOG (income from subsidies in the current year), or pot.u.aktivi.w (share of income from subsidies in the total assets of the entrepreneur[12]), in combination with other independent variables:

TROS_PLACA:REL – relative staff costs
MAT_TROS.LOG – material costs
POTP_U_PRIH – subsidies in company income
INVEST.LOG – investments
EXPORT.LOG – export.

2.2. CORRELATION AND UNIVARIANT ANALYSIS

Correlation analysis was used to verify the level of statistical connection between the impact of subsidies on the financial results of entrepreneurs on a balanced panel of entrepreneurs and the mutual correlation of independent variables as well as independent and dependent variables. The mutual correla-

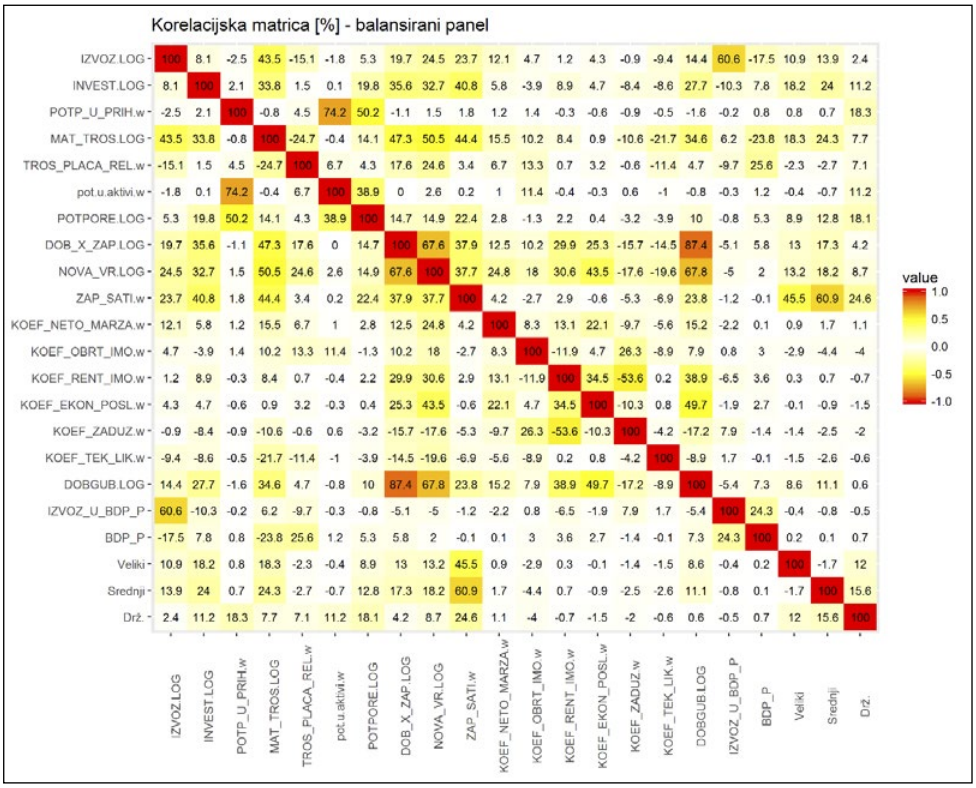
[10] Values 1. and 99. percentile were used to limit atypical values of the variables. The entire base of entrepreneurs was used for the dependent variables, and the distribution of entrepreneurs who received at least one state subsidy in the observed period from 2005. to 2015. was used for the independent variables, and the way and reasons for limiting atypical values are described in chapter 4.4.1 Limiting atypical values of variables.

[11] The selected dependent variables are in accordance with the economic measures of business performance of the company (Zelenika and Toković, 2000.) and set hypotheses.

[12] According to the formula = revenues from subsidies (SUPPORT) / total assets (ASSETS)

tions of the variables are shown in the form of a thermal map that shows their correlations on a balanced panel using a colour scale.

Figure 2: Correlation matrix of used variables (in percentages) – balanced panel



Source: work of the author

Correlation analysis on a balanced panel of data revealed that the variables DOBGUB.LOG (profit/loss of the period), ZAP_SATI.w (number of employees based on working hours) and DOB_X_ZAP.LOG (profit/loss of the period x number of employees based on working hours) have the highest correlation coefficients as expected), given that the variable DOB_X_ZAP.LOG = log (DOBGUB * ZAP_SATI.w). Although their correlation coefficient is above 80 percent, the variables are not used in the same models, so there is no risk of multicollinearity.

DOBGUB.LOG (period profit/loss) and NOVA_VR.LOG (newly created value) have a high correlation coefficient, the value of which exceeds 60 percent, but they are also variables from the dependent side of the regression equation in different models. The other variables were not correlated to the extent that there would be a risk of a significant influence of the multicollinearity effect on the regression results.

2.3. PRESENTATION OF TOTAL TURNOVER AND RECEIVED SUBSIDIES ACCORDING TO THE SIZE OF THE COMPANY

Given that company revenues are gross inflows of economic benefits during the period that result from the regular activities of entrepreneurs and result in an increase in capital, total revenues and received subsidies were analysed according to the size of the entrepreneur in the observed period. The intention was to determine the share of state subsidies in the total income of entrepreneurs by size in absolute amounts.

Table 4: Income from state subsidies in total income

Years	SMALL		MEDUIM		LARGE		TOTAL	
	Total income (000 kn)	Support (000 kn)	Total income (000 kn)	Support (000 kn)	Total income (000 kn)	Support (000 kn)	Total income (000 kn)	Support (000 kn)
2006	24.388.953	650.444	24.989.792	494.473	56.303.410	1.064.715	105.682.155	2.209.632
2007	22.546.212	696.038	22.958.094	496.134	61.882.476	1.254.301	107.386.782	2.446.473
2008	18.275.453	748.021	19.373.949	722.869	60.758.731	1.618.016	98.408.133	3.088.907
2009	12.954.490	718.531	15.591.502	615.953	43.045.348	1.562.970	71.591.340	2.897.454
2010	14.482.815	722.514	17.590.589	622.268	41.566.697	1.288.751	73.640.101	2.633.533
2011	15.324.723	738.510	18.799.066	633.761	45.770.505	1.260.865	79.894.295	2.633.136
2012	13.837.930	657.099	16.643.579	627.068	46.086.196	1.321.259	76.567.705	2.605.427
2013	14.411.151	1.702.080	15.857.244	517.216	46.837.157	1.574.216	77.105.552	3.793.512
2014	14.837.157	636.228	16.763.010	476.501	41.151.195	1.396.781	72.751.361	2.509.510
2015	15.528.442	670.594	17.938.903	551.664	42.537.374	1.286.644	76.004.719	2.508.902
Total sum	**166.587.327**	**7.940.058**	**186.505.729**	**5.757.908**	**485.939.089**	**13.628.519**	**839.032.145**	**27.326.485**

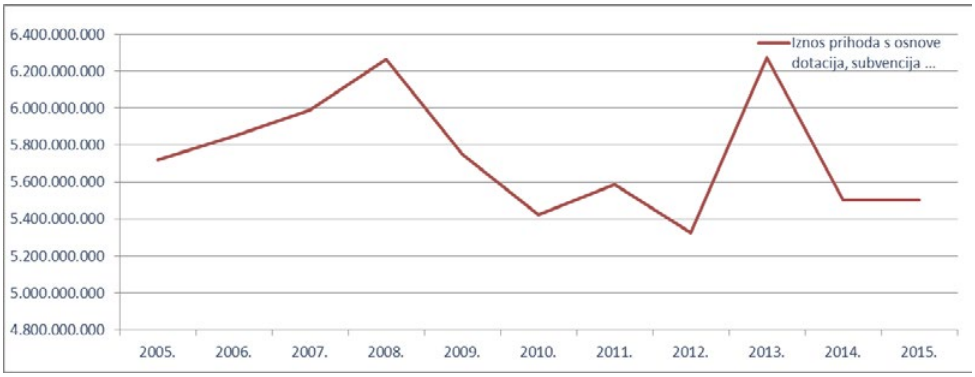
Source: work of the author

From the data presented, it is clear that large companies received the most subsidies in absolute terms (HRK 13,6 million) in the observed period. They are followed by small (HRK 7,9 million) and medium-sized companies (HRK 5,7 million). In the observed period, in 2008, large entrepreneurs received the largest amount of subsidies (HRK 1.6 million), as well as medium-sized enterprises (HRK 722 million), while in 2013, small entrepreneurs received HRK 14,4 million in subsidies.

If the share of state subsidies in the total income of entrepreneurs is observed by size in absolute amounts in the observed period, then the situation is different. The share of subsidies in total revenues is the highest among small companies and amounts to 4,8 percent, followed by medium-sized companies with 3,1 percent and large companies with 2,8 percent, which is expected considering the structure of the total revenue generated by entrepreneurs by size.

If we look at the average amount of subsidies granted per entrepreneur, that average was the highest in 2009 (HRK 1,43 million), and the year 2008 stands out for the average amount of subsidies granted, with the amount of 1,32 million kuna per entrepreneur. The reason is high sectoral subsidies, especially to the transport, shipbuilding, and HRT sectors[13]. The lowest average amount of subsidies per entrepreneur was awarded in 2015 (HRK 757.000), which corresponds to the amount awarded in 2006, when it amounted to HRK 760,000, and is the result of the implementation of the state aid policy guidelines of the Republic of Croatia[14].

Chart 1: Income of entrepreneurs from subsidies in the observed period



Source: Financial Agency, Register of annual financial statements

Below is a regression analysis of the impact of subsidies on the business performance of entrepreneurs according to size on a balanced panel.

3. RESULTS OF THE ANALYSIS OF THE INFLUENCE OF INCOME FROM STATE SUBSIDIES ON THE FINANCIAL SUCCESS OF THE COMPANY BY SIZE

The significance of the regression coefficients at the level greater than 99,9 percent (p-value < 0.1 percent) for the dependent variables and models included in the rest of the analyses (based on the results of univariant and multivariate analysis) are:

DOB_X_ZAP.LOG (profit/loss of the period x number of employees based on working hours)

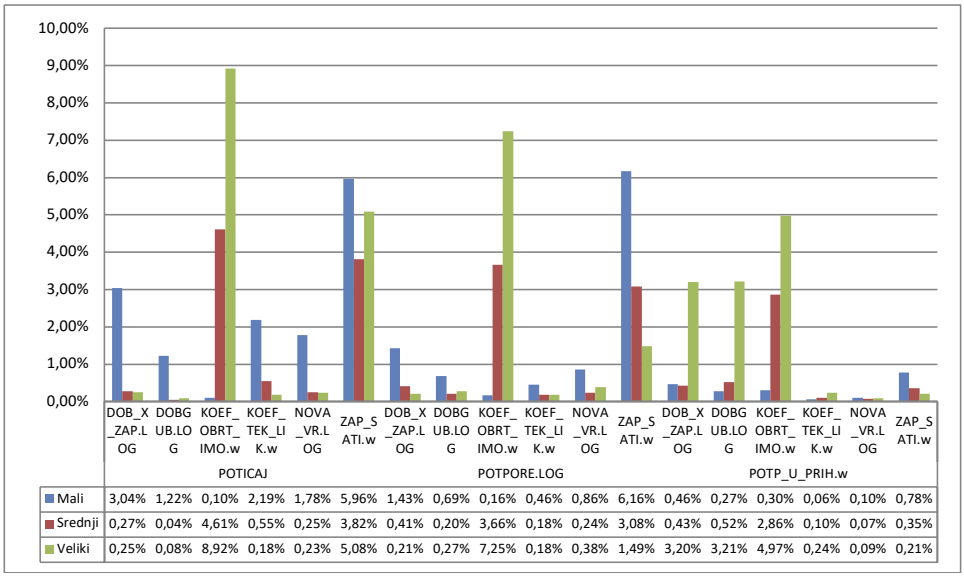
[13] *http://www.aztn.hr/uploads/documents/mediji_o_nama/Industrijska_politika_i_dravne_potpore_u_Hrvatskoj.pdf (pristupljeno 2*. 10. 2018.)

[14] Government of the Republic of Croatia (2015). Decision on enactment of state aid policy guidelines for the period 2015.-2017., Zagreb. Available at http://www.mfin.hr/adminmax/docs/Smjernice%20politike%20drzavnih%20potpora%202015.%20- %20201799.%20-%20NN%20147-14.pdf.

DOBGUB.LOG (profit/loss of the period)
KOEF_OBRT_IMO.w (turnover coefficient of total assets)
KOEF_TEK_LIK.w (coefficient of current liquidity)
NEW_VR.LOG (newly created value)
ZAP_SATI.w (number of employees based on working hours).

independent variable POTPORE.LOG

Chart 2: Presentation of the relative influence of subsidies on business success according to the size of the entrepreneur (sample: bp.vel.w.z)



	DOB_X_ZAP.LOG	DOBGUB.LOG	KOEF_OBRT_IMO.w	KOEF_TEK_LIK.w	NOVA_VR.LOG	ZAP_SATI.w	DOB_X_ZAP.LOG	DOBGUB.LOG	KOEF_OBRT_IMO.w	KOEF_TEK_LIK.w	NOVA_VR.LOG	ZAP_SATI.w	DOB_X_ZAP.LOG	DOBGUB.LOG	KOEF_OBRT_IMO.w	KOEF_TEK_LIK.w	NOVA_VR.LOG	ZAP_SATI.w
	POTICAJ						POTPORE.LOG						POTP_U_PRIH.w					
Mali	3,04%	1,22%	0,10%	2,19%	1,78%	5,96%	1,43%	0,69%	0,16%	0,46%	0,86%	6,16%	0,46%	0,27%	0,30%	0,06%	0,10%	0,78%
Srednji	0,27%	0,04%	4,61%	0,55%	0,25%	3,82%	0,41%	0,20%	3,66%	0,18%	0,24%	3,08%	0,43%	0,52%	2,86%	0,10%	0,07%	0,35%
Veliki	0,25%	0,08%	8,92%	0,18%	0,23%	5,08%	0,21%	0,27%	7,25%	0,18%	0,38%	1,49%	3,20%	3,21%	4,97%	0,24%	0,09%	0,21%

Source: work of the author

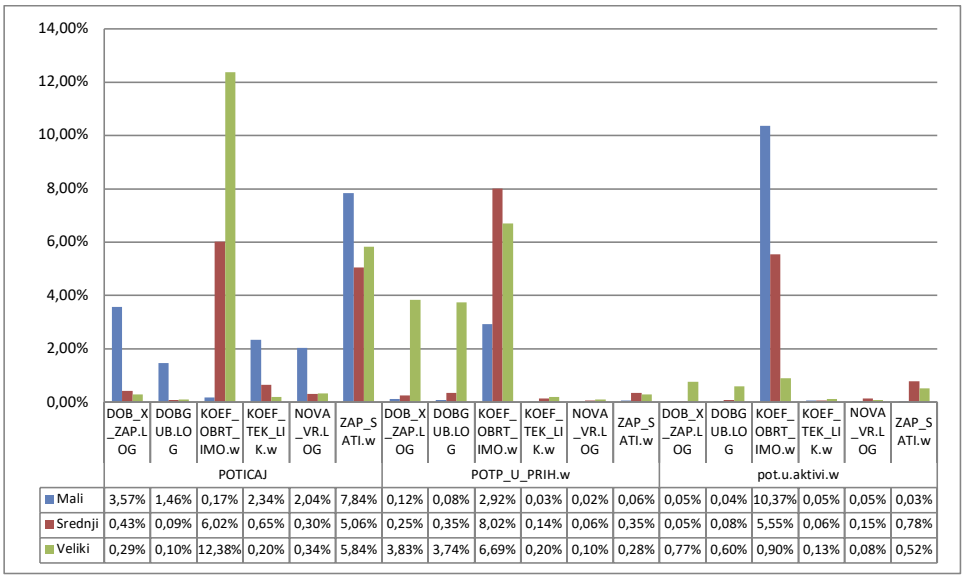
It can be concluded that the relative influence of subsidies is most pronounced among large entrepreneurs, and this is based on the indicators of the asset turnover ratio (7,25 percent) and the number of employees based on working hours (ZAP_SATI.w; 1,49 percent). The very fact that they received subsidies (INCENTIVE variable) had a significant impact on these variables (for example: for the asset turnover ratio it is 8,92 percent), and for small entrepreneurs on the profit/loss variable for the period (1,22 percent).

The influence of the auxiliary independent variable POTP_U_PRIH is also significant. Next are medium-sized and small entrepreneurs. For medium-sized enterprises, the relative impact of subsidies is on the same indicators as for large enterprises, but with a lower relative intensity. In the case of small entrepreneurs, the relative impact of subsidies had the greatest impact on the number of employees based on working hours (variable ZAP_SATI.w is 6,16 percent).

independent variable pot.in.asset.w

Chart 3 shows the relative influence of the second independent variable - support in assets on the success of entrepreneurs according to size on a balanced panel. It shows that subsidies in assets had the greatest impact on the asset turnover ratio of small (10,37 percent) and medium-sized entrepreneurs (5,55 percent), as well as the auxiliary independent variable POTP_U_PRIH.w.

Chart 3: Presentation of the relative influence of the independent variable pot.u.aktivi.w on business success according to the size of the entrepreneur (sample: bp.vel.w.z)



	POTICAJ						POTP_U_PRIH.w						pot.u.aktivi.w					
	DOB_X_ZAP.LOG	DOBGUB.LOG	KOEF_OBRT_IMO.w	KOEF_TEK_LIK.w	NOVA_VR.LOG	ZAP_SATI.w	DOB_X_ZAP.LOG	DOBGUB.LOG	KOEF_OBRT_IMO.w	KOEF_TEK_LIK.w	NOVA_VR.LOG	ZAP_SATI.w	DOB_X_ZAP.LOG	DOBGUB.LOG	KOEF_OBRT_IMO.w	KOEF_TEK_LIK.w	NOVA_VR.LOG	ZAP_SATI.w
Mali	3,57%	1,46%	0,17%	2,34%	2,04%	7,84%	0,12%	0,08%	2,92%	0,03%	0,02%	0,06%	0,05%	0,04%	10,37%	0,05%	0,05%	0,03%
Srednji	0,43%	0,09%	6,02%	0,65%	0,30%	5,06%	0,25%	0,35%	8,02%	0,14%	0,06%	0,35%	0,05%	0,08%	5,55%	0,06%	0,15%	0,78%
Veliki	0,29%	0,10%	12,38%	0,20%	0,34%	5,84%	3,83%	3,74%	6,69%	0,20%	0,10%	0,28%	0,77%	0,60%	0,90%	0,13%	0,08%	0,52%

Source: work of the author

From the summary presentation of the main variables of the model and their influence on the dependent variables according to the size of the entrepreneur, several observations can be made.

The relative influence of subsidies (POTPORE.LOG) is most pronounced on the dependent variables asset turnover ratio (7,25 percent) in large companies and the number of employees based on working hours (variable ZAP_SATI.w – 6,2 percent) in small entrepreneurs, followed by medium-sized entrepreneurs with 3,1 percent.

On the other hand, the relative influence of the independent variable subt. aktivi.w is most pronounced for the asset turnover ratio of small entrepreneurs (10,4 percent), followed by medium-sized entrepreneurs with 5,5 percent and large entrepreneurs with 0,9 percent.

However, if the auxiliary independent variables POTP_U_PRIH.w (subsidies in total income) and INCENTIVE (that they received subsidies) are also observed, then their relative influence on the dependent variable asset turnover coefficient is different on both terms according to size of the entrepreneur, and on significance.

For example, the most pronounced relative influence of the variable INCENTIVE (that they received subsidies) on the turnover ratio of total assets is for large entrepreneurs (12,4 percent), medium-sized entrepreneurs 6,0 percent, and for small entrepreneurs the relative influence is only 0,2 percent.

On the other hand, the relative influence of the independent variable POTP_U_PRIH.w (subsidies in total revenues) on the dependent variable asset turnover ratio is most pronounced in medium-sized enterprises (8,0 percent), followed by large enterprises with 6,7 percent and small enterprises with 2, 9 percent.

It can be concluded that the income from subsidies as well as the participation of subsidies in assets have a relatively significant positive impact on the activity of entrepreneurs expressed by the asset turnover ratio, but at the same time a higher share of subsidies in the total income of entrepreneurs indicates a weaker activity of the entrepreneur (reduces the asset turnover ratio), which points to the conclusion that the greater the dependence of a company's business on subsidies, the worse the business results are.

Given that the asset turnover ratio is one of the indicators of the efficiency of entrepreneurs and shows how much one monetary unit of assets generates monetary units of income, it is expected that the turnover ratio for both models is most pronounced in large entrepreneurs. It indicates a faster turnover of funds in large companies, which means that they financed the same volume of business with smaller amounts of working capital.

A relatively significant positive impact they have on employment as well as the absolute amounts of received subsidies, which leads to the conclusion that subsidies affect employment, but not in those companies where subsidies are in a high share of total revenues. A high positive correlation with the number of employees, while at the same time a negligible impact on the increase in the number of employees shows that larger amounts of subsidies were received by companies with a larger number of employees (Buneta, 2020).

Similar observations can be made for the variable realized profit/loss of the period.

Table 5: Multivariant analysis – a summary of the influence of the independent variables on explaining the variance of dependant variables expressed by relative contributions in the adjusted coefficient of determination and the sign of the regression coefficient

Relative impact			Independent variable (sign estimators)				
Dependant variable	Model ord.no.	r2	POTPORE.LOG	pot.u. aktivi.w	POTICAJ	POTP_U_ PRIH.w	Total sum
ZAP_SATI.w	8.1	31,83%	8,10% (+)		3,71% (+)	0,77% (-)	12,58%
	8.2	30,66%		0,04% (-)	5,19% (+)	0,07% (+)	5,31%
DOB_X_ZAP.LOG	10.1	43,79%	1,77% (+)		3,10% (+)	0,48% (-)	5,35%
	10.2	43,70%		0,05% (-)	3,68% (+)	0,12% (-)	3,85%
NOVA_VR.LOG	9.1	61,14%	1,17% (+)		1,93% (+)	0,11% (-)	3,22%
	9.2	61,09%		0,04% (-)	2,25% (+)	0,02% (+)	2,32%
DOBGUB.LOG	1.1	44,03%	0,83% (+)		1,30% (+)	0,30% (-)	2,43%
	1.2	43,98%		0,04% (-)	1,56% (+)	0,09% (-)	1,69%
KOEF_TEK_LIK.w	2.1	8,35%	0,52% (+)		2,31% (-)	0,06% (-)	2,89%
	2.2	8,34%		0,05% (+)	2,45% (-)	0,03% (-)	2,53%
KOEF_OBRT_IMO.w	6.1	13,31%	0,44% (-)		0,09% (-)	0,33% (+)	0,87%
	6.2	15,10%		10,84% (+)	0,21% (-)	3,12% (-)	14,17%
KOEF_NETO_ MARZA.w	7.1	9,33%	0,21% (-)		0,85% (+)	0,12% (+)	1,17%
	7.2	9,34%		0,09% (+)	0,88% (+)	0,16% (+)	1,13%
KOEF_ZADUZ.w	3.1	34,81%	0,07% (+)		0,14% (-)	0,02% (-)	0,24%
	3.2	34,82%		0,06% (-)	0,16% (-)	0,03% (+)	0,25%
KOEF_RENT_IMO.w	5.1	37,49%	0,03% (-)		0,08% (+)	0,01% (-)	0,12%
	5.2	37,49%		0,02% (+)	0,09% (+)	0,02% (-)	0,13%
KOEF_EKON_POSL.w	4.1	16,84%	0,01% (+)		0,03% (-)	0,03% (-)	0,07%
	4.2	16,85%		0,02% (-)	0,03% (-)	0,02% (+)	0,07%
ZAP_SATI.w.d	11.1	0,86%	10,22% (+)		0,98% (-)	0,87% (-)	12,07%
	11.2	0,79%		0,52% (-)	0,66% (+)	0,14% (-)	1,32%

Source: work of the author

Several important observations can be made from the summary of the multivariate analysis (Table 5), for example from the summary of the influence of the independent variables on explaining the variance of the dependent variables expressed by the relative contribution in the adjusted coefficient of determination and the sign of the regression coefficient:

First, companies with a higher proportion of subsidies in total revenues are less active and efficient, and the criteria for achieving efficiency are economy and profitability. How is it in in market economies, the basic criterion for achieving efficiency is profitability, that means that if the profitability rate is satisfactory, the company operates efficiently. However, as it is the share of subsidies in total revenues is most pronounced in large and medium-sized enterprises and they are predominantly state-owned, the obtained observations are expected (saving jobs and "losers"). Furthermore, subsidies to entrepreneurs show a relatively significant positive impact on the profitability of entrepreneurs (profit/loss of the period, newly created value and on profit * employees), as well as the impact of their relative amount on activities, which directly proves the hypothesis[15].

The share of *subsidies in assets* has a positive effect on activity (larger share of subsidies in assets increases the asset turnover ratio) of the entrepreneur, but at the same time a higher share subsidy in business income points to weaker activity of entrepreneurs (reduces asset turnover ratio).

Negative effect (negative sign of the estimator) of the subsidy allocation indicator to entrepreneur (INCENTIVE variable, "cleaned" of the influence of absolute and/or relative amount of subsidies) to the indicator of liquidity of the entrepreneur (KOEF_LIKV.w) refers to the fact that subsidies were requested and received primarily by entrepreneurs with lower liquidity.

Subsidies did not have a significant impact on other indicators of the company's operations. Still, the relative coefficients of determination for subsidies are not dominant in relation to the effects of other business inputs to the financial operations of entrepreneurs, so it cannot be claimed that subsidies have a significant positive effect on the operations of the entire economic sector of companies, but they are only marginal. The reasons for this lie in the relatively low share of subsidy in total income (< 1 %) and a small number of entrepreneurs to whom subsidies are granted (< 10 %).

4. CONCLUSION

Examining the impact of income from state subsidies on the financial results of companies, corporate profit taxpayer, according to size, is still insufficiently researched. The assumption is that such a situation is the result of difficult access to comprehensive data on state aid and subsidies, which are maintained in various databases and in accordance with different methodologies. Besides that, the so-called AOP positions in the annual financial state-

[15] The results are consistent with the research of Leibenstein (1966) i Bergstrom (1998), who also concluded that the absolute amount of subsidies has the greatest effect on increasing profitability.

ments combine data on subsidies, grants and state aid and are used as such in this research, which is a kind of limitation of this work. In one position are synthesized data on subsidies, grants, and state aid without the possibility of analytical presentation.

Given that the conducted research is based on the annual financial statements of observed entrepreneurs and calculated financial ratios with the inclusion of selected macroeconomic variables from the environment (in one of the models) in order to determine the impact of the environment on the financial results of subsidized entrepreneurs, this is at the same time an advantage and disadvantage in this research. An advantage because research based solely on financial ratios is generally criticized for ignoring the impact of the environment in which companies operate. The disadvantage is because the introduction of variables that depict the macroeconomic environment in the economy has shortcomings, such as, for example, the lack of data on sectoral GDP that would adequately reflect the macroeconomic movement of GDP in certain economic activities.

For the purposes of the research, indicator variables were also created, for example binomial variables whose values take on two states: 0 or 1 depending on whether the reference condition is met or not. As the conceptual part of the research is based on regression analysis on a balanced panel, in which the variables are classified according to their role in the regression analysis, by adding indicator and macroeconomic variables to the regression, the stability of the regression coefficients of the independent variables was tested. The influence of indicator and macroeconomic variables was examined on a balanced panel, while only a set of models for dependent variables was used for the analysis by company size because they showed a higher degree of correlation with independent variables based on subsidies.

As a summary of the conducted research, it is possible to state that the formed statistical models confirmed the research hypothesis of the connection of the influence of subsidies on the financial performance of entrepreneurs according to size.

Analysis of the impact of subsidies on the performance of companies on a balanced panel of entrepreneurs according to size showed that subsidies had the greatest relative impact on the asset turnover ratio of large companies, as well as subsidies in assets, and on the ratio of current liquidity and profit * employed. In the case of medium-sized companies, the relative impact of subsidies on the asset turnover ratio and the number of employees based on working hours is also the greatest. In the case of small entrepreneurs, the biggest relative impact of subsidies is on the number of employees, newly created value, and the coefficient of current liquidity. The influence of the auxiliary in-

dependent variable of subsidy in total income (POTP_U_PRIH) is also extremely significant on the coefficient of current liquidity, which points to a relatively significant contribution of subsidies in the total income of small entrepreneurs to their liquidity.

The research also showed that the share of subsidies in the total income of the entrepreneur is correlated with the size of the entrepreneur. The share of subsidies in total income is the highest among small companies, followed by medium-sized and large companies, which is expected considering the structure of the total income generated by entrepreneurs according to size.

One of the recommendations for future research, given the lack of research of the financial performance of subsidized companies through multiple indicators and company size, would be to examine the aforementioned interrelationship with other statistical methods in order to compare the obtained results and thus the knowledge itself.

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FINANCIJSKA USPJEŠNOST SUBVENCIONIRANIH PODUZEĆA PREMA VELIČINI U RAZDOBLJU 2005. – 2015. GODINE

SAŽETAK RADA

Međuovisnost državnih subvencija i financijskih rezultata poduzeća još uvijek su nedovoljno istražena kategorija. Stoga je predmet istraživanja u ovom radu ispitati utjecaj državnih subvencija na financijsku uspješnost poduzeća u Republici Hrvatskoj u razdoblju od 2005. do 2015. godine prema veličini. U dosadašnjim istraživanjima varijabla veličina poduzeća je često u fokusu znanstvenog istraživanja kao i uspješnost (Berger i Udell., 1995; Boeri i Bellmann, 1995), ali istraživački modeli uglavnom se odnose na preživljavanje poduzeća u odnosu na veličinu. U ovom radu je intencija istražiti utjecaj državnih subvencija na uspješnost poslovanja poduzeća prema veličini, a odabrana su ekonomska mjerila uspješnosti poslovanja promatranih poduzeća. Uzorak za procjenu parametara linearne regresije čine u provom redu poduzeća koja su u promatranom vremenskom razdoblju primila barem jedan poticaj od države i predali godišnja financijska izvješća za sve analizom obuhvaćene godine (balansirani panel). Za kontrolnu skupinu odabran je stratificirani uzorak poduzeća koja su slična poduzećima koja su primila državne subvencije po veličini aktive, broju zaposlenih, djelatnosti i veličini. Na taj način bit će moguće procijeniti postoje li signifikantni utjecaji na uspješnost poslovanja subvencioniranih promatranih poduzeća u odnosu na nesubvencionirana poduzeća. Istraživanje je pokazalo da subvencije imale relativno značajan utjecaj kod svih poduzeća, ali različitog intenziteta.

Ključne riječi: *državne subvencije, financijska uspješnost poslovanja, veličina poduzeća*