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Insolvency in the Republic of Croatia

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ABSTRACT

The issue of insolvency is significantly present in countries undergoing transition. In Croatia, there has been significant research on the possibilities of using the existing models for determining the domestic companies' ability to maintain solvency. Likewise, no model based on business enterprises' financial data has yet been proposed, which leaves an open space for this research. The purpose of this paper is to calculate and analyse solvency indicators; total debt to assets ratio, total debt to equity ratio, Altman Z-score, and the Kralicek Quick Test. This paper analyses the financial data for the period 1996–2014 and provides evidence that the insolvency of Croatian companies increased with the global financial crisis. Multiple regression analysis is used in order to show the relation between total debt to assets ratio as the dependent variable, and current assets and liabilities ratio and dummy variables as independent variables.

The conclusions and recommendations for mitigating the impact of insolvency in this paper would be useful for managers, public policy-makers and all stakeholders in companies with financial problems, as well as for financially still-healthy companies.

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Solvency; insolvency; economic crisis; total debt to assets ratio; Altman Z-score model and Kralicek Quick Test; regression analysis

JEL CLASSIFICATIONS

G30; E42; C52

1. Introduction

Solvency is the ability of a company to meet its debt and other obligations in the long run (Gryglewicz, 2011, p. 366). In other words, it is the paying ability, and represents the state when the money available for payment covers the liabilities (Marković, 2001, p. 143). Likewise, in cases when a company's liabilities exceed its assets, it is considered insolvent. Like any other business entity, a company is in a state of full solvency when its entire property (assets) is in the form of cash or cash equivalents (Kosmidis & Stavropoulos, 2014, p. 55). The further the company's assets are from the form of cash, the higher the risk of deviations from full solvency (Penman, 2013, p. 237).

Insolvency had, and still has today, enormous consequences for the entire Croatian economy. Many Croatian authors warn about the negative macroeconomic trends in the Croatian economy (Benić, 2012, p. 851; Buturac, Rajh, & Teodorović, 2009, p. 675; Kulić, 2003, p. 25; Škare & Stjepanović, 2011, p. 45). Many companies and businesses failed,

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despite the demand on the market, resulting in a significant growth of unemployment. Still, these changes were not caused solely by insolvency, however significant its role, but also by mostly difficult restructuring processes of the economy and society as a whole (Simić, Kovačević, & Simić, 2011, p. 536). The purpose of this paper is to calculate and analyse solvency indicators; total debt to assets ratio, total debt to equity ratio, Altman Z-score, and the Kralicek Quick Test. The calculation of these indicators will show the difference in the results, according to which the recommendations on the most appropriate method of calculation will be given. The goal of this paper is to analyse the financial performance of the companies and to predict their financial solvency using multiple regression analysis, which takes into account the debt to assets ratio and several independent variables. Accordingly, the following two hypotheses are tested:

Hypothesis 1: The insolvency of Croatian companies increased in the global financial crisis.

Hypothesis 2: Most of the actions undertaken by the Republic of Croatia in terms of legislation and financial incentives have been ineffective (Bankruptcy Act, Act on Financial Operations and Pre-Bankruptcy Settlement, Adoption of Regulations with the Rules of European Insolvency Law, Law on Securing Worker's Claims in the Event of an Employer's Bankruptcy, The Value Added Tax law, Act on the special measure for collecting the tax debt brought about by the economic crisis, and others).

The Republic of Croatia has not yet created all the preconditions to reduce insolvency to an acceptable level. Therefore, the conclusion of this paper offers recommendations for reducing insolvency that would be useful for managers, public policy-makers and all stakeholders in companies with financial problems, as well as for financially still-healthy companies.

The research is structured as follows. Section 2 presents an analysis of previous reference works on companies' insolvency; Section 3 refers to data and the research methodology used; Section 4 presents the main results, while Section 5 provides conclusions and recommendations.

2. Literature review

The issue of insolvency is a subject that has been analysed by many eminent authors, which resulted in a number of models for predicting company insolvency. Beaver (1967) used a simple univariate statistical model. Using a sample of 158 companies, Beaver proposed the following three indicators for predicting financial failure of the company: net cash flow/total assets; net income/total liabilities and net cash flow/total debt. Altman (2000, pp. 7–12) found a large number of variables to be significant indicators of problems in financial performance and chose five of them which are important for predicting corporate bankruptcy: net working capital/total assets, retained earnings/total assets, earnings before interest and taxes/total assets, total market value of equity/book value of total liabilities, and sales income/total assets. Altman, Haldeman and Narayanan (1977, p. 35) created the ZETA model where they analysed 27 indicators, but included only the following seven in the model: return on assets – Earnings before interest and tax (EBIT)/total assets; stability of earnings – EBIT/total interest payments; cumulative profitability – retained earnings/total assets; liquidity – total current assets/total current liabilities; capitalization – common equity/total capital; and company size – measured by the company's total assets.

It is important to note that most of the literature dealing with insolvency predictions is dominated by studies from the United States which use American companies as their research sample (Russel & Zhai, 1996, p. 185). However, these models need to be tested in other parts of the world as well, and need to be adapted to the specifics of each particular country (Khoja, Chipulu, & Jayasekera, 2014, p. 15; Nair, 2013, p. 39). Previous studies conducted in Croatia have shown that the Altman Z-score model is not adequate for implementation in the Croatian economic environment, and that the level of accuracy in predicting insolvency is lower than in the United States (Zenzerović & Peruško, 2009, p. 350). The majority of business failure papers use financial ratios as predictors, while in real life the banks combine financial and non-financial variables. In order to test the predictive power of non-financial variables, Pervan and Kuvrek (2013, p. 190) compare two insolvency prediction models. The first model, using only financial ratios, resulted in a classification accuracy of 82.8%, while the combined model, with both financial and non-financial variables, resulted in a classification accuracy of 88.1%

The authors wish to use this model to prove that the Altman Z-score is not applicable to the Croatian economy, and that it gives distorted results. On the other hand, the Kralicek Quick Test is more appropriate, and the results are much more accurate.

This paper tests the model, which, unlike the Altman Z-score model, was developed in Europe and is more applicable to the Croatian economy. Peter Kralicek (1991) developed a model on a sample of companies from German-speaking countries. Unlike Altman's model that incorporates static indicators, the Kralicek Quick Test includes both dynamic and static indicators and is most commonly used in Germany, Switzerland and Austria (Situm, 2015, p. 240). Romanian authors have proven that this model can be successfully used in Eastern Europe, with the percentage of accurate predictions as high as 80% (Beca & Dragan, 2015, p. 65). One survey testing the possibility of using the Kralicek Quick Test was conducted in Serbia, where the author Jakovčević analysed four agricultural companies with the aim of determining their ability to create increased value by using the potential of available resources. However, her conclusion does not make evident whether the results of the Kralicek Quick Test correspond to the actual state in the companies' business operations.

3. Data and methodology

In order to assess the solvency of the Croatian economy, the paper uses financial data for the period 1996–2014, provided by the Financial Agency (FINA). The data cover generated financial indicators for legal and natural persons with a registered business. For the given period, 64.8% of the total number of companies, or 81.8% of the total number of active companies were analysed. In this paper we use two economic ratios and two economic models for predicting insolvency, which are shown in Figure 1.

Solvency measures are focused on observation of the long-term financial stability in terms of the capital and financial structure of the company, and relations of individual positions and structures with assets. The most important indicators of solvency are:

- the long-term debt to total long-term capital ratio,
- the gearing ratio,
- the total liabilities and equity ratio,
- the interest coverage ratio,

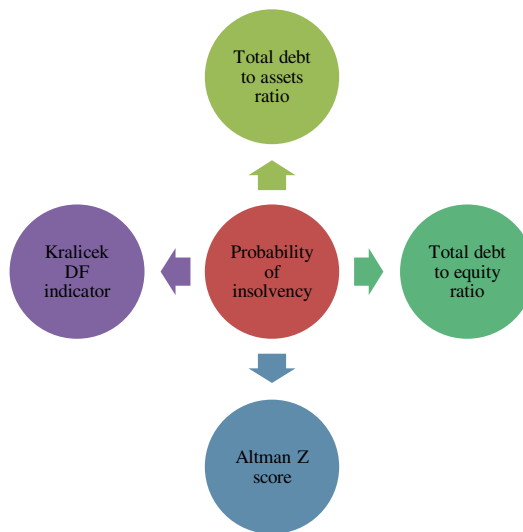


Figure 1. Economic ratios and models of insolvency prediction. Source: Authors' interpretation.

- the non-current assets and shareholders' equity ratio and the cumulative relations between assets' and liabilities' positions.

The value of each solvency indicator depends on the type of activity that the company deals with, as well as on the managerial policies towards the working capital. The methodology of calculating the Altman Z-score and Kralicek Quick Test model is shown in Table 1.

The Altman Z-score model and Kralicek Quick Test are used to determine the financial performance of the company, including solvency (Altman & Sabato, 2007, p. 343). Thus, these two indicators measure not only the solvency level, but also the company's financial operations, indicating the overall financial condition of the company in the near future. The goal of using these indicators is predicting the financial crisis or bankruptcy of a particular company in the future (Marković, 2000, p. 126).

The Altman Z-score model, initially developed by Edward Altman in the late 1960s, represents a multiple discriminant analysis (MDA) used to assess bankruptcy (Almansour, 2015, p. 116). The approach includes constructing the solvency profile of a company on the basis of its published financial accounts, which is then compared against the profiles of those that are known to be financially healthy or otherwise insolvent (Ng, Wong, & Zhang, 2011, p. 601). The most relevant contribution of Altman's model was the use of multivariate data analysis technology to predict insolvency (Mende, Cardoso, Mario, Martinez, & Ferreira, 2014, p. 159). Many scientists use it in their work for the comparison of bankruptcy models (Anjum, 2012, p. 214). The Altman Z-score model showed a high predictive ability for the initial sample one year before failure (95% accuracy). However, the model's predictive ability dropped off considerably, with only 72% accuracy two years before failure, down to 48 and 29% accuracy four and five years before failure, respectively (Lim, Yun, Gan, & Jiang, 2012, p. 70). The model is defined by the following equation (Altman & Edward, 1993, p. 184):

Table 1. Summary of financial ratios.

Measurement	Description	Term	Result ratio
Altman Z-score	Z – Altman Z-score	$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$	$Z > 2.99$ – financially safe company
	X_1 – working capital/total assets		$Z > 1.8 < 2.99$ – financially threatened company with the potential of healing
	X_2 – retained earnings/total assets		$Z < 1.81$ – company is headed for bankruptcy
	X_3 – earnings before interest and taxes/total assets		
	X_4 – market value of equity/book value of total liabilities		
	X_5 – sales/total assets		
Kralicek Quick Test model	DF – Kralicek DF indicator	$DF = 1.5 X_1 + 0.08 X_2 + 10 X_3 + 5 X_4 + 0.3 X_5 + 0.1 X_6$	DF = 2 – very good financial state
	X_1 – net cash flow/liabilities		DF = 1 – average financial state
	X_2 – total assets/liabilities		DF = 0 – uncertain financial state
	X_3 – earnings before interest and taxes/total assets		
	X_4 – earnings before interest and taxes/revenues		
	X_5 – reserve funds/revenues		
	X_6 – operating revenues/total assets		

Source: Authors' interpretation according to: Ng et al. (2011, p. 601); Poletti-Hughes and Ozkan (2014); Altman and Edward (1993, p. 184); and Zenzerović and Peruško (2006, p. 149).

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5 \quad (1)$$

where:

Z – Altman Z-score

X_1 – working capital/total assets

X_2 – retained earnings/total assets

X_3 – earnings before interest and taxes/total assets

X_4 – market value of equity/book value of total liabilities

X_5 – sales/total assets

The indicator X_1 shows the company's liquidity. The company's net working capital is defined as the company's current assets minus its current liabilities. The long-term financing of this part of the assets is covered by the company itself. The X_2 indicator refers to the ratio of retained earnings to total assets. The X_3 indicator measures operating efficiency apart from tax and leveraging factors. Since the main goal of every company is gaining profit, this indicator efficiently recognises the possibility of insolvency. Also, with a share of 69%, this indicator has the highest value in the model. Indicator X_4 defines the critical point after which the company becomes insolvent, i.e., the point at which liabilities exceed the assets. The market value of equity is calculated based on the market price of the shares. However, for those companies that are not quoted on the stock exchange, the data from the balance sheet are used. The indicator X_5 indicates the ability of assets to generate revenue. This indicator, second in importance in the model, varies greatly from industry to industry. Z-score defines the following criteria (Altman & Edward, 1993, p. 184):

$Z > 2.99$ – financially safe company

$Z > 1.8 < 2.99$ – financially threatened company with the potential of healing

$Z < 1.81$ – company is headed for bankruptcy

However, in its original form, the Altman Z-score model is not fully applicable to the Croatian economy (Škeljo, 2001, p. 78). Namely, many companies that Altman classified as bankrupt still exist in the Croatian economy, mostly due to an ineffective legal system.

Another, the Kralicek Quick Test model, is based on the balance sheets of companies in Germany, Switzerland and Austria, i.e., European companies. This method, developed in the 1990s, offers quick and correct valuation of paying disability (Polo & Caca, 2014, p. 147). Using this model, it is possible to give an early warning of a business enterprise crisis. The method established a DF indicator that looks as follows (Zenzenović & Peruško, 2006, p. 149):

$$DF = 1.5 X_1 + 0.08 x_2 + 10 x_3 + 5X_4 + 0.3 x_5 + 0.1 X_6 \quad (2)$$

where:

DF – Kralicek DF indicator

X_1 – net cash flow/liabilities

X_2 – total assets/liabilities

X_3 – earnings before interest and taxes/total assets

X_4 – earnings before interest and taxes/revenues

X_5 – reserve funds/revenues

X_6 – operating revenues/total assets

The indicator X_3 is the first in importance, while X_2 is the last. The indicator X_1 shows the degree to which net cash flow covers the liabilities. X_2 shows the share of liabilities in total assets; X_3 displays the company's profitability; X_4 displays total income profitability; X_5 shows how many units of operating income are engaged in reserve funds; and X_6 shows how much revenue is generated by a single assets unit. The value of the DF indicator can be both negative and positive. Negative DF value indicates poor financial condition of the company, while positive DF value points to a financially healthy company, as defined by the following positive values:

DF = 2 – very good financial state

DF = 1 – average financial state

DF = 0 – uncertain financial state

Thus, the companies with positive values are classified as financially stable, while the companies with negative values are classified as unstable. The companies that have a DF value greater than 1 are classified as average, while those with values 2 or more are classified as companies in a very good state. Using the Kralicek Quick Test makes it possible to determine the two groups of indicators' influence, such as financial stability and efficiency, i.e., the condition of the financial situation.

In order to test the hypotheses given above, the method of multiple regression analysis is used also. The main purpose of multiple regression is to research whether there is a relationship between several independent variables and a dependent variable. In this research, total debt to assets ratio is taken as a dependent variable; independent variables are current assets to liabilities

ratio and dummy variable d_1 . Dummy variable d_1 is the binary independent variable that represents the present actions undertaken by the Republic of Croatia in terms of legislation. Thus, it takes two values: 0 if there are no actions, and 1 if there are actions undertaken by the Republic of Croatia in terms of legislation and financial incentives. The dummy variable has the value 1 in the years 2007, 2008, 2011, 2012, 2013 and 2014, for the following reasons: Croatia entering the European Union and adjustment of the Croatian legal framework, and enforcement of the Act on Financial Operations and Pre-Bankruptcy Settlement (the Act that regulates financial results of entrepreneurs, deadlines of financial obligations fulfilment and the legal consequences of the delay with the payment of financial obligations, etc.).

4. Results

Based on the published financial data for the period 1996–2014, the financial indicators are calculated and expressed in terms of debt to assets ratio, total debt to equity ratio, Altman Z-score indicator and Kralicek DF indicator. The indicators are calculated using the aforementioned formulae, with associated values in accordance with the ratio scales. Two groups of financial and economic ratios that deal with insolvency prediction are shown in Table 2.

Table 2. The solvency of the Croatian economy from 1996 to 2014.

Year	Total debt to assets ratio	Total debt to equity ratio
2004	0.49	1.02
2005	0.49	1.06
2006	0.52	1.16
2007	0.54	1.26
2008	0.55	1.37
2009	0.56	1.44
2010	0.59	1.48
2011	0.60	1.55
2012	0.61	1.60
2013	0.60	1.51
2014	0.60	1.51

Source: Authors' interpretation.

Calculated indicators indicate that sustained negative difference between available and required working capital leads to an increase of indebtedness, excessive use of short-term funds, and discourages investment in equipment and facilities. It appears that the main occupation of Croatian companies was maintaining the current level of production, setting development aside for future periods. Even though the financial indiscipline (in both the economy and the government) in the context of an ineffective legal state certainly contributed to the escalation of insolvency, the causes of the resulting situation should be sought in the losses in the economy, the inherited problems of illiquidity, reduced production and export, unbalanced funds (large proportion of fixed assets), unreimbursed investments, etc.

Table 3 shows the financial performance of the Croatian economy expressed by the Altman Z-score indicator and the Kralicek DF indicator.

Although these figures cannot show the actual state of the financial operations, certain tendencies do become apparent. According to the Altman indicator (which is, in general, closer to the situation in the United States), the financial performance of the Croatian economy deteriorated until the end of 1999. This was followed by growth in 2000, but only until 2008 when, with the rise of the global financial crisis, it started to decrease again. According to the Kralicek model (which

Table 3. Financial performance of Croatian companies from 1996 to 2014.

Year	Altman Z-score indicator	Kralicek DF indicator
1996	1.81	1.07
1997	1.63	1.05
1998	1.47	0.94
1999	1.36	0.96
2000	1.46	1.13
2001	1.61	1.22
2002	1.57	1.39
2003	1.54	1.19
2004	1.87	1.01
2005	1.87	1.07
2006	1.86	1.08
2007	1.81	1.11
2008	1.80	1.03
2009	1.62	0.87
2010	1.57	0.92
2011	1.56	0.98
2012	1.57	0.99
2013	1.47	0.84
2014	1.49	0.99

Source: Authors' interpretation.

is closer to the European situation – Camacho-Minano, Segovia-Vargas, & Pascual-Ezama, 2013, p. 10), similar trends can be seen throughout the examined period, with the indicator ranging from 0.84 to 1.39. In general, the Altman model sets the Croatian economy somewhere around the border, while according to the Kralicek DF model, the Croatian economy is in an average financial state. All four observed financial ratios show that the period from 2001 to 2008 was the most favourable for the Croatian economy.

The results of the conducted multiple regression analysis are shown below.

The parameter estimation gives:¹

$$\begin{aligned}
 \ln \text{debt}/\text{assets} = & -1.135633 - 1.013552 \text{Incurrent_assets}/\text{liabilities} + 0.051800d_1 \\
 t = & -13.27392 \quad -5.901904 \quad 2.557869 \\
 & (0.0000) \quad (0.0004) \quad (0.0338) \quad (3) \\
 R^2 = & 0.854875 \\
 \chi^2_{\text{AUTO}}(4) = & 10.08561 \quad \chi^2_{\text{WHITE}}(4) = 6.101689 \quad \chi^2_{\text{NORM}}(4) = 0.664966 \\
 & (0.1838) \quad (0.1917) \quad (0.717141)
 \end{aligned}$$

where:

$\ln \text{debt}/\text{assets}$ – log transformed total debt to assets ratio

$\ln \text{current} - \text{assets}/\text{liabilites}$ – log transformed current assets to liabilities ratio

d_1 – dummy variable

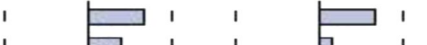
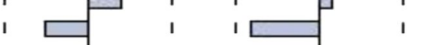

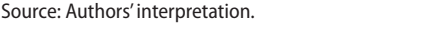
t – the t -statistics

The estimation results show that the model is well specified; the coefficients of all the variables have expected signs and are statistically significant at the 5% level. The adjusted R^2 of the model is 0.854875 and shows a quite good model fitting. After model estimation, assumptions of classical linear regression were tested.

First, the presence of autocorrelation using the Breusch–Godfrey test is tested. The empirical value of the Breusch–Godfrey test statistics is $LM = 10.08561$, and is smaller than the

critical value $\chi^2_{0,05;7} = 14.067$, and the associated probability value is 0.1838. It is therefore evident that, at the $\alpha = 0.05$ significance level, there is no evidence of autocorrelation of the residuals for lags $k \leq 7$. The autocorrelation function (ACF) and the partial correlation function (PACF) of the estimated model are analysed also (Table 4).

Table 4. The ACF and the PAC of the estimated model.

Autocorrelation	Partial correlation		AC	PAC	Q-Stat	Prob.
		1	0.393	0.393	2.2054	0.138
		2	0.231	0.091	3.0538	0.217
		3	-0.298	-0.496	4.6383	0.200
		4	-0.382	-0.205	7.6234	0.106

Source: Authors' interpretation.

The empirical value of the Ljung–Box test statistics is $Q = 7.6234$, and is smaller than the critical value $\chi^2_{0,05;8} = 15.507$, and the associated probability value is 0.106. It is therefore evident that, at the $\alpha = 0.05$ significance level, there is no evidence of autocorrelation of the residuals for lags $k \leq 4$. To test the model for the presence of heteroscedasticity the White test is used. Since the White statistic is 6.101689 and is smaller than the critical value $\chi^2_{(0,05;4)} = 9.48773$, it can be concluded that there is no presence of heteroscedasticity. The normality of the residuals is tested using the Jarque–Bera (JB) test (Figure 2).

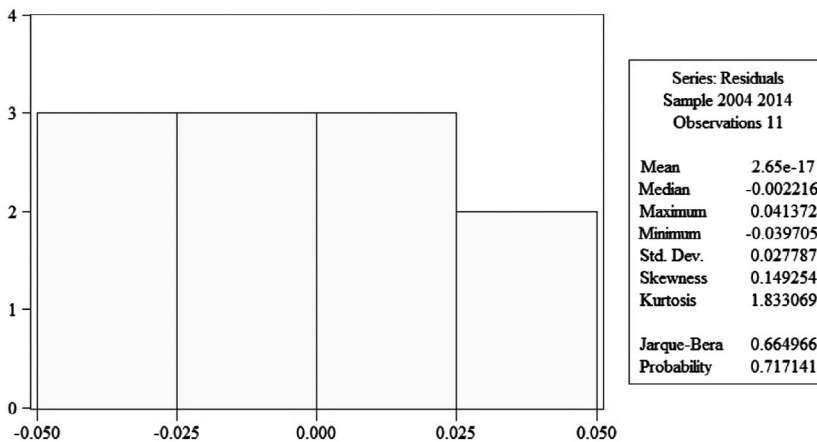


Figure 2. The Jarque–Bera testing results. Source: Authors' interpretation.

As the value of the JB statistic (0.664966) is smaller than the critical value of $\chi^2_{0,05;2} = 5.991$, the hypothesis of normally distributed residuals can be accepted.

To test the multicollinearity of the variables the variance inflation factor (VIF) is considered. The calculated VIF values ($VIF = 1.158900$) indicate that there is no evidence of serious multicollinearity between variables in the estimated model. After conducting analysis, it can be concluded that the assumptions of the classical linear regression model are not violated.

According to the estimated equation, an increase of current assets and liabilities ratio by 1% causes a decrease in total debt and assets ratio of 1.013552%. The coefficient of dummy

variable has a positive sign, which indicates that actions undertaken in the Republic of Croatia have resulted in an increase of the total debt and assets ratio in the observed period. Therefore, Hypothesis 2 – most of the actions undertaken by the Republic of Croatia in terms of legislation and financial incentives have been ineffective – can be accepted.

The insolvency of the Croatian economy was influenced by numerous external factors, of which the most important are economic crisis, state and local budgets, monetary policy and credit system of the Croatian National Bank, the banking system and credit policies of banks, the payment system and payment policies, and the judicial system. The more significant internal causes of insolvency include: dynamic incompatibility; asynchrony between cash receipts and cash payments as a result of wrong decisions in the long-term investments; slowness in adapting to new market conditions; financing of excess inventory; slowness and lack of debt collection; and bad financial results.

5. Conclusions and future development

Based on the purpose and goal, the proposed research hypotheses can be proved. Calculated indicators (Table 2) point out that in the economic crisis, the Croatian economy has a problem of increasing insolvency. Most of the actions undertaken by the Republic of Croatia in terms of legislation and financial incentives, according to this research, have been ineffective. The conducted empirical research has shown that the increase in current assets to liabilities ratio has resulted in a decrease in the total debt to assets ratio. Also, it is evident that implementation of the undertaken economic policies, legislation and financial incentive did not affect companies' solvency.

The only long-term solution to the crisis, and thus the decrease of insolvency, lies in the growth of economic activities, production, services and employment. Croatia needs a healthy, active and profitable enterprise. Government needs to carry out deep structural reforms in order to achieve long-term economic growth. Although the depth of the crisis and the recent loss of credit rating narrow the possibilities for the Croatian economy, certain measures could still achieve positive results.

In order to solve this unfavourable situation, the following steps are suggested.

- The introduction of legal instruments – the most recent laws that apply to this problem are the Bankruptcy Act, which was passed in 2015 (Official Gazette, No. 71/15, n.d.), and the Act on Financial Operations and Pre-Bankruptcy Settlements, passed in 2012 (Official Gazette 108/12, n.d.). These legal acts should reduce insolvency of the Croatian economy, since they aim at the settlement of unpaid orders and invoices from the debtor's assets.
- The Croatian National Bank should, in part, focus on increasing the overall solvency of the system through reduction of reserve requirements and interest rates. This would facilitate the growth of bank ranking and the total supply of money on the financial market.
- Entrepreneurs should be more active in increasing their cash receipts (through increased production, speeding up the production process as well as changing the production programme), in speeding up debt collection, minimising the risk of claims, and selling tangible and financial assets that serve no purpose.
- Entrepreneurs should increase short-term and long-term sources of financing and accelerate the amortisation of long-term assets. In addition to increasing cash flows, entrepreneurs should work on reducing expenditures through: postponement of

investment in worn-out fixed assets; postponement of new investments; shortening the investment lag; reducing investments in current financial assets; reduction of unfinished products inventories, and the like.

However, it is up to the government to create conditions for the implementation of these proposals through various measures of economic policy, particularly monetary policy instruments. The introduction of the proposed measures, either independently or in combination (depending on the circumstances), would significantly mitigate the various solvency problems of the Croatian economy.

In Croatia, there has not been any significant research on the possibilities of using the existing models for determining the domestic companies' ability to maintain solvency. Likewise, no model based on business enterprises' financial data has yet been proposed, which leaves an open space for further research. In future research, it would be advisable to determine the level of accuracy of classification by the Kralicek Quick Test, through separating the sample on successful and unsuccessful companies in terms of liability payments. Furthermore, taking into account the experiences of Eastern European countries (Didenko, Meziels, & Voronova, 2012, pp. 72–75), it will probably be necessary to modify some of the existing insolvency prediction models or even create a new model.

Note

1. Values in parentheses are empirical p -values.

Disclosure statement

No potential conflict of interest was reported by the authors.

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