Abstract: - According to conflicting theoretical considerations, as well as the results of the existing empirical researches, bank concentration could lead to either credit rationing or enhancing firm credit access. This paper analyzes the impact of banking industry structure on firm financing in Croatia controlling for other firm-level, banking sector-level as well as macroeconomic determinants of firm leverage. The analysis is based on the sample of 1062 manufacturing enterprises over the period from 2002 to 2011 and performed by applying dynamic panel methodology. Our findings confirm the validity of the market structure theory according to which bank concentration impedes firm financing.

Key-Words: - Bank concentration, market power theory, information-based hypothesis, firm access to finance, leverage, Croatia

1 Introduction
A positive effect of financial system on economic growth is confirmed by numerous empirical researches (for the survey see Levine [15], and Ang [1]). Namely, financial institutions and markets could affect marginal productivity of capital, saving transfer costs, saving rate and technological innovation, thus positively influencing the rate of economic growth (Pagano [20]). However, the inefficient functioning of financial markets and institutions could hinder the financing of productive investments and negatively affect real economy. According to the theoretical considerations as well as the empirical studies, one of the features of financial system, which finance-economic growth relationship depends on, is its market structure. There are two opposite views of the impact of the financial system concentration on firm access to finance. The first one is the market power theory which states that lower competition implies inefficiency in resource allocation leading to higher lending rates and credit rationing that limit firm financing. According to the alternative view, which is the relationship lending theory (the information-based hypothesis), a higher level of concentration could encourage financial intermediaries to reduce information asymmetry through relationships with firms, contributing to company financing. The results of the existing empirical studies are conflicting.
Although the financial systems of emerging economies of Central and Eastern Europe have gone through radical transformations during the last two decades, among which is the development of non-bank financial institutions and capital markets, they are still highly dominated by banks. Bank credit is the main external source of firm financing. Thus, it is of the interest of policy makers to analyze the banking sector features as possible determinants of firm financing. These considerations raise a question of the impact of banking market structure on firm financing choice. Consequently, the aim of this paper is to analyze the effects of banking sector concentration on firm access to finance in emerging economies on the sample of Croatian enterprises. The sample consists of 1062 companies over the period from 2002 to 2011. The unbalanced panel is analyzed using Generalized Method of Moments estimator.

The results of our research indicate the validity of the market structure theory. The increasing concentration of Croatian banking market impedes firm financing.

This paper contributes to relevant literature as it is the first to analyze the effect of banking market structure on firm financing in Croatia, offering additional insight on the relationship between banking market structure and firm financing in emerging markets.

The rest of the paper is structured as follows. Section 2 consists of theoretical considerations on the effects of banking industry structure on firm financing, as well as on other important determinants of company access to finance. Variables, data and methodology are presented in Section 3 which is followed by the discussion on the empirical research results. Section 5 gives concluding remarks.

2 Theoretical considerations

Researchers have always been interested in firm access to finance. Although the starting point was the considerations of firm-level determinants (Modigliani and Miller [18]), the theoretical and empirical analyses have been expanded by firms’ external determinants (Rajan and Zingales [23]). Among the factors from firm business environment, the characteristics of financial system are considered as important in determining the companies’ funding choices, one of which is its market structure.

Considering the effect of banking market structure on company access to finance, there are two conflicting theoretical views. The first one, the market power hypothesis, emphasizes the problem of higher credit price and credit rationing as consequences of banking market concentration. Higher concentration implies a lower level of competition with inefficient allocation of resources. Although higher costs of financial intermediation could be the result of X-inefficiency of financial intermediaries, according to Pagano [20], in a less competitive market, higher costs might also be the consequence of financial intermediaries’ market power. As a higher amount of savings is lost in the process of channeling the savings to investment and covering the costs of financial intermediation, fewer funds are available for investment. Moreover, according to the Guzman’s model [11], monopoly power in banking market could result in credit rationing more than in a competitive banking market structure. Thus, monopolistic banking structure through credit rationing negatively affects firm financing and economic growth.

The alternative theory, information hypothesis, predicts positive effect of banking market concentration on credit availability by reducing the problem of information asymmetry. Namely, the asymmetric information between lenders and borrowers may lead to adverse selection and moral hazard with consequence in credit rationing. However, with higher level of bank concentration, banks are more willing to invest in the reduction of information asymmetry through developing relationships with companies (the relationship lending). The relationships would provide banks with soft information about the borrowers. The decision on the lending would not be based only on the past performance of the potential borrower but on its business perspectives or future earnings that bank would participate in. Lowering information asymmetry would increase availability of funds for companies as it is shown by the model of Petersen and Rajan [22]. According to Marquze [7], since banks in a more competitive environment have information on a smaller group of borrowers, the information are more disperse, resulting in the increasing problem of adverse selection. Cetorelli and Perotto [16] show that bank concentration negatively affects the amount of credit, but also encourages banks to gather information about borrowers and thus increase the efficiency of credit analysis. According to the authors, oligopoly is the optimal market structure rather than perfect competition or monopoly.

As has already been mentioned, earlier studies of firm financing were primarily focused on internal determinants. The theoretical explanation of the influence of the firm specific factors originates from
the two most prevalent capital structure theories – trade-off and pecking order theory.

Trade-off theory (TOT) argues that companies choose their optimal level of debt by trading off the benefits of debt financing against its costs. The benefits of debt financing include the tax deductibility of interests (Modigliani and Miller, 18, Miller [17]) and the reduction of free cash flow agency costs of equity (Jensen and Meckling [14], Jensen, [13] Stulz [25]). The costs of debt relate to the costs of financial distress and the agency costs of debt. The optimal level is achieved where the marginal benefits equal the marginal cost of an additional unit of debt.

The alternative pecking order theory (POT) is based on the information asymmetry between the firm’s insiders - either shareholders or managers, and outsiders - mainly investors, regarding the real value of both current operations and future prospects. For that reason, external capital (debt and equity) will always be relatively costly compared to internal capital (retained earnings). The main prediction of this theory is that companies follow the hierarchy of preference with respect to financing resources – they will first use retained earnings as the cheapest source of finance, followed by debt finance, and finally, outside equity financing as the last option. Due to the fact that equity entails larger information asymmetry costs, due to which it is more expensive in relation to other financing sources, it is less interesting to firms and serves as their last resort. However, despite the important contributions of both these theories in the understanding of capital structure decisions, neither of them gives a definite answer to the question of how companies should be financed. Consequently, the researchers have been looking for other determinants of corporate financing although, in some cases, resulting in similar equivocal views. As it is explained earlier, among other factors, this refers to banking sector concentration, too.

As the impact of the banking market structure on firm access to finance is ambiguous in theory, it is also indefinite from an empirical perspective. The existing empirical tests on the relationship between bank concentration and corporate financing have been mainly based on the data from developed countries or on the samples consisting of countries with different level of economic development. Petersen and Rajan [21] confirm the importance of relationship lending for credit availability. Cetorelli and Gambra [7] find that a higher level of banking sector concentration results in a lower amount of credit. However, in accordance with their findings, industries with a higher level of external finance dependence grow faster in more concentrated banking sectors. Beck et al. [3] show that bank concentration negatively affects firms’ access to finance, especially for small and medium size firms. In the further stage of the analysis including the level of economic development, the result indicates that the negative impact holds for developing countries, but not for developed ones. Carbó-Valverde et al. [5] find conflicting results, depending on applied measure of bank concentration. According to our best knowledge there is only one empirical research of the influence of banking market structure on firm leverage in Central and Eastern European countries (Hake [12]). The study provides evidence of positive impact of bank concentration on firm indebtedness. However, the research is based on the data in the pre-crisis period and does not include Croatia in the analysis.

3 Variables, data and methodology
In order to evaluate the impact of bank concentration on firm financing, in this research a firm leverage was used as a dependent variable. Different authors used different modification of this variable (for the discussion on leverage definitions, see Rajan and Zingales [23]) but one of the most common is total liabilities over total assets. Its advantage is in its availability for all firms in the dataset. However, this broader measure is likely to overstate the true level of leverage. Namely, having in mind that theory of capital structure refers to the part of the total liabilities used for financing (i.e. not for transaction purposes), the usage of broader leverage measure may screen the important differences between long-term and short-term debt. Thus, in our study, we consider narrower leverage measure, calculated as long-term debt over total assets, which is in accordance with other relevant studies. Data from Orbis database (produced by Bureau van Dijk) are used for the calculation of this measure.

Figure 1 shows average corporate leverage for the manufacturing enterprises in the Republic of Croatia over the period 2002-2011. During the first years, the leverage was slowly increasing after which there is a period of stable firm borrowing. As a tradable sector, the ratio in the manufacturing industry in 2010 increased at above-average debt growth for all industries. The decreasing of leverage in the 2011 was the result of worse economic perspectives and impeded access to foreign sources of finance (CNB [8] [9]).
In the existing empirical researches, banking market structure is usually measured by concentration ratios expressed by the share of the \( n \) leading banks in the total assets of the banking sector or by Herfindahl Hirschman Index (HHI). There is an exception in the study of Carbó-Valverde et al. [5] where the Lerner index is applied. In our research, as a proxy of bank concentration variable, we use the share of three largest banks in total assets of the banking system. As it is explained earlier, according to the market structure hypothesis, higher concentration leads to lower leverage. Taking into consideration the information-based hypothesis, the opposite is true. The data for this variable were collected from the Croatian National Bank.

Figure 2 shows bank concentration ratio measured by the share of three largest banks in total assets of the banking sector in the period from 2002 to 2011. The number of banks in the period decreased from 46 to 32. Despite its fluctuation, during the analyzed period, the ratio shows medium level of concentration thus indicating the presence of oligopolistic market structure. The highest value of the ratio was reached in 2008 as a consequence of crisis and greater trust in larger rather than in small banks.

In accordance with the models of capital structure determinants, among independent variables we use firm-specific variables, including size, profitability and tangibility. The effect on firm size is ambiguous. The trade-off theory predicts that bankruptcy costs decline with firm size. Accordingly, an inverse relationship between size and the probability of bankruptcy is expected and hence, a positive relationship between size and leverage too. In line with the arguments of Titman and Wessels [26], larger firms tend to be more diversified, which lowers the probability of default implying positive size-leverage relationship. According to the viewpoint of pecking order theory (Myers, [19]), company size can be regarded as proxy for information asymmetry between company insiders and capital markets. As a result, larger firms are more transparent to outside investors and are better able to overcome information asymmetry than smaller ones, thus, they can obtain external financing, both debt and equity, more easily.

Profitability is usually taken as firm-specific attribute that clearly distinct between two main capital structure theories. The trade-off theory predicts a positive influence of profitability on leverage as a result of bankruptcy costs, taxes and agency costs. Firstly, expected costs of financial distress decline with profitability increase because more profitable firms can support more debt. Secondly, it pays off to profitable firms to have more leverage since interest payments are tax deductible and firms can realize tax savings through the use of additional debt. Finally, higher leverage helps to control agency problem of free cash flow by forcing managers to pay out more of the excess cash instead of spending it inefficiently (Jensen and Meckling, [13], Jensen [12]). The use of higher leverage can serve as a signal of optimistic future of the company (Ross, [24]).

In contrast, the pecking order model (Myers, [19]) predicts negative relationship between profitability and leverage as a consequence of hierarchy of financing due to the adverse selection costs associated with new equity issues in the presence of information asymmetry. Firms that have higher operating profitability have more earnings that they can potentially retain to finance their investments. Thus, profitable firms need less external financing and have lower leverage.

To sum up, based on the elaborated arguments, TOT predicts that larger firms, firms with higher profitability and more tangible assets could enjoy larger tax benefits of debt and hence should have higher leverage. On the contrary, POT predicts
inflation are expected. As a measure of inflation, the negative relationship with the level of leverage is predicted.

Thus, positive relation between tangibility of assets and leverage is predicted.

The measures of firm-specific variables follow. As a proxy of firm size ln of total turnover is used. Profitability is measured by return on equity (ROE) while as a proxy of tangibility we used ratio of fixed assets and total assets. All mentioned data are collected from Orbis of Bureau van Dijk database.

Besides bank concentration, as a banking industry-specific variable, bank credit risk is introduced. It is an indicator of bank performance in credit activity and bank propensity to supply loans. The variable is measured as a ratio of non-performing loans and total loans. The source of the data is World Development Indicators of the World Bank.

As additional control variables we apply macroeconomic variables: lending interest rate and inflation. The lending interest rate, as a proxy for the cost of debt, should be negatively related to leverage as a higher interest rate implies a higher financing cost and thus less amount of borrowed funds. The data are extracted from World Development Indicators of the World Bank.

Frank and Goyal [10] experimented with several country-specific variables but all others, besides inflation, were less robust determinants of leverage. Saying differently, macroeconomic variable of inflation was the single one that performed the best in explaining the leverage of analyzed (US) firms.

The effect of inflation is not unambiguous. The inflation is predicted to be positively related to leverage due to higher real value of tax deductions on debt (real value of tax shield is positively related to inflation) (Frank and Goyal [10]). However, inflation affects firm choice of external financing. In most cases, firms will resort to internal sources in a period of high inflationary pressures as this will increase the cost of obtaining external sources, namely debt (Bopkin [4]). Thus, according to this argument, the negative relationship with the level of leverage is expected. As a measure of inflation, GDP deflator is used. The data are collected from World Development Indicators of the World Bank.

The empirical analysis of banking concentration and firm financing is based on an unbalanced panel. The sample consists of 1062 very large, large, medium and small manufacturing enterprises operating in the Republic of Croatia during the period between 2002 and 2011. However, due to the fact that the panel is unbalanced, the total number of observations is 6878.

The dynamic model of the following form is applied:

\[
\text{Leverage}_i = \alpha + \delta \text{Leverage}_{i-1} + \beta (\text{CR}_i) + \sum \beta_j X_j + \epsilon_{it} = \nu_i + \epsilon_{it}
\]

It is a modified model of capital structure that, beside firm-specific variables, includes banking sector factors and macroeconomic determinants. Leveraging presents firm i’s access to bank credit at time t, with \(i = 1, \ldots, N, \quad t = 1, \ldots, T; \) \( \alpha \) is a constant term, Leveraging \( \epsilon_{it} \) is the one-period lagged leverage, \( \delta \) is the speed of adjustment to equilibrium, CR represents bank concentration, vector of \( X_i \) control variables accounts for firm-specific, banking-industry specific and macroeconomic variables, \( \epsilon_{it} \) is the disturbance, with \( \nu_i \) the unobserved firm-specific effect and \( \epsilon_{it} \) the idiosyncratic error.

As an estimator, two-step General Method of Moments (GMM) estimator developed by Arellano-Bond [2] is used. The estimator produces consistent results under the assumptions that there is no second order correlation in the first-differenced residuals and the instrumental variables are uncorrelated with the residuals. Thus, we apply Arellano-Bond test for the first and second serial correlation in the first-differenced residuals. The Sargan test of over-identifying restrictions is used to check for validity of the instruments.

4 Estimation results

The results of the analysis are shown in Table 1. The Sargan test confirms the validity of instruments. The tests of autocorrelation show that there is no second order serial correlation, confirming the consistency of the results of GMM estimators.

The dynamic nature of the model is confirmed by the significance of the coefficient on the lagged leverage variable. The estimation results show negative effects of bank concentration on firm leverage. Thus, as the banking market structure...
becomes more concentrated, the costs of saving transfer and credit rationing are increasing, sustaining firm leverage. An increase of one percent point of the concentration ratio of the three largest banks reduces firm leverage by 0.279 per cent. The results are consistent with the market structure theory.

### Table 1 Estimation results (GMM system estimator)

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Dependent variable: Leverage</th>
<th>Coefficients</th>
<th>Standard errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.00021</td>
<td>0.00094</td>
<td></td>
</tr>
<tr>
<td>Leverage</td>
<td>0.61642***</td>
<td>0.33771</td>
<td></td>
</tr>
<tr>
<td>CR3</td>
<td>0.00279**</td>
<td>0.00112</td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>-0.00084</td>
<td>0.00373</td>
<td></td>
</tr>
<tr>
<td>Firm profitability</td>
<td>-1.51e-06***</td>
<td>3.98e-07</td>
<td></td>
</tr>
<tr>
<td>Tangibility</td>
<td>0.24123***</td>
<td>0.30336</td>
<td></td>
</tr>
<tr>
<td>Bank credit risk</td>
<td>-0.001492</td>
<td>0.00104</td>
<td></td>
</tr>
<tr>
<td>Lending rate</td>
<td>-0.00175</td>
<td>0.00162</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>-0.00528**</td>
<td>0.00228</td>
<td></td>
</tr>
<tr>
<td>Sargan test (p-value)</td>
<td>0.67620</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First-order correlation (m_1) (p-value) 0.00000
Second-order correlation (m_2) (p-value) 0.60440

***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Source: Authors’ calculations

The evidence is in line with Beck et al. [3] for the countries with a low level of economic development and an undeveloped institutional structure as well as in part with findings of Cetorelli and Gambera [6] based on the same concentration ratio we use. On the other hand, our results are contrary to Hake [12] who uses different measures of concentration. The reason could be in diverse indicators of concentration. Namely, different evidence, as a result of different concentration measures applied, is confirmed by Carbó-Valverde et al. [5]. Beside diverse measures, the argument for conflicting results could be found in heterogeneity of the sample in the study of Hake [12].

Considering the firm-specific characteristics included in the model, coefficients of profitability and tangibility are statistically significant while size does not show significant impact on firm leverage. Profitability negatively affects firm debt, supporting the pecking order theory. Companies with higher profitability have higher level of internal savings available for firm financing and less need for external source of finance. Coefficient of tangibility variable has a positive sign as it is expected. The fixed asset serves as a collateral or may be sold in order to meet firm debt obligations making borrowing easier. The same results related to firm-level determinants of the leverage are achieved by Hake [12].

Among external determinants of corporate leverage, although with the expected sign, bank credit risk and the lending rate have an insignificant impact on firm access to finance. However, inflation shows significance with a negative sign, implying that the costs of borrowing under inflationary conditions increase, thus lowering firm debt.

### 5 Conclusion

The paper gives an overview of theoretical considerations on banking market structure effects on firm financing and the evidence of this impact in emerging economies on the sample of 1062 manufacturing enterprises in the Republic of Croatia in the period from 2002 to 2011. The empirical analysis shows that bank concentration leads to credit rationing resulting in negative effects on firm leverage. Since Croatian banking structure has already been significantly transformed, especially in terms of ownership structure (a very high share of foreign ownership is present) as well as due to consolidation, which strongly affected the market structure, the policy makers should focus their efforts to continuation of regulatory improvements in order to provide conditions for overcoming the obstacles to obtaining finance for entrepreneurs. Additional incentives will be given by forthcoming accession of Croatia to the European Union.

As additional determinants of firm financing choice the findings confirm the importance of firm past leverage, profitability and tangibility, as well as inflation.

For future work, there is a suggestion to apply different measures of bank concentration. Additionally, since the impact of bank concentration on firm access to finance could vary among enterprises of different size and age, future work could extend the analysis taking into consideration these variables in interaction with banking market concentration.

### References:


