ICAP S.A.

MACROECONOMICS IMPACT ON DEFAULT RATES

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EXECUTIVE SUMMARY

In the underlying report, ICAP proceeded with the monitoring of the default rate estimates for Greek companies, based on the latest macroeconomic data, for each ICAP credit risk model. Its purpose is to identify, whether the calculated default rate estimate in each category, presents significant deviation from the default rate used in each ICAP model (macroeconomic adjustment) and proceed with the necessary actions.

The main conclusions and findings are:

- Regarding the credit risk model SA, LLC, SSLLC with published Balance Sheet of the Industry sector, the analysis indicated a deviation of 2.73% between the upper limit of the 95% Confidence Interval of the default rate estimation and the macroeconomic adjustment of the specific model.
- SA, LLC, SSLLC with published Balance Sheet of the Trade sector, also presented a deviation of 3.45% between the upper limit of the 95% Confidence Interval of the default rate estimation and the macroeconomic adjustment of the specific model.
- Considering the credit risk model SA, LLC, SSLLC with published Balance Sheet of the Services sector, the analysis indicated a mild deviation of 1.16% between the upper limit of the 95% Confidence Interval of the default rate estimation and the macroeconomic adjustment of the specific model.
- The results of the analysis referring to SA, LLC, SSLLC without published Balance Sheet, reflected no deviation,
- Finally, the GP, LP, SP model presents a deviation of 3% between the upper limit of the 95% Confidence Interval of the default rate estimation and the macroeconomic adjustment of the specific model.

Although the findings are consistent for a third consecutive year, due to the conservative estimates taken into account in the models, they do not rise issues of concern, since they do not result in a negative impact of mis predicting defaulted companies. The overall evolution of the Greek macroeconomic environment, justifies the increase on GNDI and Consumer Confidence indices and the decrease on

the unemployment rate, leading to lower semi-annual default rate estimation and to lower values of the formed limits of confidence intervals, presenting deviations from the conservative macroeconomic adjustment used in each model. The Internal Review Function already explores improvement actions in order to ensure the models' fine tuning.

INTRODUCTION

ICAP has developed different credit risk models for companies based on legal status, size, availability of financial data and the activity sector that evaluate companies' financial and commercial data.

ICAP's Credit Models are classified in the following categories:

1. Assessment of companies with published Balance Sheets in the Industry sector,
2. Assessment of companies with published Balance Sheets in the Trade sector,
3. Assessment of companies with published Balance Sheets in the Services sector,
4. Assessment of companies that are obliged to, but have not published Balance Sheet, in all Sectors,
5. Assessment of companies that are not obliged to publish Balance Sheets, in all sectors.

The main sources for the macroeconomic data are the following:

- Eurostat
- Hellenic Statistical Authority
- Bank of Greece
- Organisation for Economic Co-operation and Development
- European Commission
- ECB
- World Bank

Several macroeconomic indicators were analysed in order to assess their relationship with the default rate separately in each one of ICAP's model.

Their analysis included the stage of the univariate and multivariate analysis:

During the stage of the univariate analysis the relationship between each macroeconomic indicator and the companies' default rate was examined.

During the stage of the multivariate analysis, the stepwise variable selection method was employed in order to select the optimal combination of two or more macroeconomic indicators to explain the variation in the default rate.

The macroeconomic indicators that were found significant in all ICAP models, for the default rate prediction in the next 12 months, are the:

- Unemployment,
- Gross National Disposable Income and
- Consumer Confidence

MACROECONOMIC INDICATORS

The values of macroeconomic indicators that were available in January 2019 are presented in the table below.

Table 01 Macroeconomics – January 2019

Macroeconomic Indicators – January 2019	Value	Date of Latest Available Data
Gross National Disposable Income (in millions €)[1]	45.668	2018 Q4
Unemployment (%)[2]	18.50	December 2018
Consumer Confidence Index[3]	-35.00	December 2018

Sources:

[1] Eurostat, Q4 2018

[2] Hellenic Statistical Authority, December 2018

[3] European Commission (DG ECFIN), December 2018

PREDICTED DEFAULT RATE IN THE NEXT 12 MONTHS

As already stated, ICAP analysis[1] verifies a high correlation between macroeconomics and credit risk, especially with the Unemployment Rate, the Gross National Disposable Income (GNDI) and Consumer Confidence.

Given the differences in ICAP models, the relation between default rate and macroeconomics is presented separately in each one.

ICAP Model: Companies with published Balance Sheets in the Industry sector

The parameter estimates of the macroeconomic indicators that were found statistically significant are: Unemployment, Gross National Disposable Income and the Consumer Confidence

The Unemployment indicator is positively associated with the default rate, while GNDI and Consumer Confidence are negatively associated.

Considering the latest available data of the macroeconomic indicators in January 2019, the predicted default rate and the 95% confidence levels are:

Table 2 Default Rate Estimates

Model	January 2019 Default Rate Estimate	95% Confidence Interval	
		Lower Limit	Upper Limit
Industry with published Balance Sheets	18.70%	16.57%	20.82%

The Macroeconomic adjustment used currently in "Industry with published Balance Sheets" model is 23.55%, which exceeds the upper limit of the 95% Confidence Interval formulated from the January's 2019 Default Rate estimate.
This evidence may suggest, that the 12-month default rate for companies operating in Industry is lower than 23.55%.

[1] Further details are presented in document: "Macroeconomics Impact on Default Rates Model Development – November 2014"

ICAP Model: Companies with published Balance Sheets in the Trade sector

The parameter estimates of the macroeconomic indicators that were found statistically significant are Unemployment, the Gross National Disposable Income and the Consumer Confidence.

The Unemployment indicator is positively associated with the default rate, while GNDI and Consumer Confidence are negatively associated.

Considering the latest available data of the macroeconomic indicators in January 2019, the predicted default rate and the 95% confidence levels are:

Table 3 Default Rate Estimates

Model	January 2019 Default Rate Estimate	95% Confidence Interval	
		Lower Limit	Upper Limit
Trade with published Balance Sheets	11.26%	9.46%	13.05%

The Macroeconomic adjustment used currently in the model is 16.50%, which exceeds the upper limit of the 95% Confidence Interval formulated from the January's 2018 Default Rate estimate.

This evidence may suggest, that the 12-month default rate for companies operating in Trade is lower than 16.50%.

ICAP Model: Companies with published Balance Sheets in the Services sector

The parameter estimates of the macroeconomic indicators that were found statistically significant are Unemployment and the Gross National Disposable Income.

The Unemployment indicator is positively associated with the default rate while GNDI is negatively associated.

Considering the latest available data of the macroeconomic indicators in January 2019, the predicted default rate and the 95% confidence levels are:

Table 4 Default Rate Estimates

Model	January 2019 Default Rate Estimate	95% Confidence Interval	
		Lower Limit	Upper Limit
Services with published Balance Sheets	11.02%	9.51%	12.54%

The Macroeconomic adjustment used currently in the model reflecting the 12-month default rate, prediction is 13.70%, which exceeds the upper limit of the 95% Confidence Interval formulated from the January's 2019 Default Rate estimate. This evidence may suggest, that the 12-month default rate for companies operating in Trade is lower than 13.70%.

ICAP Model: Companies without published Balance Sheet in all sectors

The parameter estimates of the macroeconomic indicators that were found significant are Unemployment and the Gross National Disposable Income.

The Unemployment indicator is positively associated with the default rate, while GNDI is negatively associated.

Considering the latest available data of the macroeconomic indicators in January 2019, the predicted default rate and the 95% confidence levels are:

Table 5 Default Rate Estimates

Model	January 2019 Default Rate Estimate	95% Confidence Interval	
		Lower Limit	Upper Limit
Without published Balance Sheets in all sectors	23.48%	19.18%	27.77%

The Macroeconomic adjustment used currently in the model reflecting the 12-month default rate prediction is 27.24%, which is included in the 95% Confidence Interval formulated from the January's 2019 Default Rate estimate, calculated using the latest available data.

ICAP Model: Companies that are not obliged to publish Balance Sheets in all sectors

The parameter estimates of the macroeconomic indicators that were found statistically significant are Unemployment, the Gross National Disposable Income and the Consumer Confidence.

The Unemployment indicator is positively associated with the default rate while GNDI and Consumer Confidence are negatively associated.

Taking into account the latest available data of the macroeconomic indicators in January 2019, the predicted default rate and the 95% confidence levels are:

Table 6 Default Rate Estimates

Model	January 2019 Default Rate Estimate	95% Confidence Interval	
		Lower Limit	Upper Limit
With no obligation for published Balance Sheets in all sectors	14.13%	11.49%	16.76%

The Macroeconomic adjustment used currently in the model is 19.76%, which marginally exceeds the upper limit of the 95% Confidence Interval formulated from the January's 2019 Default Rate estimate.

This evidence may suggest, that the 12-month default rate for GP-LP-SP companies is lower than 19.76%.