

# **IMPACT OF ADVERSE MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES**

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**PREFACE**

The projections in this study reflect Cerved Rating Agency's (hereinafter also called "the Agency") opinion on the expected behaviour of the overall creditworthiness and economic and financial situation of the Italian non-financial companies in case of occurrence of a range of hypothesised adverse scenarios.

The study is the product of the analysis of the Global, European and Italian macroeconomic historical and forward looking data, individual Italian non-financial companies' information and dedicated studies on countries' defaults.

The document presents three distinct sections. The first section illustrates the trend and the expected behaviour of the main macroeconomic indicators considered for a significant representation of the Italian and European economic conjuncture. Moreover, the study gives evidence of the bankruptcy and other insolvency procedures trend in Italy.

The second section focuses on Sovereign defaults, analysing a set of dedicated studies on the macroeconomic situation in the aftermath of severe deterioration of the creditworthiness of the countries, including the expected impact on the most representative macroeconomic indicators; the outcome is an overview of the hypothesised default scenarios in a three-year-time horizon.

The third section contains a quantification of the impact of the selected scenarios on the simulation portfolio represented by Italian non-financial companies, obtained through a statistical model considering a set of underlying assumptions. This analysis envisages also a study on the most impacted sectors and their respective level of expected riskiness, varying on the basis of the hypothesised default scenarios.

Eventually, as a corollary to the presented study, the Annex shows an estimation of the expected evolutions (in average) of the most representative financial indicators, evidencing the potential impact on the profitability and financial structure of the Italian non-financial companies following the application of the hypothesised default scenarios.

## EXECUTIVE SUMMARY

Following the evolution and the development of the main macroeconomic indicators, the Agency expects Italy's growing trend already initiated in the last periods to be confirmed for 2018 and beginning of 2019. This would result in a slight reduction of the expected default rate of Italian non-financial companies.

Nevertheless, the Agency has assessed the possibility of occurrence of severe macroeconomic conditions based on its interpretation of the historical conditions arisen after the Sovereign default or near to default situations in a three years' time horizon. The hypothesised severe scenarios are the "weakly preemptive" case and the "post default restructuring" case, where the macroeconomic indicators considered in this study suffer a relevant stress denoting high risky conditions for the Country. Beside these severe scenarios, for simulation purposes the Agency has also taken into account the EBA baseline and adverse scenarios. In synthesis, the following four scenarios have been considered and quantified:

Probability to happen	Consensus scenario: high			Adverse scenario: low			Extreme scenarios: remote but still possible					
Severity	Low			High			Severe			Very severe		
Scenario	EBA baseline			EBA adverse			Weakly preemptive			Post default restructuring		
Year	1	2	3	1	2	3	1	2	3	1	2	3
<b>GDP</b>	1.4%	1.3%	1.3%	-0.6%	-1.5%	-0.6%	-4.0%	-4.0%	-3.0%	-6.0%	-6.0%	-5.0%
<b>10 y Yield</b>	2.1%	2.5%	2.8%	3.3%	3.7%	4.0%	10.0%	10.0%	10.0%	12.0%	12.0%	12.0%

Such scenarios have been applied to the simulation portfolio by statistical procedures, following basically the modelling approach already used by the banking system in the context of regulatory stress testing exercises. The applied scenarios on the simulation portfolio, which represents a sample of Italian non-financial companies currently presenting an average individual PD around 6.8%, have led to the following outcomes:

- in the EBA baseline scenario, the average estimated PD ranges between 6.5% and 6.3% within the considered time horizon. This is due to the fact that the scenario is rather positive and the behaviour of the portfolio follows this expected slight reduction of the riskiness;
- in the EBA adverse scenario, the average estimated PD ranges between 7.3% and 9.2% within the considered time horizon. This is due to the fact that the scenario is quite negative and the behaviour of the portfolio follows this expected increase of the riskiness;
- in the weakly preemptive scenario, the average estimated PD ranges between 10.0% and 16.9% within the considered time horizon. This is due to the fact that the scenario is largely negative and the behaviour of the portfolio follows this expected relevant increase of the riskiness;
- in the post default restructuring scenario, the average estimated PD ranges between 11.0% and 20.0% within the considered time horizon. This is due to the fact that the scenario is very severe and the behaviour of the portfolio follows this expected very significant increase of the riskiness.

The application of the negative scenarios determines a migration of the counterparties towards the worst rating classes, with a significant reduction of the investment grade area and a gradual increase of the speculative area. The hypothesised deterioration in the creditworthiness in more negative areas would affect, among others, risky sectors like "Construction" and "Retail trade", which would reach significant level of expected average default probability.

This global deterioration of the risk profiles would therefore reduce significantly both the profitability of the companies and the Net Financial Debt / Equity ratio due to an expected decrease of the revenues and to the scarcity of financing by banks following the expected cut of lending activities.

## ITALIAN ECONOMY FACT SHEET (JUNE 2018)

### GDP AND EMPLOYMENT CONTINUE TO GROW AT MODERATE PACE

Following the acceleration in output growth in 2017, the Italian economy is expected to grow at 1.4% in 2018, largely supported by domestic demand, meanwhile GDP growth is set to moderate to 1.1% in 2019.

Positive labour market trend, which showed the first signs of recovery in 2014, reached its peak value of 1.3% in 2016. This trend is expected to continue over the forecast period albeit with slower growth prospects, estimated at 0.7% both in 2018 and 2019 (compared to 1.1% in 2017).

Employment is projected to grow broadly in line with economic activity but also to benefit from the new permanent three-year reductions of social contributions for hiring newly-employed young workers.

### INFLATION TO BE STABLE IN 2018, INCREASING IN 2019

Italian headline inflation will experience a modest decline in 2018 compared to the previous year (1.2% and 1.3% respectively). Core inflation, however, is predicted to increase to 0.9% in 2018 (up from 0.8% in 2017).

In 2019 both headline inflation rate and core inflation rate will accelerate, by 1.7% and 1.7% respectively, still remaining below the European Central Bank target rate of 2.0%.

### NOT SIGNIFICANT PUBLIC DEBT REDUCTION

In the first quarter of 2018 Italy recorded a government debt equivalent to 131.80% of the country's gross domestic product. At the current level, Italian public debt to GDP ratio is the fifth largest worldwide and the fourth in terms of absolute values.

The public debt-to-GDP ratio is set to slightly decline below 130% over the second half of 2018 and 2019 mainly due to the forecasted national GDP growth.

Exhibit 1: Italian GDP and employment (Y-o-Y % change)

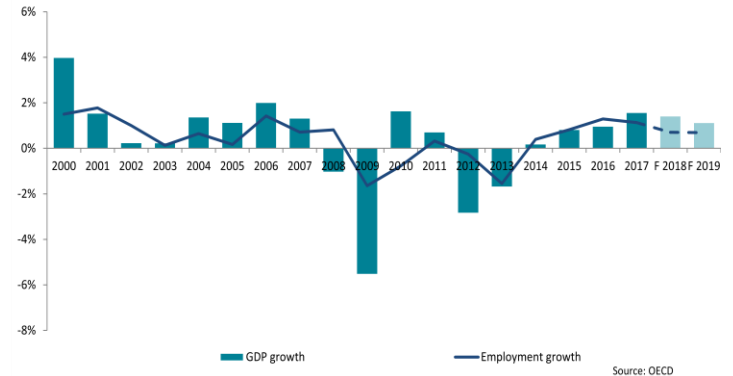


Exhibit 2: Harmonised core and headline inflation, Italy

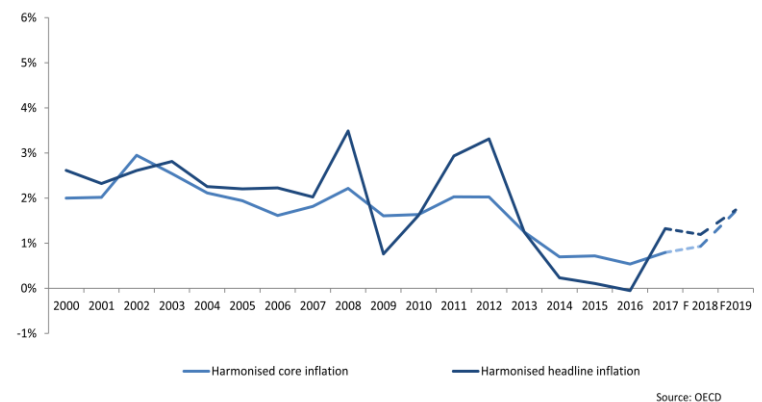
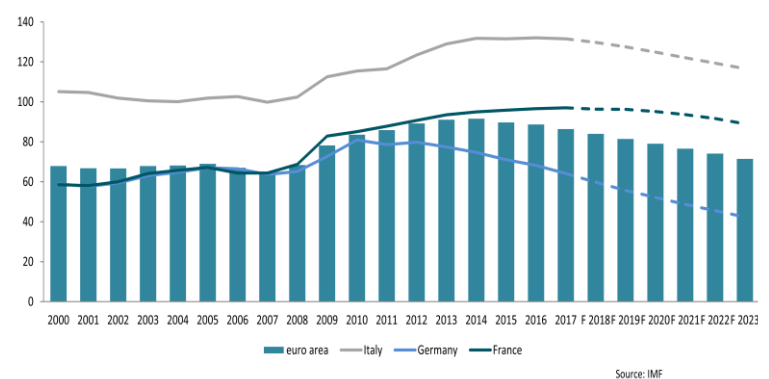


Exhibit 3: Public debt as % of GDP



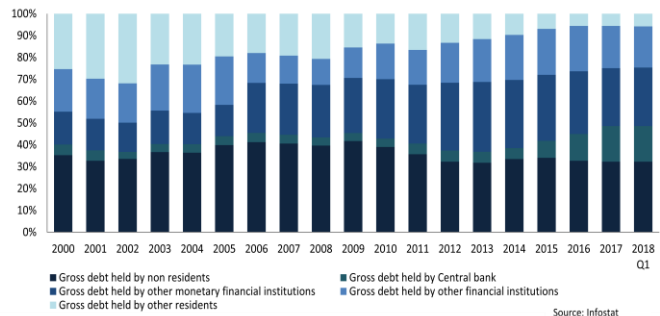
## ITALIAN ECONOMY FACT SHEET (JUNE 2018)

### ITALIAN GROSS DEBT HELD BY SECTOR

In the first half of 2018 the general government debt amounted to €2.3 trillion, held 67.7% by residents (16.3% by Central bank, 26.8% by other monetary financial institutions, 18.8% by other financial institutions and 5.8% by other residents) and 32.3% by non-residents.

Gross debt held by non-residents (share) recorded its peak value of 41.7% in 2009.

Exhibit 4: Italian gross debt held by sector (share)

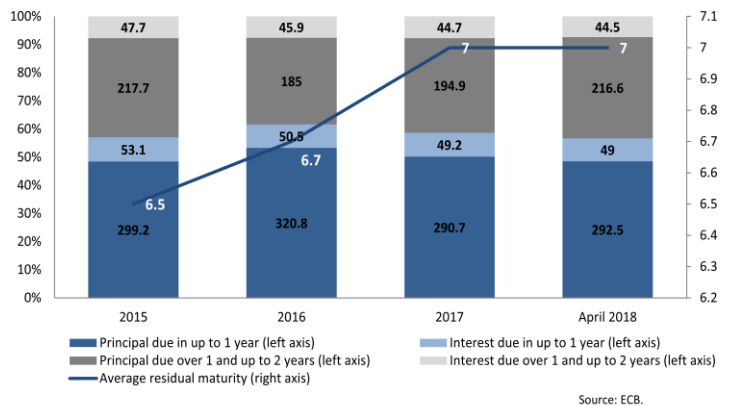


### PUBLIC DEBT SERVICE

In the first quarter of 2018 the Italian debt service due in 2 years amounted to €602.7 billion equivalent to 35.1% of GDP, divided into principal payments (€509.2 billion – 29.6% of GDP) and interest expenditure (€93.5 billion – 5.5% of GDP).

Italy's average outstanding debt maturity has risen to seven years compared to the figure recorded in the 2015 (6,5 years).

Exhibit 5: Italian debt service due in 2 years



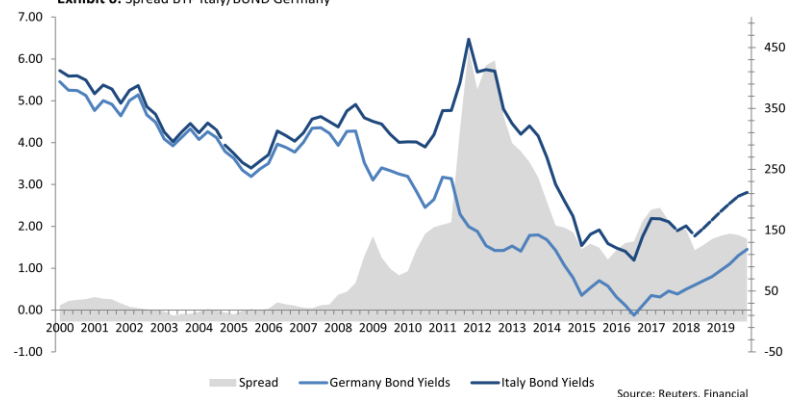
### SPREAD PREDICTED TO SLOWLY FALL

Italy's 10-year yield spread over comparable German bunds widened to 243.3 basis points in the first half of 2018.

After reaching its highest level in 2011 (447.7 basis points), the 10-year spread in the period 2012-2015 decreased reaching its lowest value of 101.6 at the end of 2015.

In the short term (second half of 2018 and 2019) Italy's 10-year yield spread is predicted to fall slightly, to 135.6 and 135.9 basis points respectively.

Exhibit 6: Spread BTP Italy/BUND Germany



## ITALIAN ECONOMY FACT SHEET (JUNE 2018)

### NUMBER OF BANKRUPTCY AND OTHER LEGAL PROCEEDINGS TO DECREASE FURTHER

From 2000 to the first half of 2018 the number of bankruptcies and other legal proceedings, protests and prejudicial acts in Italy mirrored the general trend of the Italian economy.

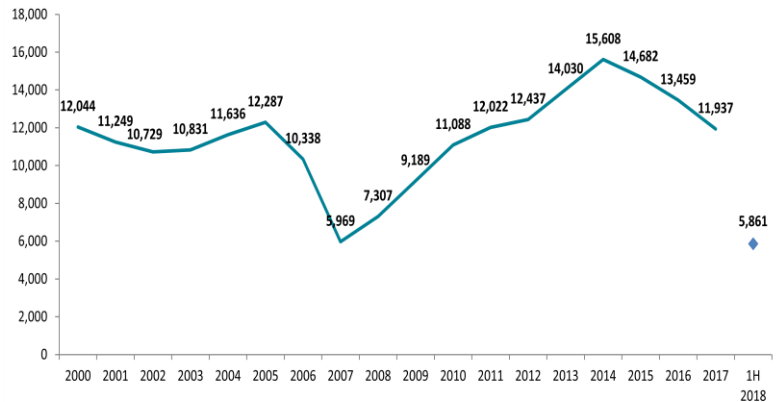
After reaching its minimum level in 2007 (5,969), the number of bankruptcy procedures in the period 2009-2014 increased dramatically reaching its peak value of 15,608 in 2014. With the improvement in the economic and financial environment, starting from 2015 the number of bankruptcy procedures decreased sharply in all macro sectors returning approximately to the levels recorded from 2000 to 2006. A positive trend was recorded also in 2017, when bankruptcy procedure was initiated for 11,937 companies, -11.3% compared to the same period in 2016. According to the latest data in the first half of 2018 this trend has remained unchanged.

Worth mentioning is the design of a new Italian bankruptcy law that should be approved by October 2018. The regulatory framework aims at more efficient resolutions of cases of company crisis supporting continuity of its operating activities and safeguarding the interest of creditors by introducing innovative solutions such as pre-crisis warning mechanisms.

Other legal proceedings, after reaching its maximum level in 2013 (3,593) in 2016 decreased to 1,993, and the trend continues in 2017 evidencing 1,866 procedures, -6.4% compared to the same period in 2016. In the first six months of 2018 810 other procedures have been registered.

In the last five years new protests and prejudicial acts have also shown a decreasing trend, with -52.7% and -7.0% of acts respectively in 2017 compared to the numbers recorded in 2013. According to the latest data in the first half of 2018 this slight downward trend is continuing (7,084 protests and 5,970 prejudicial acts).

Exhibit 7: Bankruptcy



Source: Cerved database

Exhibit 8: Other legal proceedings

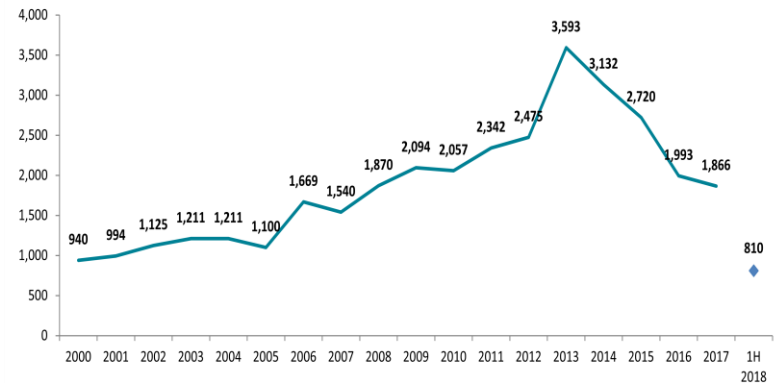
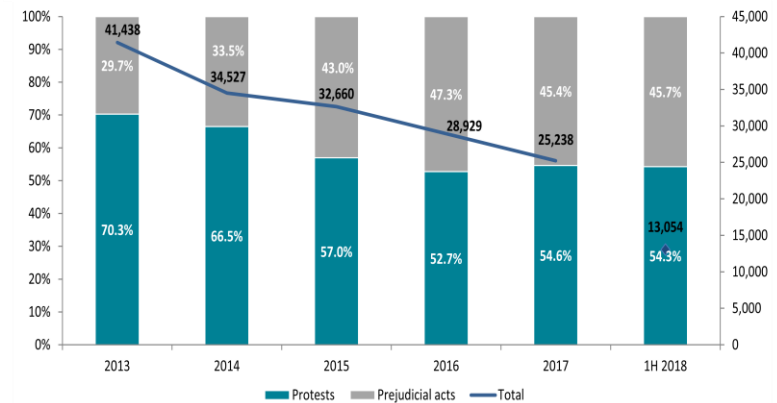


Exhibit 9: Protests and prejudicial acts



Source: Cerved database

## ADVERSE ITALIAN MACROECONOMIC SCENARIOS

### PREMISES

The next paragraph describes some “*extreme but plausible*” adverse macroeconomic scenarios as well as the impact that such scenarios might have on the Italian non-financial companies.

The extreme negative economic and financial scenario on the country level is undoubtedly represented by its sovereign default, defined as the failure to meet the financial commitments by a sovereign entity (in this specific case the Italian Government). The development of the sovereign debt crises depends on the gravity of the debt burden, the degree of the creditors losses (debt haircut, interest and/or maturity modifications) and the willingness of the government to pay and to negotiate. With the aim to classify the variety of potential sovereign debt crises scenarios and to create the methodological basis for this Study the Agency has followed the definitions of Asonuma and Trebesch (2016)<sup>1</sup> as presented below:

1. a “*strictly preemptive*” case: debt restructuring implemented with no missed payments;
2. a “*weakly preemptive*” case: debt restructuring implemented with some missed payments but only temporarily and after the start of negotiations with creditor representatives (no unilateral default);
3. a “*post default restructuring*” case: all other cases in which payments are missed unilaterally and with no prior agreement with credit representatives.

Sovereign debt crises affects the main macroeconomic indicators. Loss of a national state creditworthiness generally results in a denied or restricted access to international financial markets, reduction in *GDP* and investment, increase in interest rates and causes negative impact on domestic and international trade. Asonuma, Chamon, Erce e Sasahara (2017)<sup>2</sup> showed that the impact on *GDP* and investment growth, access to financial markets, level of interest rates and lending volumes to the private sector will be significantly different depending on the type of debt restructuring that takes place: “*GDP and investment decline substantially in post-default DRs [Debt Restructurings], less severely in weakly preemptive ones, and are unaffected in strictly preemptive cases. Private credit falls and lending rates hike sharply during post-default DRs, while no such effect is found for strictly preemptive cases. Capital flows remain low after any DR, but recover fast after strictly preemptive cases*”. Considering the structure of Italian public debt, the scenario appears even more complex: “*...when domestic banks hold large amounts of government debt, the domestic financial sector may be put under significant stress by the default. Sovereign defaults could lead to banking crises or a domestic credit crunch ... default episodes may cause a collapse in confidence in the domestic financial system and may lead to bank runs, resulting in banking crises or at least a credit crunch ... even in the absence of a bank run, default episodes would have a negative effect on banks’ balance sheet, especially if holdings of the defaulted paper are large, and lead banks to adopt more conservative lending strategies ... default episodes are often accompanied by a weakening of creditor rights or at least more uncertainty about them, which, may also have a negative effect on bank lending.*”

### HISTORICAL DEFAULTS

Bank of Canada provides a detailed and well-structured database of all the recorded sovereign defaults covering a period from 1960 to 2016: the default events are defined as “*when debt service is not paid on the due date or within a specified grace period, when payments are not made within the time frame specified under a guarantee, or, absent an outright payment default, in any of the following circumstances where creditors incur material economic losses on the sovereign debt they hold*”<sup>3</sup>.

<sup>1</sup> Asonuma, T. and C. Trebesch, 2016, “*Sovereign Debt Restructurings: Preemptive or Postdefault*,” *Journal of the European Economic Association*, Vol.14(1), pp.175–214.

<sup>2</sup> Asonuma, T., Chamon M., Erce A., and Sasahara A., “*Costs of Sovereign Defaults: Restructuring Strategies, Bank Distress and the Credit Investment Channel*”, IMF working paper 2017.

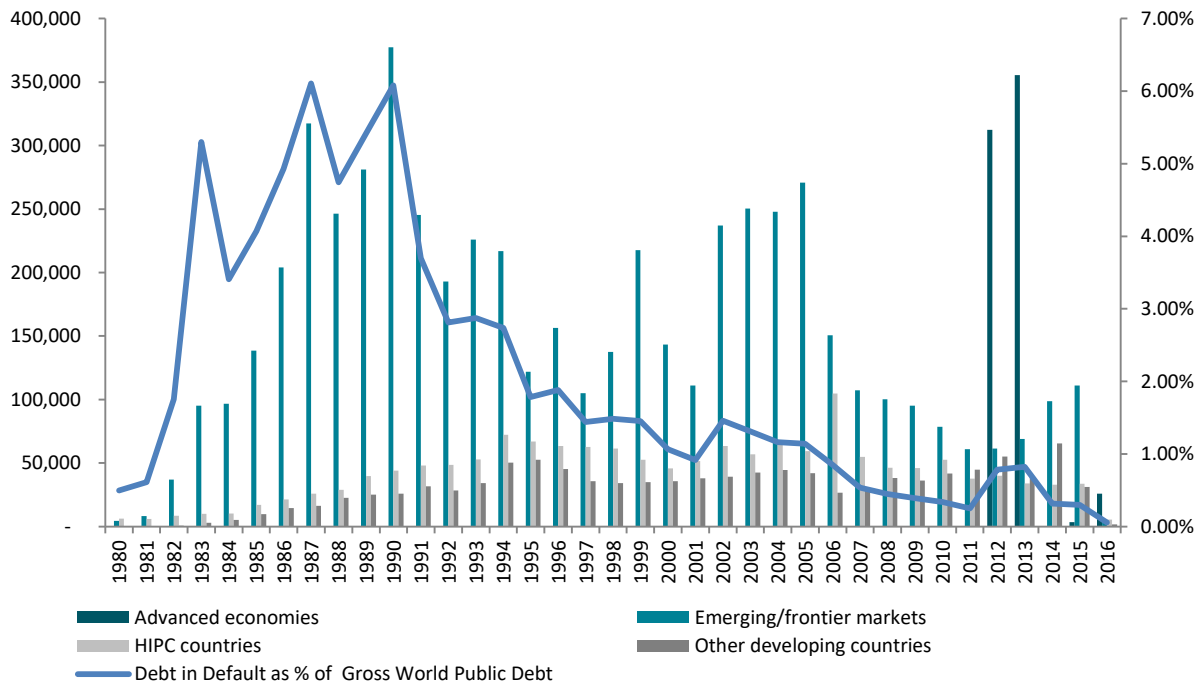
<sup>3</sup> List of other conditions on the specific paper: “*Database of Sovereign Defaults, 2017*”, D. Beers and J. Mavalwalla.



## ADVERSE ITALIAN MACROECONOMIC SCENARIOS

The graph below, referring to the period 1980-2016, shows the distribution of nominal value of sovereign government debt in default by reference country cluster and as a % of gross world public debt.

Exhibit 10: distribution of Sovereign defaults by country group, (USD Billions)



Source: Bank of Canada Default Database

The peak values starting from the 80s are mainly attributable to the Latin American debt crisis, the end 90s/mid 2000s peak values were caused mainly by the Russian and Argentinian defaults while the recent wave starting from 2011 mainly refers to the Greek sovereign debt restructuring plan. It is worth mentioning that the majority of sovereign defaults has been historically concentrated in developing or Heavily Indebted Poor Countries (HIPC), with Greece being an outlier representing the Advanced Economies (AE) cluster. The value of its debt restructuring program has achieved a quite remarkable size.

The two case studies presented below are considered particularly relevant for the purpose of this Research, more specifically the Argentina 2001 sovereign debt default and the Greek 2012 debt restructuring. Both cases clearly show the severe consequences that sovereign defaults cause on macroeconomic parameters.

## ADVERSE ITALIAN MACROECONOMIC SCENARIOS

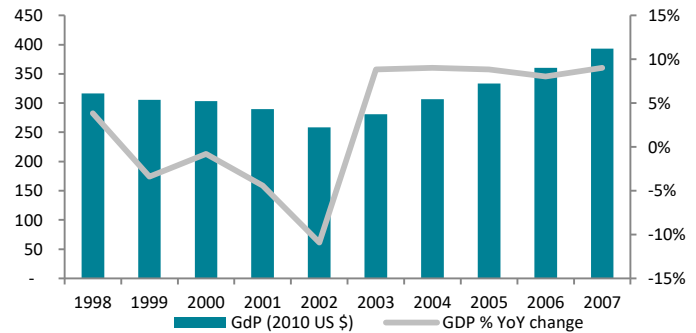
### ARGENTINA

The Country defaulted on almost \$66 billion of its sovereign debt in December 2001, increasing later that amount to \$100 billion. The default was preceded by a severe economic crisis starting by the end of the 90s due to both external and internal factors. The default is to be considered a “Post restructuring default” as no agreement with creditors had been reached before scheduled payments were missed.

As Exhibits 11 and 12 show, the post default period affected the GDP and the lending interest rate in a dramatic way. The GDP decreased by more than 10% in a single year in 2002, rebounding gradually in the following years and reaching pre-default levels only in 2004 as external factors favoured the country’s trade conditions.

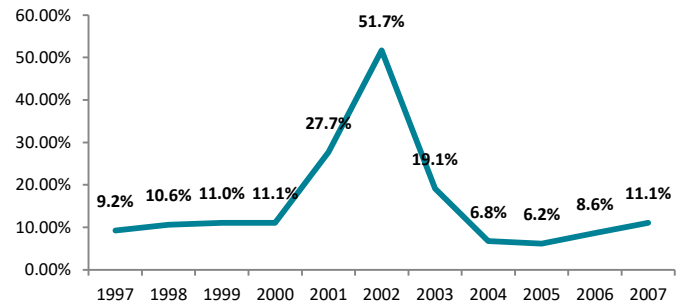
The lending interest rate (i.e. the bank rate that usually meets the short and medium-term financing needs of the private sector) achieved its peak at 51,7% in 2002, and fell below its pre-default levels in 2004.

Exhibit 11: Argentina GDP (constant 2010 US\$) and GDP growth (annual %)



Source: The World Bank

Exhibit 12: Argentina Lending Interest Rate



Source: The World Bank

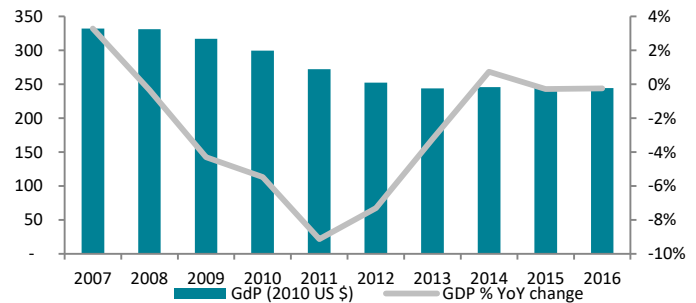
### GREECE

The Greek debt crisis started in the aftermath of 2008 global financial crisis and was mainly caused by the structural weaknesses of the Greek economy and the very high level of the Greek public debt and deficit.

The Greek Government was granted a bail-out loan in 2010 of €110 billion by the IMF and the ECB on the condition that austerity measures would be taken. The Agency classifies this scenario as a “Weakly Preemptive” case as the program was agreed with creditors without unilaterally missed payments. GDP growth rate was at its lowest levels in 2011 (-9,13%) and remained negative in the following years with the only exception of 2014. The agreement with creditors included a debt restructuring through a debt buyback and exchange program.

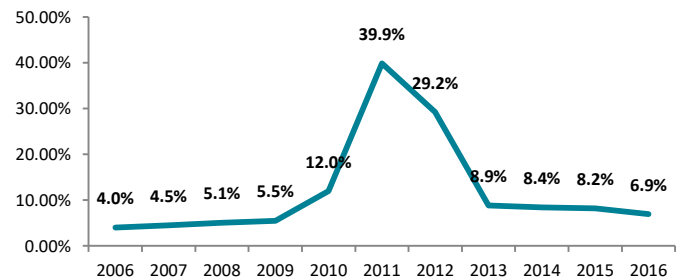
Exhibit 14 shows 10 year government bond yields, reaching its peak value (39,9%) in 2011.

Exhibit 13: Greek GDP (constant 2010 US\$) and GDP growth (annual %)



Source: The World Bank

Exhibit 14: Greek 10 year bonds yield (as at 31/12)



Source: The Bank of Greece

## ADVERSE ITALIAN MACROECONOMIC SCENARIOS

### SCENARIOS

The empirical results of the Asonuma, Chamon, Erce and Sasahara (2017) study evidence the impact of default on the *GDP* growth (considered as isolated effect, i.e. excluding other impacts such as those on FX rates, interest rates, etc.). A sovereign default has a more profound negative impact on *GDP* trend in post default restructurings compared to weakly preemptive restructurings as shown in Exhibit 15.

**Exhibit 15:** Impacts of Sovereign defaults on *GDP* (accounting for structural differences of their economies), t=1 is default announcement year, AIPW approach)

Scenario / Year	1	2	3	4	5
<b>Post default restructuring</b>	-1,5%	-2,9%	-3,5%	-3,8%	-5,0%
<b>Weakly preemptive</b>	-1,6%	-1,5%	-1,0%	-3,7%	-6,3%

Source: Asonuma T., Chamon M., Erce A., and Sasahara A., “Costs of Sovereign Defaults: Restructuring Strategies, Bank Distress and the Credit Investment Channel”, IMF working paper 2017

In the “*extreme but plausible*” scenario that Italy will be unable to meet its financial obligations the Agency believes that the impact on the *GDP* growth will be stronger due to structural weakness of the Italian economy reflected in the *GDP* growth still below the European average (and remaining with no clear perspective of significant improvements) and an unemployment rate still significantly higher than the Eurozone average. It is highly likely that Italian economy would be hit very hard in the very first years after the default announcement with *GDP* decrease in the range of -3%/-6%. More specifically the Agency believes that in the post default restructuring scenario a *GDP* would decrease by 6% for two years after the default event and by 5% in the third year, while in the weakly preemptive restructuring scenario a decrease would be 4% for first two years and 3% in the third year after the default event.

Defaults are also associated with significant increases of national bond yields. T. Asonuma (2016)<sup>4</sup> analyses the impacts of past defaults on borrowing costs, coming to the conclusion that “*past defaulters suffer significantly higher borrowing costs than non-defaulters ... [and] are more likely to default again*”. One significant consequence is an extensive banking crisis, the probability that such event happens being considerably higher in post default restructuring. Moreover, Italy had already experienced a similar situation in the aftermath of the global financial crisis, with Italian corporations facing difficulties in obtaining credit from financial institutions. The Agency, with respect to the peak interest rate of 6% reached in 2012, estimates that a post default restructuring scenario will lead to at least 600 basis points increase and a weakly preemptive case to a more moderate increase of 400 basis points. In this way 10 year Bond Yields in post default restructuring scenario will remain at 12% for the three years following the default and in a weakly preemptive scenario will rise up to 10%. As mentioned before, both scenarios should be considered as extreme cases but plausible.

Hence, for the sake of this study the Agency’s stress test assumptions are displayed in the table below:

**Exhibit 16:** Impacts of sovereign defaults scenarios on *GDP* and 10 years yield rates

Post default scenario				Weakly preemptive scenario			
Year	1	2	3	Year	1	2	3
<b>GDP</b>	-6%	-6%	-5%	<b>GDP</b>	-4%	-4%	-3%
<b>10 y Yield</b>	12%	12%	12%	<b>10 y Yield</b>	10%	10%	10%

Source: Cerved Rating Agency’s assumptions

<sup>4</sup> Asonuma, T., “Serial Sovereign Defaults and Debt Restructurings”, IMF Working Paper No. 16/66.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

### ASSUMPTIONS

Cerved Rating Agency has decided to adopt a statistical approach for the quantification of the impact of the macroeconomic scenarios on its internal probability of default and ratings. To the purpose of model development, Cerved Rating Agency has set up some theoretical and practical assumptions as methodological hypotheses, which are clearly illustrated hereinafter.

#### Modelling framework

The methodological framework recalls the approach adopted by significant banking institutions for stress testing models development, used for various regulatory and managerial purposes. The quantitative model respects a minimum set of statistical properties, in order to avoid the development of spurious regressions and biases in the estimation of the coefficients. The selected modelling approach is therefore the linear regression on the first differences of the dependent and independent variables of the quarterly time series analysed.

#### Time horizon

In the estimation of the deterioration of the creditworthiness of the portfolio following the application of negative scenarios and starting from the hypotheses of the adverse Italian macroeconomic scenario presented before, the Agency has set the following time horizons for model development purposes:

- one year default probability, consistent with the internal and regulatory best practices;
- quarterly frequency of dependent and independent variables;
- initial starting point of the simulation: end of 2017, corresponding to the macroeconomic as-is situation as of year  $t$ ;
- first year of simulation (short term): end of 2018, corresponding to the macroeconomic scenario as of year  $t+1$ ;
- second year of simulation (medium term): end of 2019, corresponding to the macroeconomic scenario as of year  $t+2$ ;
- third year of simulation (long term): end of 2020, corresponding to the macroeconomic scenario as of year  $t+3$ .

#### Internal and external data

Consistently with the choices already adopted by a vast number of banking institutions in the context of EBA stress test, the Agency has decided to adopt the external data for model development, in order to:

- leverage on the availability of public data available in the Bank of Italy statistics<sup>5</sup>;
- analyse the whole deepness of historical time series;
- allow benchmarking comparison with internal data.

In order to analyse the impact of the estimation on the internal data, the Agency has set the hypothesis of reflecting the increase estimated on the public default rates on the internal probabilities of default in a consistent manner, by the application on the rating class probabilities of default (hereinafter also called *PD*) of a common stressing factor. To this purpose, the Agency has analysed the impact on the rated portfolio containing public and private ratings as of the end of May 2018.

<sup>5</sup> Public statistics on Italian economy are available on the Bank of Italy website <https://www.bancaditalia.it/statistiche/basi-dati/bds/index.html?com.dotmarketing.htmlpage.language=1>.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

### Scenarios applied

Cerved Rating Agency has addressed the choice to consider a set of scenarios for its assessment. The selected scenarios are “*extreme but plausible*”, as suggested by the literature and the regulation. In order to define a range of scenarios and to assess the related impact, the Agency has decided to select the following scenarios:

- the **EBA baseline scenario**, considering the expected evolution of the macroeconomic factors in normal conditions with no adverse events for the Italian and the European market;
- the **EBA adverse scenario**, considering the estimated evolution of the macroeconomic factors in negative conditions with the presence of adverse events for the Italian and the European market;
- the **weakly preemptive scenario**, considering a negative economic conjuncture in a near to default situation;
- the **post default restructuring scenario**, considering a very negative economic conjuncture after an hypothetical default of the country.

It is worth to note that the Agency has decided to assess the impact of the EBA scenarios<sup>6</sup> for comparison and benchmarking purposes, as already addressed by the significant banking institutions in the context of the EBA regulatory stress testing exercise performed in the first semester of 2018.

The EBA provides the forecasted scenarios as of the end of the projections year, namely 2018, 2019 and 2020. Bearing in mind that the Agency link model is based on quarterly observations, for simplification purposes, the forecasted scenarios have been considered as constant for all the quarters.

The Agency has not considered specifically the impact of Italy’s potential exit from Eurozone, that might occur, apart from sovereign default event, either due to strictly national decisions or to Eurozone countries consensual return to the local currencies (at the time this Study is written the overall probability of Eurozone break-up according to Sentix<sup>7</sup> is estimated at roughly 12%). Anyhow, the Agency thinks that any scenario including Italy’s Euro abandon may be treated as the post default restructuring scenario.

All the estimates described hereinafter support the opinion of Cerved Rating Agency based on these methodological assumptions, which express the prediction of the Agency on the future macroeconomic scenarios on a best effort basis.

### **METHODOLOGICAL APPROACH**

Cerved Rating Agency has developed a dedicated statistical model aimed at quantifying the impact of the scenarios on the Agency’s public and private ratings, following a specific modelling framework. The methodological approach relies on a series of sequential steps:

1. definition of the model design;
2. data gathering of the independent and dependent variables;
3. multivariate analysis and testing;
4. estimation of the riskiness increase.

Details for each step are described hereinafter.

<sup>6</sup> The EBA scenarios are available on the European Banking Authority website <https://www.eba.europa.eu/-/eba-launches-2018-eu-wide-stress-test-exercise>.

<sup>7</sup> Sentix is an organisation expressing opinions on the behavioural finance. Further details are available at the website <https://www.sentix.de/index.php/en/>.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

### 1 – Definition of the model design

The defined statistical model is a so called “*satellite*” or “*link*” model, that aims to show the impact of the variation of the independent variables (i.e. macroeconomic factors) on the dependent variable (i.e. default rates). The historical decrease or increase of the factors may lead to changes in the behaviour of the effective riskiness expressed by the empirical default rates.

The modelling framework relies on the adoption of the linear regression, expressed by the following formula:

$$y_i = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p + \epsilon_i$$

where:

- $y_i$  is the target (dependent) variable;
- $\alpha$  is the intercept of the regression;
- $\beta_p$  is the coefficient of the regressor  $x_p$ ;
- $x_p$  is the regressor  $p$ ;
- $\epsilon_i$  are the residuals of the regression.

The modelling framework is consistent with the approach adopted by the major banking groups for stress testing models development purposes.

### 2 – Data gathering of the independent and dependent variables

The following independent variables have been analysed for modelling purposes, as of the quarter  $t$ :

- $GDP\_Italy\_nom\_t$ : year on year (YoY) variation of the nominal Gross Domestic Product (*GDP*) of Italy;
- $GDP\_Italy\_real\_t$ : year on year (YoY) variation of the real Gross Domestic Product (*GDP*) of Italy;
- $GDP\_European\ Union\_t$ : year on year (YoY) variation of the Gross Domestic Product (*GDP*) of the European Union;
- $GDP\_Eurozone\_t$ : year on year (YoY) variation of the Gross Domestic Product (*GDP*) of Eurozone;
- $Unempl\_Italy\_t$ : unemployment rate of Italy;
- $Unempl\_European\ Union\_t$ : unemployment rate of European Union;
- $Unempl\_Eurozone\_t$ : unemployment rate of Eurozone;
- $IR10Y\_Germany\_t$ : interest rate of the 10 years government bond of Germany;
- $IR10Y\_Italy\_t$ : interest rate of the 10 years government bond of Italy;
- $Spread\_IR10Y\_Ita\_Ger\_bps\_t$ : difference in basis points between the interest rates of the 10 years government bond of Germany and Italy;
- $HPI\_Italy\_t$ : residential House Price Index of Italy, basis 100 in 1980.

Beside the quarter  $t$ , each of the mentioned variable is considered also as lagged variable in the previous quarters, namely  $t-1$ ,  $t-2$  and  $t-3$ . The purpose of the lagged variables is to analyse the lagged effect on the default rates on the following quarters.

The model considers as dependent (i.e. target) variable the evidence of default rates at Italian system level. More in detail, the target variable has been built considering the number of the quarterly charge offs (i.e. “*sofferenze rettificate*”) on the only Italian non-financial companies available among the Bank of Italy statistics.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

The default rate is calculated as follows:

$$DR_t = \frac{D_t}{B_t}$$

where:

- $DR_t$  is the quarterly default rate as of the quarter  $t$ ;
- $D_t$  is the number of new charge offs occurred at the end of the quarter  $t$ ;
- $B_t$  is the number of performing counterparties as of the beginning of the quarter  $t$ .

In order to predict an annual probability of default, the quarterly default rate has been converted in an annual default rate adopting the following formula:

$$(1 + i_k)^k = 1 + i$$

where:

- $i_k$  is the quarterly default rate;
- $i$  is the annual default rate.

Therefore, the annualised default rate  $DR_t^A$  is the following:

$$DR_t^A = (1 + DR_{t-3})(1 + DR_{t-2})(1 + DR_{t-1}) - 1$$

In order to analyse the increase or decrease of the target default rate, the difference between two consecutive default rates has been considered as a target variable:

$$Y_t = DR_t^A - DR_{t-1}^A$$

Thus, the estimated model aims at interpreting the expected evolution in the quarterly increase of the default rates.

### 3 – Multivariate analysis and testing

The modelling procedure has led to the definition of the following model:

Variabile	Description	Coefficient	P-value
const	Intercept of the model	-0,000541692	0,100742172
GDP_Italy_nom_t1	YoY variation of the nominal GDP of Italy at quarter t-1	-0,000287664	0,000000001
IR10Y_Italy_t	Interest rate of the 10 years government bond of Italy at quarter t	+0,000320082	0,000109549

From a statistical point of view, the two macroeconomic variables identified are significant considering a confidence level of 95%, as the p-values are lower than 5%. Additionally, from an economic perspective, the following applies:

- the negative coefficient of the *GDP* denotes an inverse relationship with the target variable, meaning that an increase of the *GDP* yields to a reduction of the default rate;

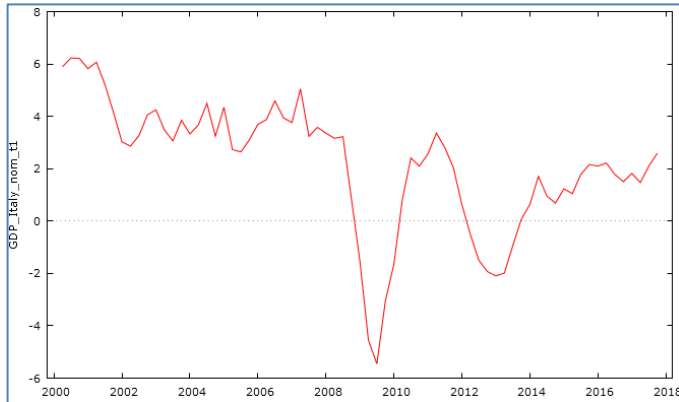
## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

- the positive coefficient of the interest rate denotes a direct relationship with the target variable, meaning that an increase of the interest rate yields to an increase of the default rate.

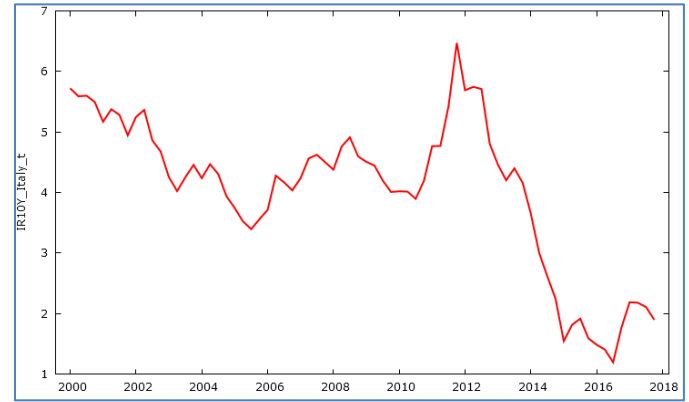
This behaviour is consistent and reasonable with the expected riskiness. The growth of the government bond interest rate usually denotes an increasing riskiness of the country.

The following graphs represent the trend of the selected regressors in the modelling sample.

**Exhibit 17:** YoY variation of the nominal GDP of Italy, 1 quarter lagged



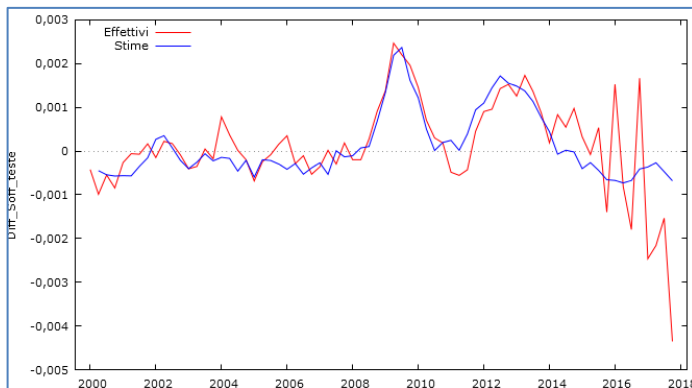
**Exhibit 18:** Interest rate of the 10 years government bond of Italy



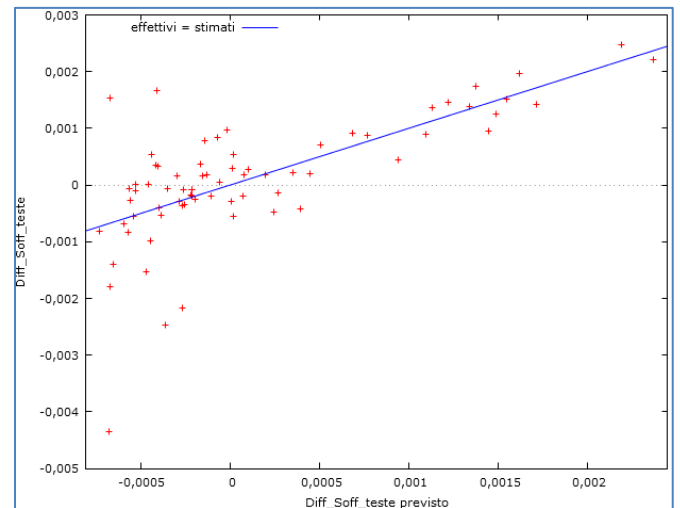
The graph shows evidence of some peaks: at the end of 2009 for the GDP and at the beginning of 2012 for the interest rate. These peaks of the distributions are generally linked to relevant levels of economic crises.

The following graph shows evidence of the differences between expected and empirical values of the target variable with respect to time and the linear regression line.

**Exhibit 19:** Empirical versus predicted values



**Exhibit 20:** Target variable versus time





## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

The model testing yields to the following outcomes:

- the  $R^2$  of the linear regression, denoting the fitting capability of the model, is around 47%, which can be considered as satisfactory;
- the Durbin-Watson statistics of the model, denoting the presence of autocorrelation among the residuals of the regression, is around 1.45, which can be considered as indicative of poor autocorrelation.

Additional analyses on the stationarity of the dependent and independent variables and on the regression residuals has led to the following outcome<sup>8</sup>:

Variable type	Variable	Levels / First differences	Augmented Dickey Fuller test type	P-value	Outcome
Target variable	Diff_Soff_teste	Levels	Constant	0.444	Not stationary
Target variable	Diff_Soff_teste	Levels	Constant and trend	0.884	Not stationary
Target variable	Diff_Soff_teste	First differences	Constant	0.001	Stationary
Target variable	Diff_Soff_teste	First differences	Constant and trend	0.002	Stationary
Independent variable	GDP_Italy_nom_t1	Levels	Constant	0.441	Not stationary
Independent variable	GDP_Italy_nom_t1	Levels	Constant and trend	0.222	Not fully stationary
Independent variable	GDP_Italy_nom_t1	First differences	Constant	0.083	Stationary
Independent variable	GDP_Italy_nom_t1	First differences	Constant and trend	0	Stationary
Independent variable	IR10Y_Italy_t	Levels	Constant	0.755	Not stationary
Independent variable	IR10Y_Italy_t	Levels	Constant and trend	0.722	Not stationary
Independent variable	IR10Y_Italy_t	First differences	Constant	0.002	Stationary
Independent variable	IR10Y_Italy_t	First differences	Constant and trend	0.012	Stationary
Residuals	Res_regr_model	Levels	Constant	0.088	Stationary
Residuals	Res_regr_model	Levels	Constant and trend	0.153	Not fully stationary
Residuals	Res_regr_model	First differences	Constant	0.001	Stationary
Residuals	Res_regr_model	First differences	Constant and trend	0.002	Stationary

<sup>8</sup> For the stationarity analysis, a confidence level of 90% has been adopted.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

The outcome of the statistical tests indicates that both the regressors of the model and the target variable are not stationary in the levels but are stationary in the first differences, meaning that they are both integrated processes of order 1. This implies that a long-term relationship can exist between dependent and independent variables. The p-values lower than 10% lead to the rejection of the null hypothesis of the augmented Dickey Fuller test of presence of an unit root in a time series sample. Also for the residuals, the stationarity hypothesis can be confirmed by the tests<sup>9</sup>.

### 4 – Estimation of the riskiness increase

Following the model estimation and testing, Cerved Rating Agency has estimated the increase of the expected riskiness through the adoption of a stressing multiplier, expressing the percentage increase in terms of default rates following the application of the considered scenario. This multiplier is computed as follows with respect to the effective value of the annualised default rate as of the end of 2017:

$$k = \frac{DR_{Q4\ 2017+n}^A}{DR_{Q4\ 2017}^A} - 1$$

The coefficient  $k$  expresses therefore the relative percentage increase in the expected riskiness with respect to the end of 2017, which is the last observation of the estimation sample. Once this  $k$  factor has been estimated, the reflection on the internal estimates of the  $PD$  follows a consistent behaviour. As already introduced in the assumptions, the Agency's internal  $PD$ s are subject to the same creditworthiness deterioration (i.e. stress) expected at Italian level. This can be summarised by the following:

$$PD_i^{stressed} = PD_i(1 + k)$$

Where:

- $PD_i^{stressed}$  represents the stressed 1-year probability of default of the Agency's rating class  $i$ ;
- $PD_i$  represents the 1-year probability of default of the rating class  $i$ ;
- $k$  represents the stressing factor.

The stressing factor is independent of the considered rating class. The deterioration is considered as constant between the rating classes. According to the new  $PD_i^{stressed}$  previously presented, the application portfolio can be subject to a rating migration on worse rating classes.

## OUTCOMES

The application of the stressing factor to the last available rated portfolio as of May 2018, including public and private ratings issued by the Agency and sufficiently representative of the Italian non-financial companies economic structure, has determined rating migrations on different rating classes. The magnitude of this shift is naturally dependent on the applied scenario and yields to different behaviours on the sampled portfolio. The Agency has analysed the impact of several scenarios, coming up with different behaviours in the estimated riskiness of the portfolio. Additionally, the analysis has been extended to a selected sample of economic micro-sectors and NACEs<sup>10</sup>, providing the estimation of an average  $PD$  value for the assessed time horizon. The selected economic micro-sectors are consistent with the ones already analysed by the Agency in its study "*Italian non-financial companies economic outlook 2018*".

<sup>9</sup> Augmented Dickey Fuller test passed with a 90% confidence level considering the hypothesis of presence of constant, slightly above the 10% p-value threshold with the hypothesis of constant and trend (p-value equal to 15%). In any case, the stationarity hypothesis on the residuals has been considered as satisfied.

<sup>10</sup> NACE (*Nomenclature statistique des activités économiques dans la Communauté européenne*) is an European classification of economic activities within the European Community.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

### EBA baseline scenario

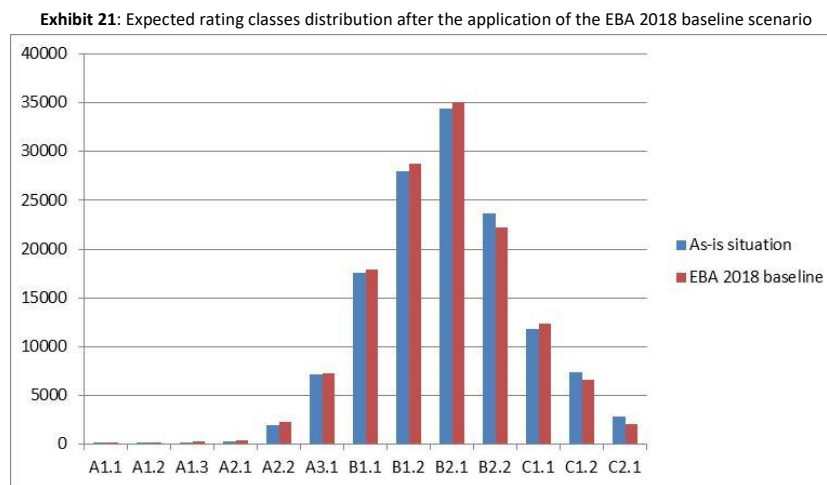
The EBA baseline scenario is broadly in line with the macroeconomic situation as the end of 2017, basically presenting for the European market a situation not characterised by evident and severe signals of deterioration. More in detail, for the Italian market, the values for the *GDP* and the interest rate of the 10 years government bond for 2018 confirm the fairly positive behaviour already experienced in the last quarters of 2017. For the following years, the *GDP* confirms the trend whereas the interest rate is expected to increase, reaching 2.8 at the end of 2020.

Specifically, for simulation purposes, the Agency has adopted the following scenarios:

Variable	2018	2019	2020
<i>GDP</i> Italy	1.4	1.3	1.3
IR10Y Italy	2.1	2.5	2.8

The application of the statistical model on the EBA baseline scenario yields to an overall reduction of the expected default rate around 5% for 2018, whereas for 2019 and 2020 the decrease is around 7%. This is due to the fact that the global scenario is fairly positive, and the impact on the overall riskiness reflects this behaviour accordingly.

Exhibit 21 shows the impact of the EBA baseline scenario as of the year 2018 on the considered portfolio, whose average default probability is expected to be around 6.5%:

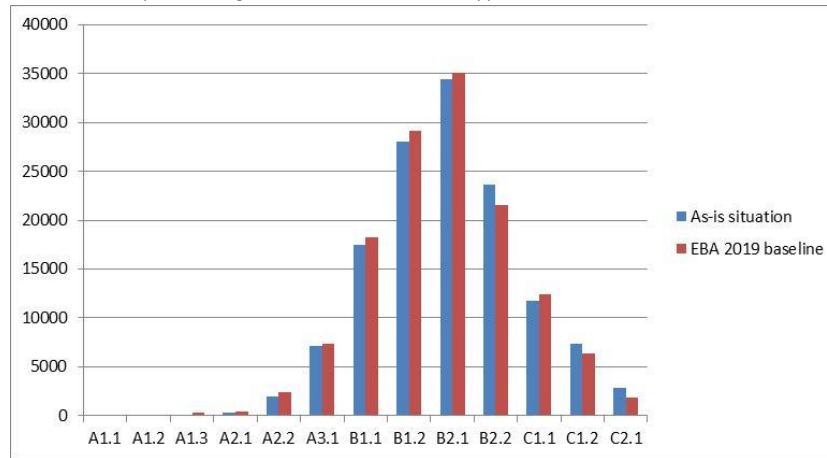


The application of the scenario implies a slight global reduction of the portfolio riskiness. More in detail, the rating class A1.3 gets a relative increase of more than 100%, moving from 129 counterparties to 272 after the application of the stressing factor. Conversely, the rating class C2.1 is subject to a reduction of almost 30%, moving from the initial 2,806 to the final 2,055 counterparties after the stress.

Exhibit 22 shows the impact of the EBA baseline scenario as of the year 2019 on the considered portfolio, whose average default probability is expected to be around 6.4%:

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

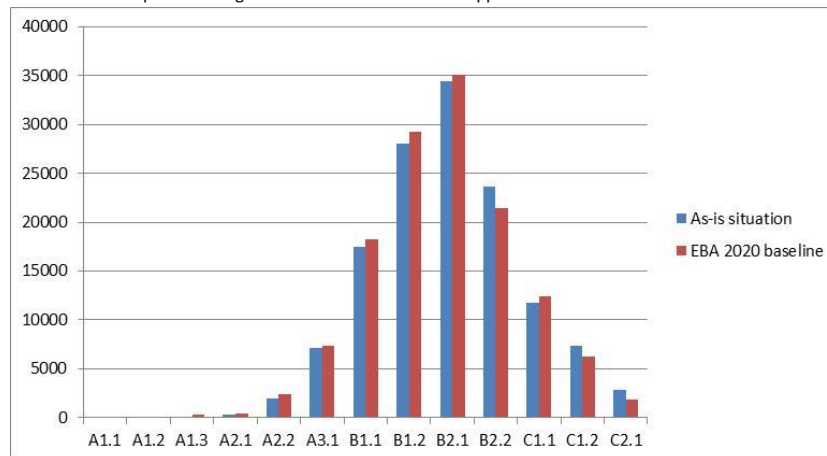
**Exhibit 22:** Expected rating classes distribution after the application of the EBA 2019 baseline scenario



The application of the scenario implies a slight global reduction of the portfolio riskiness. More in detail, the rating class A1.3 gets a relative increase of more than 130%, moving from 129 counterparties to 298 after the application of the stressing factor. Conversely, the rating class C2.1 is subject to a reduction of more than 30%, moving from the initial 2,806 to the final 1,857 counterparties after the stress.

Exhibit 23 shows the impact of the EBA baseline scenario as of the year 2020 on the considered portfolio, whose average default probability is expected to be around 6.3%:

**Exhibit 23:** Expected rating classes distribution after the application of the EBA 2020 baseline scenario



The application of the scenario implies a slight global reduction of the portfolio riskiness. More in detail, the rating class A1.3 gets a relative increase of more than 130%, moving from 129 counterparties to 300 after the application of the stressing factor. Conversely, the rating class C2.1 is subject to a reduction of more than 30%, moving from the initial 2,806 to the final 1,833 counterparties after the stress.

The Agency has assessed the impact of the scenario at single economic NACE / micro-sector level, projecting the individual *PD* values, on average, on the three years horizon envisaged by the selected scenario. The following table summarises such outcome:

**IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES**

NACE	Micro-sector	PD 2018	PD 2019	PD 2020
A – Agriculture, forestry and fishing	-	6.42%	6.31%	6.29%
B – Mining and quarrying	-	6.91%	6.78%	6.76%
C – Manufacturing	Automotive	5.81%	5.71%	5.69%
	Chemistry & Pharmaceuticals	4.03%	3.95%	3.94%
	Clothing	6.51%	6.39%	6.37%
	Equipment	4.44%	4.36%	4.34%
	Food, beverage and tobacco	5.75%	5.65%	5.63%
	Heavy manufacturing	5.10%	5.00%	4.99%
	Other manufacturing	5.70%	5.60%	5.58%
	Paper, packaging & forest products	5.33%	5.23%	5.22%
	ICT	4.65%	4.57%	4.56%
	Textile	4.99%	4.90%	4.88%
D – Electricity, gas, steam and air conditioning supply	-	6.39%	6.27%	6.26%
E – Water supply; sewerage; waste management and remediation activities		6.96%	6.83%	6.81%
F – Construction		7.85%	7.71%	7.69%
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	5.16%	5.07%	5.06%
	Retail	7.80%	7.66%	7.64%
	Wholesale	6.37%	6.25%	6.24%
H – Transporting and storage	-	6.92%	6.80%	6.78%
I – Accommodation and food service activities		9.24%	9.07%	9.05%
J – Information and communication		6.23%	6.12%	6.10%

The analysis gives evidence of the presence of highly risky sectors, as for instance “Accommodation and food service activities”, whose probability of default is expected to be around 9% for the projected years. As far as the “Construction” sector is concerned, the probability of default is estimated to be close to 8% for the considered period.

Less risky sector like “Chemistry & pharmaceuticals” is expected to have a probability of default around 4% for the analysed timeframe.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

### EBA adverse scenario

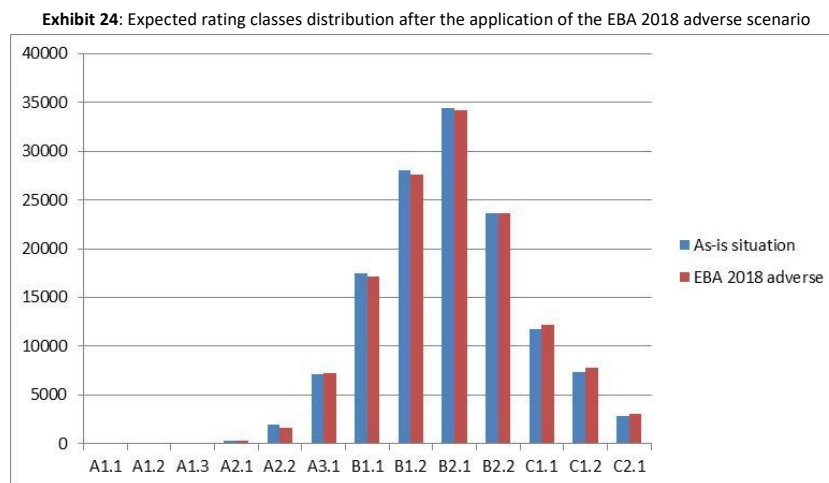
The EBA adverse scenario considers for the European market a not negligible deterioration in the macroeconomic situation with respect to that registered in 2017. More in detail the values of the Italian *GDP* growth and the interest rate of the 10 years government bond for 2018 are subject to an evident deviation from the baseline and migrate significantly from the levels experienced in the last quarters of 2017. For the following years, the *GDP* and the interest rate are expected to confirm the negative trend, reaching respectively -0.6 and 4.0 at the end of 2020.

Specifically, for simulation purposes, the Agency has adopted the following scenarios:

Variable	2018	2019	2020
<i>GDP</i> Italy	-0.6	-1.5	-0.6
IR10Y Italy	3.3	3.7	4.0

The application of the statistical model on the EBA adverse scenario yields to an overall increase of the expected default rate around 6% for 2018, 21% for 2019 and 35% for 2020. This is due to the fact that the global scenario is explicitly negative, and its impact on the overall riskiness reflects this phenomenon accordingly.

Exhibit 24 shows the impact of the EBA adverse scenario as of the year 2018 on the considered portfolio, whose average default probability is expected to be around 7.3%:

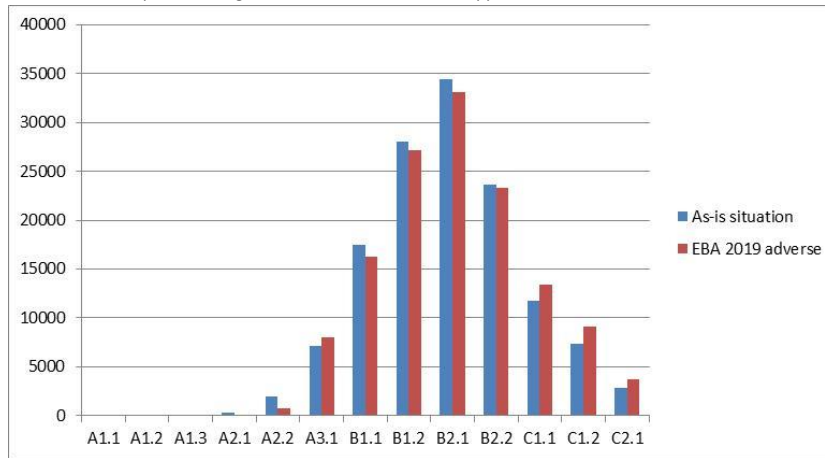


The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of around 10%, moving from 2,806 counterparties to 3,073 after the application of the stressing factor. Conversely, the rating class A2.2 is subject to a reduction of around 15%, moving from the initial 1,907 to the final 1,612 counterparties after the stress.

Exhibit 25 shows the impact of the EBA adverse scenario as of the year 2019 on the considered portfolio, whose average default probability is expected to be around 8.2%:

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

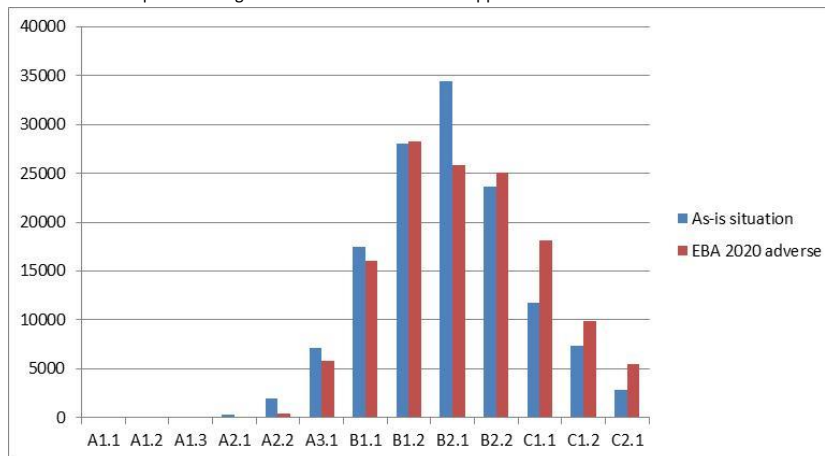
**Exhibit 25:** Expected rating classes distribution after the application of the EBA 2019 adverse scenario



The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of more than 30%, moving from 2,806 counterparties to 3,729 after the application of the stressing factor. Conversely, the rating class A1.3 is subject to a reduction of around 75%, moving from the initial 129 to the final 32 counterparties after the stress.

Exhibit 26 shows the impact of the EBA adverse scenario as of the year 2020 on the considered portfolio, whose average default probability is expected to be around 9.2%:

**Exhibit 26:** Expected rating classes distribution after the application of the EBA 2020 adverse scenario



The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of more than 90%, moving from 2,806 counterparties to 5,470 after the application of the stressing factor. Conversely, the rating class A2.1 is subject to a reduction of more than 80%, moving from the initial 320 to the final 61 counterparties after the stress. It is worth to note that in this scenario 0 counterparties get to best rating A1.1.

Moreover, the Agency has assessed the impact of the negative scenario at single economic NACE / micro-sector level, projecting the individual *PD* values, on average, on the three years horizon envisaged by the selected scenario. The following table summarises such outcome:

**IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES**

NACE	Micro-sector	PD 2018	PD 2019	PD 2020
A – Agriculture, forestry and fishing	-	7.20%	8.17%	9.10%
B – Mining and quarrying	-	7.74%	8.78%	9.78%
C – Manufacturing	Automotive	6.52%	7.39%	8.22%
	Chemistry & Pharmaceuticals	4.52%	5.12%	5.70%
	Clothing	7.30%	8.26%	9.19%
	Equipment	4.98%	5.64%	6.29%
	Food, beverage and tobacco	6.45%	7.31%	8.12%
	Heavy manufacturing	5.71%	6.48%	7.21%
	Other manufacturing	6.39%	7.25%	8.07%
	Paper, packaging & forest products	5.98%	6.77%	7.54%
	ICT	5.22%	5.91%	6.57%
	Textile	5.59%	6.34%	7.06%
D – Electricity, gas, steam and air conditioning supply	-	7.17%	8.13%	9.06%
E – Water supply; sewerage; waste management and remediation activities	-	7.80%	8.84%	9.83%
F – Construction	-	8.81%	9.99%	11.12%
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	5.79%	6.57%	7.31%
	Retail	8.75%	9.92%	11.05%
	Wholesale	7.14%	8.10%	9.02%
H – Transporting and storage	-	7.76%	8.80%	9.80%
I – Accommodation and food service activities	-	10.37%	11.75%	13.10%
J – Information and communication	-	6.99%	7.93%	8.82%

Also in this scenario the most risky sector is “Accommodation and food service activities”, whose probability of default is expected to be around 12% for the projected years. As far as the “Construction” sector is concerned, the probability of default remains high and is estimated to oscillate around 10% for the considered period.

Less risky sector like “Chemistry & pharmaceuticals” is expected to have a probability of default around 5% for the analysed timeframe.



## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

### Weakly preemptive scenario

The weakly preemptive scenario presented before denotes severe signals of deterioration of the macroeconomic situation for the European market. More in detail, for the Italian market, the values for the *GDP* and the interest rate of the 10 years government bond for 2018 are subject to extreme shocks and migrate heavily from the levels experienced in the last quarter of 2017. For the following years, the *GDP* and the interest rate confirm the recession phase, reaching respectively -3.0 and 10.0 at the end of 2020.

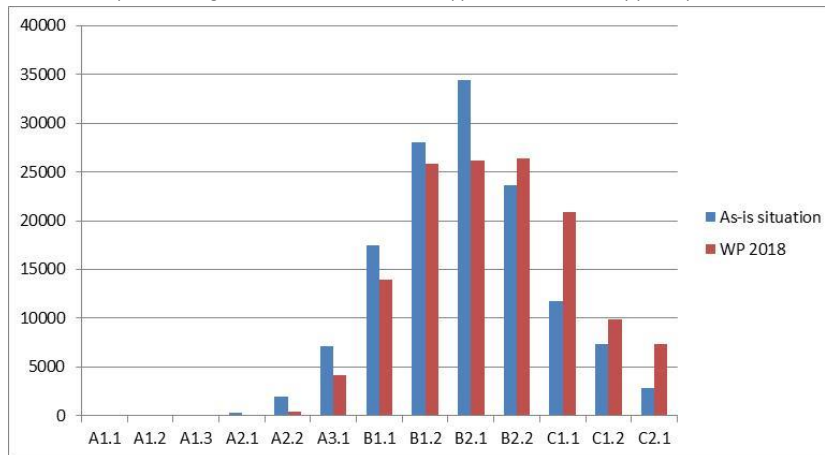
Specifically, for simulation purposes, the Agency has adopted the following scenarios:

Variable	2018	2019	2020
<i>GDP</i> Italy	-4.0	-4.0	-3.0
IR10Y Italy	10.0	10.0	10.0

The application of the statistical model on the weakly preemptive scenario yields to an overall increase of the expected default rate around 47% for 2018, 100% for 2019 and 152% for 2020. This is due to the fact that the global scenario is extremely negative, and the impact on the overall riskiness reflects this behaviour accordingly.

Exhibit 27 shows the impact of the weakly preemptive scenario as of the year 2018 on the considered portfolio, whose average default probability is expected to be around 10.0%:

**Exhibit 27:** Expected rating classes distribution after the application of the weakly preemptive 2018 scenario

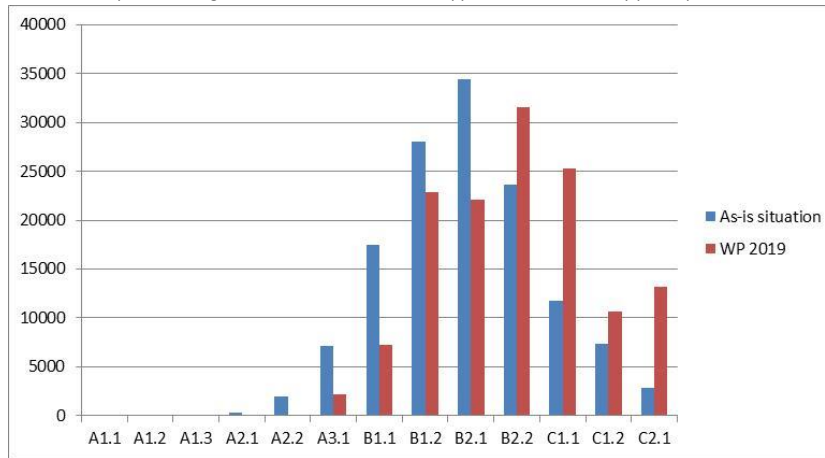


The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of around 161%, moving from 2,806 counterparties to 7,320 after the application of the stressing factor. Conversely, the rating class A2.1 is subject to a reduction of more than 90%, moving from the initial 320 to the final 21 counterparties after the stress. It is worth to note that in this scenario there are no counterparties assigned to the best rating class A1.1.

Exhibit 28 shows the impact of the weakly preemptive scenario as of the year 2019 on the considered portfolio, whose average default probability is expected to be around 13.6%:

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

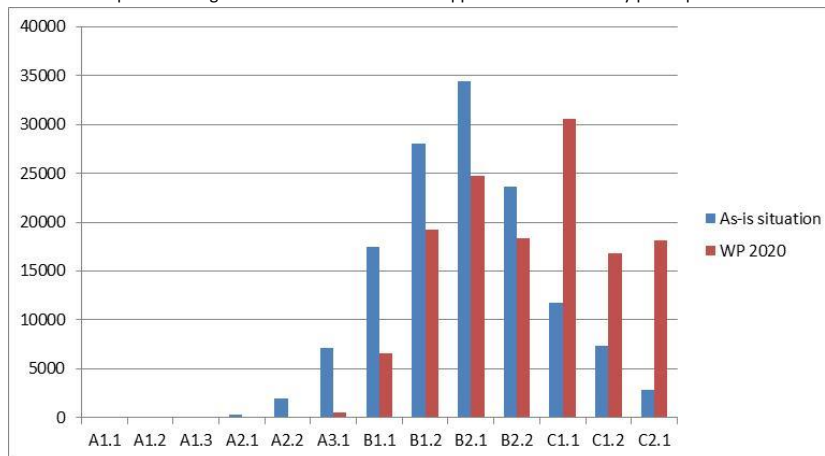
**Exhibit 28:** Expected rating classes distribution after the application of the weakly preemptive 2019 scenario



The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of around 370%, moving from 2,806 counterparties to 13,150 after the application of the stressing factor. Conversely, the rating class A2.1 is subject to a reduction of almost 100%, moving from the initial 320 to the final 3 counterparties after the stress.

Exhibit 29 shows the impact of the weakly preemptive scenario as of the year 2020 on the considered portfolio, whose average default probability is expected to be around 16.9%:

**Exhibit 29:** Expected rating classes distribution after the application of the weakly preemptive 2020 scenario



The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of almost 550%, moving from 2,806 counterparties to 18,115 after the application of the stressing factor. Conversely, the rating class A2.2 is subject to a reduction of 100%, moving from the initial 1,907 to the final 6 counterparties after the stress. It is worth to note that in this scenario there are no counterparties assigned to the two best rating classes A1.1 and A1.2.

The Agency has also assessed the impact of the negative scenario at single economic NACE/micro-sector level, projecting the individual *PD* values, on average, on the three years horizon envisaged by the selected scenario. The following table summarises such outcome:

**IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES**

NACE	Micro-sector	PD 2018	PD 2019	PD 2020
A – Agriculture, forestry and fishing	-	9.95%	13.55%	16.88%
B – Mining and quarrying	-	10.70%	14.52%	18.05%
C – Manufacturing	Automotive	8.98%	12.17%	15.12%
	Chemistry & Pharmaceuticals	6.22%	8.45%	10.51%
	Clothing	10.03%	13.59%	16.85%
	Equipment	6.88%	9.35%	11.64%
	Food, beverage and tobacco	8.85%	11.96%	14.83%
	Heavy manufacturing	7.88%	10.68%	13.25%
	Other manufacturing	8.82%	11.98%	14.90%
	Paper, packaging & forest products	8.24%	11.19%	13.90%
	ICT	7.15%	9.65%	11.96%
	Textile	7.71%	10.46%	12.98%
D – Electricity, gas, steam and air conditioning supply	-	9.90%	13.45%	16.77%
E – Water supply; sewerage; waste management and remediation activities	-	10.73%	14.54%	18.00%
F – Construction	-	12.15%	16.51%	20.53%
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	7.99%	10.87%	13.53%
	Retail	12.08%	16.40%	20.36%
	Wholesale	9.85%	13.36%	16.58%
H – Transporting and storage	-	10.70%	14.52%	18.05%
I – Accommodation and food service activities	-	14.32%	19.47%	24.20%
J – Information and communication	-	9.63%	13.09%	16.33%

The analysis shows the presence of highly risky sectors, as for instance “Retail trade”, whose probability of default is expected to reach 20% for the projected years. As far as the “Construction” sector is concerned, the probability of default is estimated to oscillate around 16% for the considered period.

Less risky sector remains “Chemistry & pharmaceuticals” with expected probability of default around 8% for the analysed timeframe.

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

### Post default restructuring scenario

The post default restructuring scenario described before denotes extremely severe signals of deterioration of the macroeconomic situation for the European market. More in detail, for the Italian market, the values for the *GDP* and the interest rate of the 10 years government bond for 2018 are subject to extreme shocks and migrate heavily from the levels experienced in the last quarters of 2017. For the following years, the *GDP* and the interest rate confirm the recession phase, reaching respectively -5.0 and 12.0 at the end of 2020.

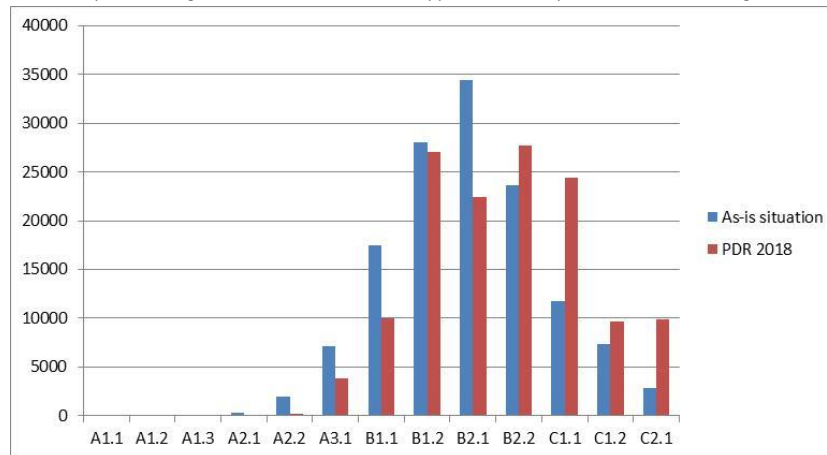
Specifically, for simulation purposes, the Agency has adopted the following scenarios:

Variable	2018	2019	2020
<i>GDP</i> Italy	-6.0	-6.0	-5.0
IR10Y Italy	12.0	12.0	12.0

The application of the statistical model on the post default restructuring scenario yields to an overall increase of the expected default rate around 62% for 2018, 133% for 2019 and 201% for 2020. This is due to the fact that the global scenario is deeply negative, and the impact on the overall riskiness reflects this behaviour accordingly.

Exhibit 30 shows the impact of the post default restructuring scenario as of the year 2018 on the considered portfolio, whose average default probability is expected to be around 11.0%:

**Exhibit 30:** Expected rating classes distribution after the application of the post default restructuring 2018 scenario

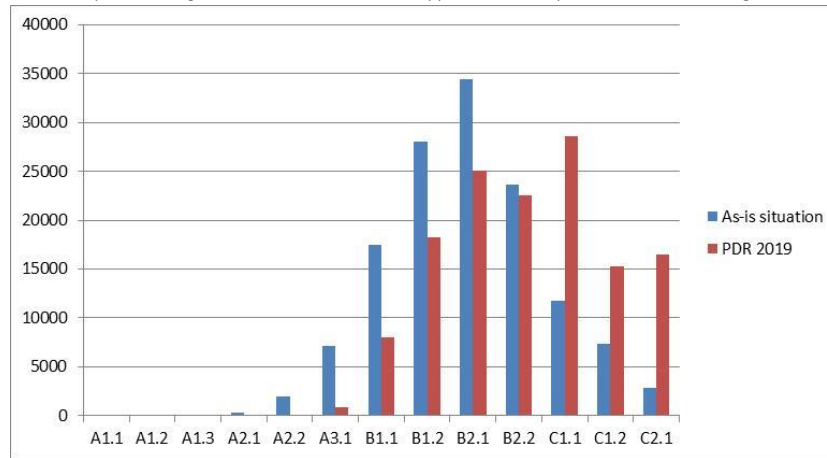


The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of around 250%, moving from 2,806 counterparties to 9,908 after the application of the stressing factor. Conversely, the rating class A1.3 is subject to a reduction of almost 100%, moving from the initial 129 to the final 4 counterparties after the stress. It is worth to note that in this scenario there are no counterparties assigned to the best rating class A1.1.

Exhibit 31 shows the impact of the post default restructuring scenario as of the year 2019 on the considered portfolio, whose average default probability is expected to be around 15.7%:

## IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES

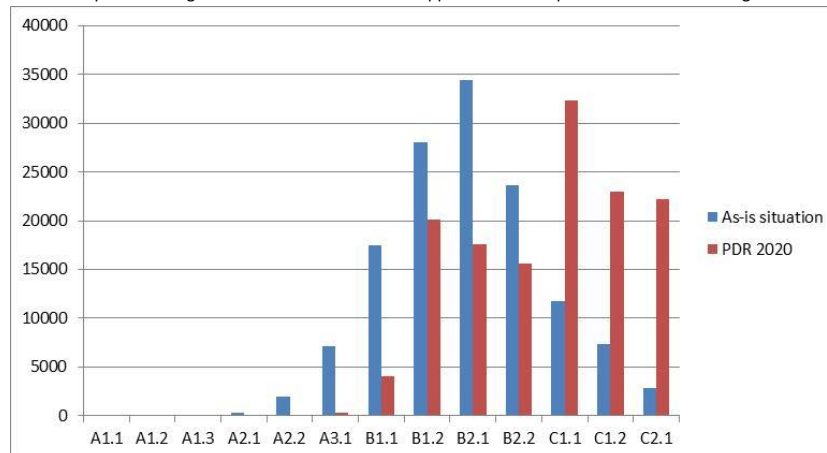
**Exhibit 31:** Expected rating classes distribution after the application of the post default restructuring 2019 scenario



The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of around 490%, moving from 2,806 counterparties to 16,456 after the application of the stressing factor. Conversely, the rating class A2.1 is subject to a reduction of almost 100%, moving from the initial 320 to the final 3 counterparties after the stress.

Exhibit 32 shows the impact of the post default restructuring scenario as of the year 2020 on the considered portfolio, whose average default probability is expected to be around 20.0%:

**Exhibit 32:** Expected rating classes distribution after the application of the post default restructuring 2020 scenario



The application of the scenario implies a global increase of the portfolio riskiness. More in detail, the rating class C2.1 gets a relative increase of almost 700%, moving from 2,806 counterparties to 22,219 after the application of the stressing factor. Conversely, the rating class A2.2 is subject to a reduction of 100%, moving from the initial 1,907 to the final 5 counterparties after the stress. It is worth to note that in this scenario there are no counterparties assigned to the best rating classes A1.1 and A1.2.

The Agency has assessed the impact of the negative scenario at single economic NACE/micro-sector level, projecting the individual *PD* values, on average, on the three years horizon envisaged by the selected scenario. The following table summarises such outcome:

**IMPACT OF ADVERSE ITALIAN MACROECONOMIC SCENARIOS ON ITALIAN NON-FINANCIAL COMPANIES**

NACE	Micro-sector	PD 2018	PD 2019	PD 2020
A – Agriculture, forestry and fishing	-	10.97%	15.69%	19.99%
B – Mining and quarrying	-	11.79%	16.77%	21.35%
C – Manufacturing	Automotive	9.89%	14.05%	17.90%
	Chemistry & Pharmaceuticals	6.86%	9.76%	12.44%
	Clothing	11.04%	15.68%	19.83%
	Equipment	7.58%	10.81%	13.75%
	Food, beverage and tobacco	9.73%	13.79%	17.47%
	Heavy manufacturing	8.67%	12.33%	15.61%
	Other manufacturing	9.72%	13.85%	17.57%
	Paper, packaging & forest products	9.08%	12.93%	16.39%
	ICT	7.86%	11.13%	14.14%
	Textile	8.49%	12.08%	15.27%
D – Electricity, gas, steam and air conditioning supply	-	10.91%	15.57%	19.89%
E – Water supply; sewerage; waste management and remediation activities	-	11.81%	16.77%	21.09%
F – Construction	-	13.38%	19.08%	24.28%
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	8.80%	12.57%	16.04%
	Retail	13.30%	18.94%	24.02%
	Wholesale	10.85%	15.42%	19.55%
H – Transporting and storage	-	11.78%	16.77%	21.36%
I – Accommodation and food service activities	-	15.78%	22.50%	28.58%
J – Information and communication	-	10.61%	15.16%	19.36%

The analysis shows the presence of highly risky sectors, as for instance “*Retail trade*”, whose probability of default is expected to reach 24% for the projected years. As far as the “*Construction*” sector is concerned, the probability of default is estimated to oscillate around 20% for the considered period.

Less risky sector like “*Chemistry & pharmaceuticals*” is expected to have a probability of default around 9% for the analysed timeframe.

## HIGHLIGHTS ON ITALIAN NON-FINANCIAL COMPANIES' KEY INDICATORS IN CASE OF ADVERSE MACROECONOMIC SCENARIOS

The Agency has also performed a dedicated analysis on the potential impact of the different scenarios on the Italian non-financial companies' EBITDA margin and Net Financial Debt/Equity ratio detailed by NACE/micro-sector, both indicators deemed relevant for a synthetic description of the financial resilience of a company.

Consistently with the previous analysis, the Agency has estimated the impact of the four scenarios mentioned before, i.e.:

- **EBA baseline** scenario;
- **EBA adverse** scenario;
- **weakly preemptive** scenario;
- **post default restructuring** scenario.

on these indicators.

The estimations have been carried out as a proxy on the financial and *PD* data available relating to the last accessible portfolio as of May 2018 containing public and private ratings issued by the Agency.

The application of the negative scenarios results in an overall decrease of the EBITDA margin and the NFD/Equity ratio, mainly due to the growth of the expected riskiness.

In particular, the main factor contributing to the EBITDA margin decrease is represented by a general reduction of the revenues across the analysed sectors leading to a market size reduction and therefore higher competitive pressure from peers.

The contraction of NFD/Equity ratio is mainly result of the contraction of company financing coming from the banking system (i.e. credit crunch). Higher interest rates will directly affect the industrial and commercial entities' profitability, hence, generally speaking, banks will perceive economic environment as excessively risky and therefore will reduce their lending activities, introducing more rigid risk assessment procedures and criteria for credit evaluations and approval. The effect of the expected decrease in companies' equity is usually less strong than the effect of the credit crunch, so an overall decrease of the ratio is expected, as already observed during the global economic crisis that started to take hold in 2008 (as described in the Agency's Outlook 2018).

The Annex shows the expected values of EBITDA margin and NFD/Equity ratio according to the four scenarios mentioned before.

### EBA baseline scenario – Impact on the EBITDA margin

After the application of the scenario, the Agency expects the following average values for the selected NACE/micro-sectors for the financial indicator EBITDA margin:

NACE	Micro-sector	EBITDA margin as-is	EBITDA margin 2018	EBITDA margin 2019	EBITDA margin 2020
A – Agriculture, forestry and fishing	-	0.05	0.05	0.05	0.05
B – Mining and quarrying	-	0.07	0.07	0.07	0.07
C – Manufacturing	Automotive	0.05	0.05	0.05	0.05
	Chemistry & Pharmaceuticals	0.07	0.07	0.07	0.07
	Clothing	0.08	0.08	0.08	0.08
	Equipment	0.09	0.09	0.10	0.10
	Food, beverage and tobacco	0.09	0.09	0.10	0.10
	Heavy manufacturing	0.06	0.06	0.06	0.06
	Other manufacturing	0.03	0.03	0.03	0.03
	Paper, packaging & forest products	0.05	0.05	0.05	0.05
	ICT	0.10	0.10	0.11	0.11
	Textile	0.08	0.08	0.08	0.08
D – Electricity, gas, steam and air conditioning supply		0.09	0.09	0.10	0.10
E – Water supply; sewerage; waste management and remediation activities	-	0.09	0.09	0.10	0.10
F – Construction		0.06	0.06	0.06	0.06
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	0.02	0.02	0.02	0.02
	Retail	0.04	0.04	0.04	0.04
	Wholesale	0.04	0.04	0.04	0.04
H – Transporting and storage		0.05	0.05	0.05	0.05
I – Accommodation and food service activities	-	0.10	0.10	0.11	0.11
J – Information and communication		0.08	0.08	0.08	0.08



### EBA baseline scenario – Impact on the NFD/Equity

After the application of the scenario, the Agency expects the following average values for the selected NACE /micro-sectors for the financial indicator NFD/Equity:

NACE	Micro-sector	NFD/Equity as-is	NFD/Equity 2018	NFD/Equity 2019	NFD/Equity 2020
A – Agriculture, forestry and fishing	-	1.27	1.34	1.36	1.37
B – Mining and quarrying	-	0.72	0.76	0.77	0.77
C – Manufacturing	Automotive	0.81	0.85	0.87	0.87
	Chemistry & Pharmaceuticals	0.67	0.71	0.72	0.72
	Clothing	1.03	1.08	1.10	1.11
	Equipment	0.65	0.68	0.70	0.70
	Food, beverage and tobacco	1.05	1.11	1.13	1.13
	Heavy manufacturing	0.79	0.83	0.85	0.85
	Other manufacturing	0.87	0.92	0.93	0.94
	Paper, packaging & forest products	0.79	0.83	0.85	0.85
	ICT	0.81	0.85	0.87	0.87
	Textile	0.77	0.81	0.83	0.83
D – Electricity, gas, steam and air conditioning supply		0.44	0.46	0.47	0.47
E – Water supply; sewerage; waste management and remediation activities	-	0.91	0.95	0.97	0.97
F – Construction		1.06	1.12	1.14	1.15
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	1.27	1.34	1.36	1.37
	Retail	0.88	0.93	0.94	0.95
	Wholesale	1.05	1.11	1.13	1.13
H – Transporting and storage		0.84	0.89	0.90	0.90
I – Accommodation and food service activities	-	0.56	0.59	0.60	0.61
J – Information and communication		0.51	0.54	0.55	0.55

### EBA adverse scenario – Impact on the EBITDA margin

After the application of the scenario, the Agency expects the following average values for the selected NACE /micro-sectors for the financial indicator EBITDA margin:

NACE	Micro-sector	EBITDA margin as-is	EBITDA margin 2018	EBITDA margin 2019	EBITDA margin 2020
A – Agriculture, forestry and fishing	-	0.05	0.04	0.04	0.03
B – Mining and quarrying	-	0.07	0.06	0.06	0.05
C – Manufacturing	Automotive	0.05	0.04	0.04	0.03
	Chemistry & Pharmaceuticals	0.07	0.06	0.06	0.05
	Clothing	0.08	0.07	0.06	0.06
	Equipment	0.09	0.08	0.07	0.07
	Food, beverage and tobacco	0.09	0.08	0.07	0.07
	Heavy manufacturing	0.06	0.05	0.05	0.04
	Other manufacturing	0.03	0.03	0.03	0.02
	Paper, packaging & forest products	0.05	0.04	0.04	0.03
	ICT	0.10	0.09	0.08	0.07
	Textile	0.08	0.07	0.06	0.06
D – Electricity, gas, steam and air conditioning supply		0.09	0.08	0.07	0.07
E – Water supply; sewerage; waste management and remediation activities	-	0.09	0.08	0.07	0.07
F – Construction		0.06	0.05	0.05	0.04
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	0.02	0.02	0.02	0.02
	Retail	0.04	0.03	0.03	0.03
	Wholesale	0.04	0.04	0.03	0.03
H – Transporting and storage		0.05	0.04	0.04	0.04
I – Accommodation and food service activities	-	0.10	0.09	0.08	0.07
J – Information and communication		0.08	0.07	0.06	0.06

### EBA adverse scenario – Impact on the NFD/Equity

After the application of the scenario, the Agency expects the following average values for the selected NACE /micro-sectors for the financial indicator NFD/Equity:

NACE	Micro-sector	NFD/Equity as-is	NFD/Equity 2018	NFD/Equity 2019	NFD/Equity 2020
A – Agriculture, forestry and fishing	-	1.27	1.19	1.05	0.94
B – Mining and quarrying	-	0.72	0.68	0.60	0.54
C – Manufacturing	Automotive	0.81	0.76	0.67	0.60
	Chemistry & Pharmaceuticals	0.67	0.63	0.56	0.50
	Clothing	1.03	0.97	0.85	0.77
	Equipment	0.65	0.61	0.54	0.48
	Food, beverage and tobacco	1.05	0.99	0.87	0.78
	Heavy manufacturing	0.79	0.74	0.65	0.59
	Other manufacturing	0.87	0.82	0.72	0.65
	Paper, packaging & forest products	0.79	0.74	0.65	0.59
	ICT	0.81	0.76	0.67	0.60
	Textile	0.77	0.72	0.64	0.57
D – Electricity, gas, steam and air conditioning supply		0.44	0.41	0.36	0.33
E – Water supply; sewerage; waste management and remediation activities	-	0.91	0.85	0.75	0.68
F – Construction		1.06	1.00	0.88	0.79
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	1.27	1.19	1.05	0.95
	Retail	0.88	0.83	0.73	0.65
	Wholesale	1.05	0.99	0.87	0.78
H – Transporting and storage		0.84	0.79	0.70	0.63
I – Accommodation and food service activities	-	0.56	0.53	0.47	0.42
J – Information and communication		0.51	0.48	0.42	0.38

### Weakly preemptive scenario – Impact on the EBITDA margin

After the application of the scenario, the Agency expects the following average values for the selected NACE /micro-sectors for the financial indicator EBITDA margin:

NACE	Micro-sector	EBITDA margin as-is	EBITDA margin 2018	EBITDA margin 2019	EBITDA margin 2020
A – Agriculture, forestry and fishing	-	0.05	0.03	0.02	0.02
B – Mining and quarrying	-	0.07	0.05	0.03	0.03
C – Manufacturing	Automotive	0.05	0.03	0.02	0.02
	Chemistry & Pharmaceuticals	0.07	0.05	0.03	0.03
	Clothing	0.08	0.05	0.04	0.03
	Equipment	0.09	0.06	0.05	0.04
	Food, beverage and tobacco	0.09	0.06	0.05	0.04
	Heavy manufacturing	0.06	0.04	0.03	0.02
	Other manufacturing	0.03	0.02	0.02	0.01
	Paper, packaging & forest products	0.05	0.03	0.02	0.02
	ICT	0.10	0.07	0.05	0.04
	Textile	0.08	0.05	0.04	0.03
D – Electricity, gas, steam and air conditioning supply		0.09	0.06	0.05	0.04
E – Water supply; sewerage; waste management and remediation activities	-	0.09	0.06	0.05	0.04
F – Construction		0.06	0.04	0.03	0.02
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	0.02	0.02	0.01	0.01
	Retail	0.04	0.02	0.02	0.01
	Wholesale	0.04	0.03	0.02	0.02
H – Transporting and storage		0.05	0.03	0.02	0.02
I – Accommodation and food service activities	-	0.10	0.07	0.05	0.04
J – Information and communication		0.08	0.05	0.04	0.03

### Weakly preemptive scenario – Impact on the NFD/Equity

After the application of the scenario, the Agency expects the following average values for the selected NACE /micro-sectors for the financial indicator NFD/Equity:

NACE	Micro-sector	NFD/Equity as-is	NFD/Equity 2018	NFD/Equity 2019	NFD/Equity 2020
A – Agriculture, forestry and fishing	-	1.27	0.86	0.63	0.51
B – Mining and quarrying	-	0.72	0.49	0.36	0.29
C – Manufacturing	Automotive	0.81	0.55	0.41	0.33
	Chemistry & Pharmaceuticals	0.67	0.46	0.34	0.27
	Clothing	1.03	0.70	0.52	0.42
	Equipment	0.65	0.44	0.33	0.26
	Food, beverage and tobacco	1.05	0.72	0.53	0.43
	Heavy manufacturing	0.79	0.54	0.40	0.32
	Other manufacturing	0.87	0.59	0.44	0.35
	Paper, packaging & forest products	0.79	0.54	0.40	0.32
	ICT	0.81	0.56	0.41	0.33
	Textile	0.77	0.52	0.39	0.31
D – Electricity, gas, steam and air conditioning supply		0.44	0.30	0.22	0.18
E – Water supply; sewerage; waste management and remediation activities	-	0.91	0.62	0.46	0.37
F – Construction		1.06	0.72	0.53	0.43
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	1.27	0.86	0.64	0.51
	Retail	0.88	0.60	0.44	0.36
	Wholesale	1.05	0.72	0.53	0.42
H – Transporting and storage		0.84	0.57	0.42	0.34
I – Accommodation and food service activities	-	0.56	0.38	0.28	0.23
J – Information and communication		0.51	0.35	0.26	0.20

### Post default restructuring scenario – Impact on the EBITDA margin

After the application of the scenario, the Agency expects the following average values for the selected NACE /micro-sectors for the financial indicator EBITDA margin:

NACE	Micro-sector	EBITDA margin as-is	EBITDA margin 2018	EBITDA margin 2019	EBITDA margin 2020
A – Agriculture, forestry and fishing	-	0.05	0.03	0.02	0.02
B – Mining and quarrying	-	0.07	0.04	0.03	0.02
C – Manufacturing	Automotive	0.05	0.03	0.02	0.02
	Chemistry & Pharmaceuticals	0.07	0.04	0.03	0.02
	Clothing	0.08	0.05	0.03	0.03
	Equipment	0.09	0.06	0.04	0.03
	Food, beverage and tobacco	0.09	0.06	0.04	0.03
	Heavy manufacturing	0.06	0.04	0.02	0.02
	Other manufacturing	0.03	0.02	0.01	0.01
	Paper, packaging & forest products	0.05	0.03	0.02	0.02
	ICT	0.10	0.06	0.04	0.03
	Textile	0.08	0.05	0.03	0.03
D – Electricity, gas, steam and air conditioning supply		0.09	0.06	0.04	0.03
E – Water supply; sewerage; waste management and remediation activities	-	0.09	0.06	0.04	0.03
F – Construction		0.06	0.04	0.02	0.02
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	0.02	0.01	0.01	0.01
	Retail	0.04	0.02	0.02	0.01
	Wholesale	0.04	0.02	0.02	0.01
H – Transporting and storage		0.05	0.03	0.02	0.02
I – Accommodation and food service activities	-	0.10	0.06	0.04	0.03
J – Information and communication		0.08	0.05	0.03	0.03

### Post default restructuring scenario – Impact on the NFD/Equity

After the application of the scenario, the Agency expects the following average values for the selected NACE /micro-sectors for the financial indicator NFD/Equity:

NACE	Micro-sector	NFD/Equity as-is	NFD/Equity 2018	NFD/Equity 2019	NFD/Equity 2020
A – Agriculture, forestry and fishing	-	1.27	0.78	0.55	0.43
B – Mining and quarrying	-	0.72	0.44	0.31	0.25
C – Manufacturing	Automotive	0.81	0.50	0.35	0.28
	Chemistry & Pharmaceuticals	0.67	0.41	0.29	0.23
	Clothing	1.03	0.64	0.45	0.36
	Equipment	0.65	0.40	0.28	0.22
	Food, beverage and tobacco	1.05	0.65	0.46	0.36
	Heavy manufacturing	0.79	0.49	0.34	0.27
	Other manufacturing	0.87	0.54	0.38	0.30
	Paper, packaging & forest products	0.79	0.49	0.34	0.27
	ICT	0.81	0.51	0.36	0.28
	Textile	0.77	0.48	0.33	0.26
D – Electricity, gas, steam and air conditioning supply		0.44	0.27	0.19	0.15
E – Water supply; sewerage; waste management and remediation activities	-	0.91	0.56	0.40	0.31
F – Construction		1.06	0.66	0.46	0.36
G – Wholesale and retail trade; repair of motor vehicles and motorcycles	Automotive	1.27	0.79	0.55	0.43
	Retail	0.88	0.54	0.38	0.30
	Wholesale	1.05	0.65	0.46	0.36
H – Transporting and storage		0.84	0.52	0.37	0.29
I – Accommodation and food service activities	-	0.56	0.35	0.24	0.19
J – Information and communication		0.51	0.31	0.22	0.17

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