The EBA EU-wide Stress Test 2016: Deciphering the black box

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Key Points

The results of the European Banking Authority's (EBA) stress test, administered to banks across the EU and published at the end of July 2016, revealed some large differences across banks. Our analysis of the results for the 51 banking groups suggests that not economic growth but rather the exposures to non-performing loans (NPLs) and to governments and corporates seem to be the main drivers behind the impact of the adverse scenario. This implies that the stress tests are primarily responding to the risks that have already materialised. They are therefore useful for understanding the implications of the currently identified risks, but they do not necessarily give insights into the fundamental soundness of the European banking sector.

Policy Recommendation

If well-executed, the stress test can be a useful tool for acquiring a better understanding of the implications of the current issues facing European banks. It does not, however, give insights into the fundamental soundness of the European banking sector, which is widely considered to be one of the main objectives of the stress test. To obtain such insights, a more intriguing exercise with a longer horizon (say, five or ten years instead of three) and multiple scenarios would be recommended.

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The results of the European Banking Authority's (EBA) latest bi-annual stress test revealed some large differences across banks. In this policy brief we analyse the results for the 51 European banking groups, with a focus on better understanding the main drivers behind the results of the test that assumed demand and financial shocks. The main findings are that not economic growth but rather the exposures to non-performing loans (NPLs) and to governments and corporates seem to be the main drivers behind the impact of the pessimistic (adverse) scenario. This implies that the stress tests are primarily responding to the risks that have already materialised and not necessarily provide insights into the fundamental soundness of the European banking sector.

Large differences across banks

Looking at the impact of the stress tests conducted by the European Banking Authority (EBA), the banks would lose 3.4%[1] of the fully-loaded common equity tier 1 (CET1) in the three-year period under the scenario. The differences are, however, large. The stress would have the largest impact on the Italian Banca Monte dei Paschi di Siena (MPS). Hence, the bank would lose 14.5% of its CET1, which is equivalent to more than three times the minimum requirement of 4.5% CET1. This poor performance was already expected given the sizeable exposures to non-performing loans (NPLs) in the bank's portfolio.[2] In turn, the adverse economic scenario would barely have an impact on the only Norwegian bank in the sample, DNB, which would lose less than 0.1% of its CET1.

The impact of the adverse scenario is also expressed in terms of leverage exposure, which is likely to be binding only in 2018. The regression analysis in Annex 1 confirms that the change in leverage exposure is almost completely explained by the impact of the adverse scenario on CET1 ratio (+), risk-weighted assets to leverage ratio (+), and change in risk-exposures (-). In the remainder of this analysis of the impact of the adverse scenario, we therefore focus exclusively on the impact expressed in fully-loaded CET1 ratio.

Adverse scenario

To fully understand the results one needs to take a closer look at the adverse scenario and the different channels ('exposures') through which this scenario impacts the profit and loss accounts, and thus ultimately capital.

The adverse scenario foresees a demand shock (foreign and domestic) as well as financial shock in the period between 2016 and 2018. The adverse scenario also includes a set of shocks to residential and commercial real estate prices, as well to foreign exchange rates in Central and Eastern Europe. The shocks are estimated to lead to an average cumulative drop in real GDP of 7.1% from the baseline. More specifically, the shocks vary between countries from 4.8% in Hungary to 14.8% in Latvia. The difference between the five largest EU countries, however, are fairly limited in both real and nominal terms. The difference between France (5.6%), Germany (6.6%), Italy (5.9%), Spain (6.7%) and the United Kingdom (6.8%) is just over one percent when considering the deviation between the baseline and adverse scenario real growth rates. The absolute cumulative growth rates are within a 1.5% range. When accounting for inflation, the GDP growth rates vary from approximately -14.6% in Greece to 4.4% in

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[1] The impact of the adverse scenario is 3.4% weighted for risk-weighted assets and 3.9% when the plain average is taken.

[2] See also De Groen (2016) for a case study on Banca Monte dei Paschi di Siena.

Hungary. The differences between the five larger European countries are substantially smaller, with less than 5%. When Germany and the UK are excluded from the sample, the difference is even less than 1%. It is worth noting that the nominal growth in Germany is with a decline of 3.7%, which is assumed to be substantially lower than that of France (-0.1%), Italy (-1.0%) and Spain (-0.4%). The limited variance and the fact that countries that are currently struggling more are less affected offer possible reasons why the economic growth has limited explanatory power when regressed on the total impact of the adverse scenario. Hence, both the real and nominal cumulative growth have a counter-intuitive insignificant positive relationship with the impact of the adverse scenario, i.e. the higher economic growth, the higher the total impact of the adverse scenario.

The 2016 stress test is thus a sort of black box in which many different shocks are jumbled together, which makes deciphering the results not necessarily straightforward. To enhance our understanding, we tried to identify the main drivers behind the total impact of the adverse scenario.

How do the projected losses arise?

Figure 1 shows the different elements of the impact of the stress tests and their contribution to the total impact of the adverse scenario. The EBA assumes that banks make on average profits of about 0.9 % of their risk-weighted assets (RWA). Over three years this amounts to a cushion worth 2.7% of RWA. Under the adverse scenario this cushion is more than offset by losses arising from a number of channel impairments, market risk, risk exposure, dividend payments and other effects. The main losses are caused by impairments (3.7%) and market risks (0.6%). Moreover, the risk-weights (risk exposure) are increasing under the scenarios, which has the effect of reducing the CET1 ratio (1.2%).

Economic growth has a significant impact on some of the components of the impact of the adverse scenario. A decidedly mixed picture arises when looking at the impact of the cumulative nominal economic growth on the five key components. The impairments and market risks are positively related to the impact of the adverse scenario and the dividends and risk exposures negatively so. All the results except for profits are significant at least at the 10% level. Moreover, the economic growth explains only about a quarter or less of the variance in the respective components.

Figure 1. Decomposed impact of the adverse scenario (CET1)
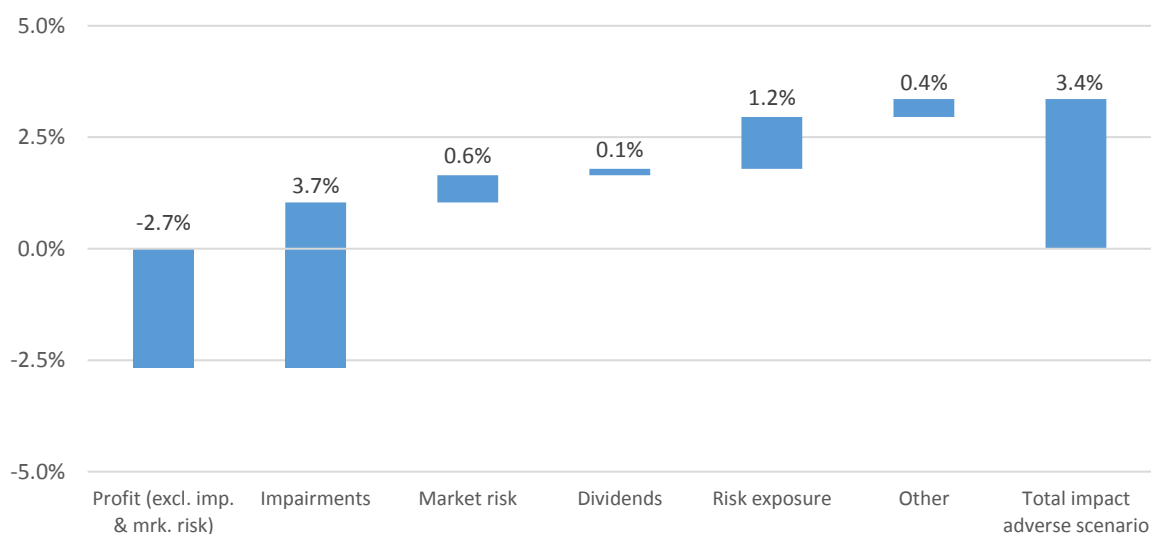
Note: The figure shows the decomposed impact of the adverse scenario on both the fully loaded CET1 (% of total risk-weighted assets). The figures are weighted based on share in risk-weighted assets. *Source*: Author's elaboration based on EBA (2016).

## Government and corporate exposures

The main drivers behind the stress test results are, however, the exposures to governments and corporates as well as non-performing exposures. To identify the main drivers of the stress test results, the main exposures have been regressed on the impact of the adverse scenario. The combined exposures to governments, institutions, corporates and retail account, on average, for more than 80% of the total exposures provided in the results of the stress test.

They results of the regressions show that the level of the government exposures best explains the impact of the adverse scenario among the four variables. Government exposures have a significantly (5% level) positive relationship with the impact of the adverse scenario, i.e. banks with relatively larger exposures to governments are more affected by the adverse scenario. The explanatory power is, with about one-tenth of the variance in the impact of the adverse scenario, relatively limited.

Turning to the results for the different components as shown in Figure 1, the results show that there is a significant (5% level) positive relation with market risks. In fact, the higher the government exposures, the higher the impact of the market risk. The latter can be explained by the stress present in the securities portfolios, in which haircuts and lower yields on government bonds are foreseen.

Moreover, exposures to corporates significantly (10% level) reduce the impact of the adverse scenario. Similar regressions for the different components of the stress test show that there is only a significant (1% level) negative relationship between exposures to corporates and market risks. Hence, the higher the corporate exposure, the lower the impact of the market risks. The exposures to institutions and retail have no significant relationship with the total impact under the adverse scenario.

Figure 2. Impact of total adverse scenario vs government exposures (lhs) and distribution of government exposures (rhs)
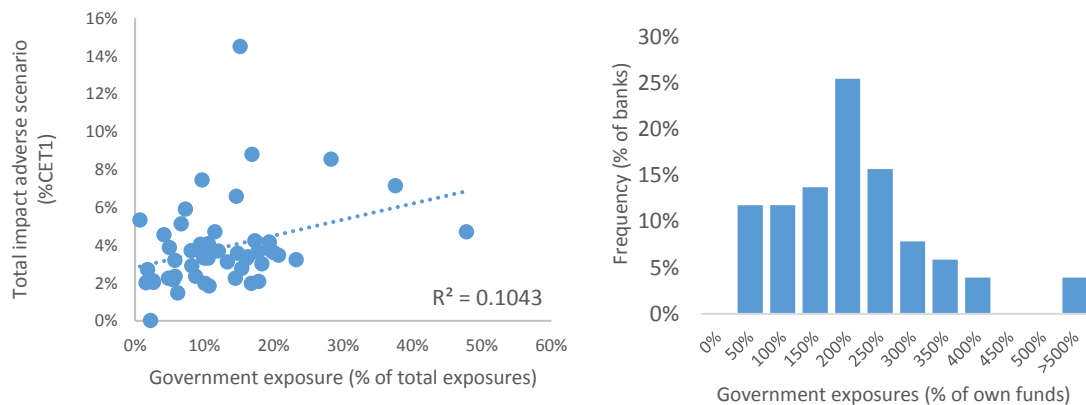
Note: Government exposures include the total exposures to central, regional and local governments. The values below the bars in the histogram (rhs) show the maximum values of each bin, which is the minimum value for the next bin. Hence, 25% of the banks had exposures to governments between 150% and 200% of the own funds at the end of 2015.

Source: Authors' elaboration based on EBA (2016).

Most European banks hold large portfolios of government debt. Figure 2 shows that for most banks the government debt portfolio is about twice the size of the total own funds. The portfolios have often low risk-weights and the diversification is limited. Hence, on average, about 60% of the government exposures is to the respective domestic governments. The share of exposures to the home government vary between 11% for the UK-based HSBC to almost 100% for the Italian Banco Popolare.

The large exposures to governments contribute to the creation of a potential so-called 'doom loop' between banks and their governments. Hence, the systemic relevant banks might need to be bailed-out in case the government fails. Although defaults are rare, the recent past has shown that it is not impossible and the potential losses can be substantial. In particular in the euro area, where several countries share the same currency and devaluation is does not a real option, there is a risk of government debt defaults as the Greek private-sector involvement (PSI) showed in 2012. In the case of the Greek PSI, the private sector agreed to take a loss of more than 50% on their debt securities. At that time it was based on a 'voluntary' agreement with creditors, but since 2013, the by-laws of all the euro-area governments include collective-action clauses which would allow the losses in the future to be imposed on the banks (De Groen, 2015; ESRB, 2015; Gros, 2013).

The government risk in the stress-test was primarily addressed by calculating the impact of a reduction in yields and haircuts that are largely similar across countries,[3] whereas in particular the concentration risk forms a potential threat to the system.

[3] For example, the haircuts on AFS/FVO sovereign exposures depend on the type of exposure, country and maturity. Looking at the total haircut for the 10-years maturity, the haircuts for the EU countries range from 6.1% for the UK to 18.3% of the market value for Greece. Haircuts for the larger countries were set at: France (7.9%), Germany (7.2%), Italy (11.7%), Spain (11.3%) and the United Kingdom (6.1%).

Non-performing exposures

Non-performing exposures seem to be the main driver behind the stress test results. The total gross non-performing debt exposures on the balance sheet as a share of total gross debt exposures have a significant (1%-level) positive relation with the total impact of the adverse scenario, i.e. the higher the non-performing exposure, the higher the expected reduction in the CET1 ratio under the adverse scenario. The non-performing exposures explain about one-fifth of the variance of the adverse scenario.

Looking at the different components, the non-performing exposures largely explain (70%) the higher impairments and to a lesser extent the lower risk-weighted exposures (22%).[4] There is also a quite strong negative correlation (-53%) between the impairments and risk exposures. In fact, when the losses on the non-performing exposures are taken into account, the risk-weights on these exposures can be reduced. The non-performing exposures also have less, but still significant impact on the assumed profitability of the banks. Even though the impairments are excluded from the profitability, higher non-performing exposures imply significantly (10%-level) lower profits.

Figure 3. Impact total adverse scenario vs non-performing exposures
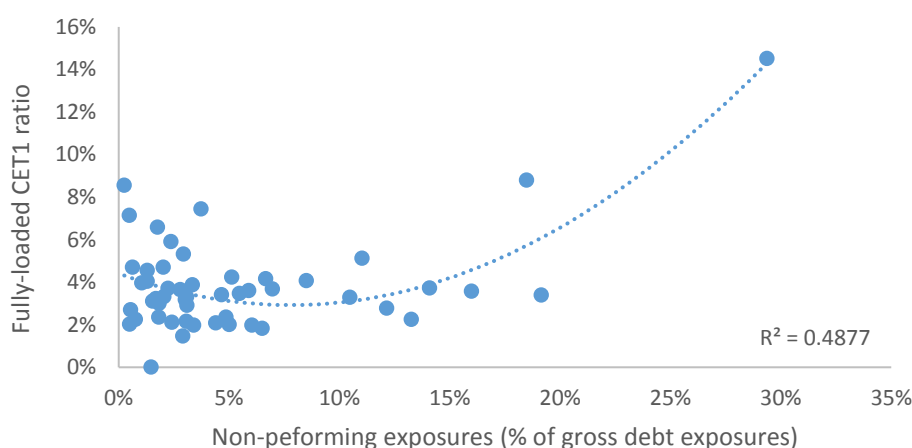
Source: Author's elaboration based on EBA (2016).

Customer loans form the largest exposures for most banks, which makes substantial losses on these exposures or so-called NPLs constitute an important threat to banking-sector. Based on the harmonised definition for NPLs by the European Banking Authority in 2013, Italy, Cyprus, Greece, Slovenia, Portugal and Ireland, are among the countries where many banks have already been resolved with the highest levels of NPLs in the EU. The variances between the countries are due to economic structure and situation, bank lending policies as well as effectiveness in nudging payments and dealing with distressed debt, but also more to structural differences in legal systems, court procedures and tax regimes (EBA, 2016). The NPLs are in particular concentrated in the loan portfolios of small- and medium-sized enterprises and to a lesser extent of households. The latter, however, often deliver fewer losses for the banks since the collateral and personal liability of households is in general less affected by failures than that of SMEs.

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[4] The results were significant at 1% level for both variables.

Exposures combined in single model

Combined, the results of the models with exposures to governments/corporates and non-performing exposures explain most of the impact of the adverse scenario. The exposure to governments and corporates are quite strongly negatively correlated. In order to avoid multicollinearity in each of the regressions, only one of the variables is included. The models with both exposures to governments or corporates and non-performing exposures explain respectively 27% and 28% of the variance in the total impact of the adverse scenario.

The impact of the non-performing exposures seem, however, not to be linear (see Figure 3), but rather take a U-shape. In particular, in banks with higher non-performing exposures the impact of the adverse scenario seems to be higher, whereas for banks with a very low level of non-performing exposures, the total impact of the adverse scenario is also higher. Hence, banks with slightly higher non-performing exposures have relatively lower adjustments in the risk-weights. To capture this observation, a square of the non-performing exposures has been included in the model. This makes the coefficient for non-performing exposures turn negative and almost doubles the explanatory power of the model, respectively, to 55% for the model with government exposures and to 56% for the model with exposures to corporates (See Annex 2).[5]

Besides these exposures, tests have also been conducted with dummies for size, risk models (standard vs IRB), business models, ownership structures and the large countries. The results suggest that these indicators have very limited impact with almost all of the dummy variables showing insignificant results. The additions had limited impact on the model with government exposures, non-performing exposures and the square of the non-performing exposures, except for the non-performing exposures that becomes less significant at the moment that country dummies for the largest countries are included.

Supervisory Review and Evaluation Process

In the previous stress tests and capital exercises, the EBA used a threshold to determine whether a bank had to raise capital or not. This time the results of the exercise for the banks that account for about 70% of the EU banking sector feed into the Supervisory Review and Evaluation Process (SREP), which the direct supervisors of the banks use to determine the add-ons to the legislative capital requirements.

Concluding remarks

On the basis of our analysis of the results for the 51 banking groups, it seems that not economic growth but rather, in particular, the exposures to non-performing loans and to governments and corporates seem to be the main drivers behind the impact of the adverse scenario.

This makes the stress test appear primarily to be designed to respond to the current supervisory concerns of large exposures to governments and stocks of NPLs, but not, for example, to longer-term issues such as enhanced competition through digitalisation, cybercrime, long-term low economic growth, etc. Thus, if well executed, the stress test can serve as a useful tool for acquiring a better understanding of the implications of the current

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[5] All the variables are significant at the 1% level, except for the government exposures, which are significant at the 5% level

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issues. It does not, however, provide insights into the fundamental soundness of the European banking sector, which is widely considered to be one of the main objectives of the stress test.

To obtain better insights on the soundness of the European banking sector, a more intriguing exercise with a longer time horizon (e.g. five or ten years instead of three years) and multiple scenarios would be recommended. Hence, as the results of the stress test and previous analyses have shown, the European banking groups are diverse and respond differently to various kinds of risks (Ayadi et al., 2016). Moreover, the assessment of the previous cases of bank failures showed that even after three years, many of the resolved banks are still experiencing substantial losses (De Groen & Gros, 2015).

References

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ESRB (2015), ESRB report on the regulatory treatment of sovereign exposures, European Systemic Risk Board, Frankfurt (www.esrb.europa.eu/pub/pdf/other/esrbreportregulatorytreatmentsovereignexposures032015.en.pdf).

Gros, D. (2013), "The self-serving regulatory treatment of sovereign debt in the euro area", CEPS Policy Brief No. 289, CEPS, Brussels (www.ceps.eu/publications/banking-union-sovereign-virus-self-serving-regulatory-treatment-sovereign-debt-euro).

Annex 1. Explaining the impact of the adverse scenario (% of leverage exposures)

Most of the attention in the media has focused on the results concerning capital relative to risk-weighted assets (CET). But the EBA has also provided the impact expressed in terms of the leverage ratio. This ratio is currently only monitored, but is expected to become binding in 2018. The threshold is expected to become 3% of own funds, as a share of total exposures. Looking at the impact, the leverage ratio would drop, on average, 0.8% in the period from 2016 to 2018 under the adverse scenario. Italy's Banca Monte dei Paschi di Siena (MPS) is also the worst performer in terms of the fully-loaded leverage exposures with a loss in capital of 5.8%, while Sweden's Skandinaviska Enskilda Banken would be able to improve the leverage ratio despite the lower-than-expected economic growth. In total, seven out of the 51 banking groups in the exercise would not have sufficient capital to meet the minimum threshold.[6]

Table A1. OLS-regression results explaining the impact of the adverse scenario (% of leverage exposures)

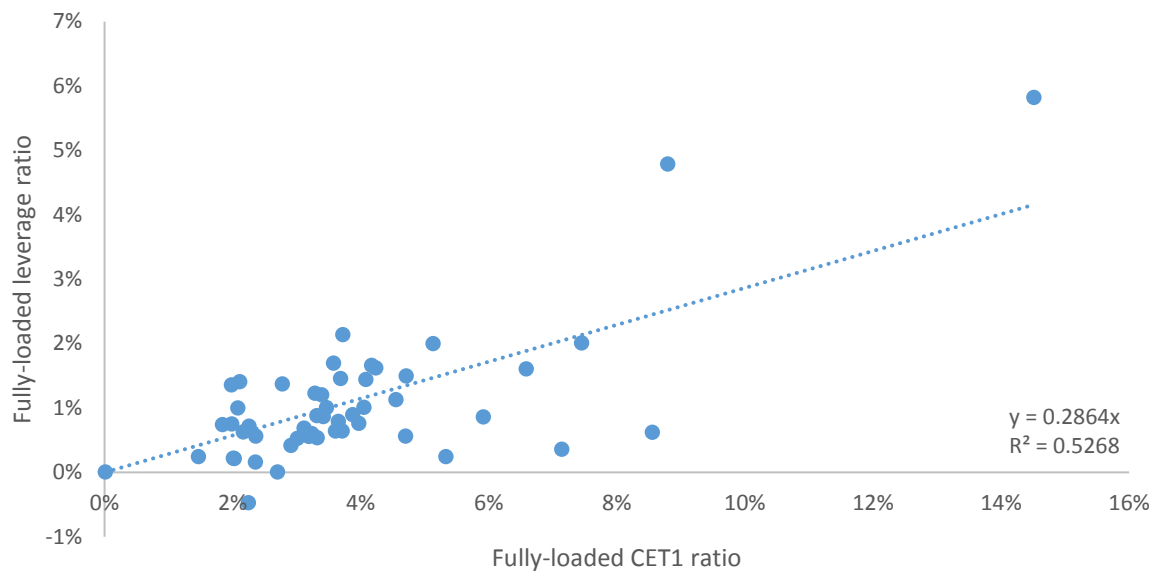|	Impact adverse scenario (% of leverage exposures)
	1
Impact adverse scenario (% of RWA)	0.402***
	0.0188
Risk-weighted assets to total leverage exposures	0.023***
	0.004
Change of risk-weighted assets in adverse scenario (% of RWA)	-0.366***
	0.044
Constant	-0.009***
	0.002
Observations	51
R-squared	0.924
Adj. R-squared	0.919
F statistic	190.37

Source: Author's elaboration based on EBA (2016).

The large difference between the CET1 and leverage ratios is primarily due to the difference between the denominators of the ratios, risk-weighted assets and leverage exposure, respectively. The risk-weighted assets are on average 36% of the leverage ratio, but vary between 9% for the Dutch communal financer Bank Nederlandse Gemeenten and 95% of the German car-financer Volkswagen Financial Services.

The change in leverage exposure is almost completely explained by the impact of the adverse scenario on CET1 (+), risk-weighted assets to leverage ratio (+) and the change in risk-exposures (-). Hence, a simple regression with these three indicators explains 92% of all the variance (see Table A1). All the variables are significant at 1% level.

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[6] The following seven banking groups have a fully-loaded leverage ratio below 3% in the adverse scenario: ABN AMRO Group (NL), Banca Monte dei Paschi di Siena (IT), Bank Nederlandse Gemeenten (NL), Bayerische Landesbank (DE), Deutsche Bank (DE), Norddeutsche Landesbank Girozentrale (DE) and Société Générale (FR).

Figure A1. Distribution of the impact of the adverse scenario (CET1 vs leverage)

Note: The figure shows the impact of the adverse scenario on both the fully loaded CET1 (% of risk-weighted assets) and leverage ratio (% of leverage exposures).
Source: Author's elaboration based on EBA (2016).

Annex 2. Explaining the impact of the adverse scenario (% of risk-weighted assets)

Table A1. OLS-regression results explaining the impact of the adverse scenario

	Impact adverse scenario (% of RWA)											
	2	3	4	5	6	7	8	9	10	11	12	13
Exposure to governments	0.085**							0.073**	0.067**			0.041
	-0.035							-0.032	-0.026			0.029
Exposure to institutions		0.029										
		-0.039										
Exposure to corporates			-0.057*							-0.061**	-0.058***	-0.042*
			-0.029							-0.026	-0.02	0.023
Exposure to retail				-0.03								
				-0.021								
Nominal GDP growth					0.073							
					-0.098							
Nominal GDP growth						0.118						
						-0.167						
Non-performing exposures							0.175***	0.163***	-0.380***	0.179***	-0.370***	-0.372***
							-0.051	-0.049	-0.107	-0.049	-0.106	0.105
Non-perf. exp. squared									2.392***		2.413***	2.391***
									-0.44		-0.434	0.430
Constant	0.028***	0.036***	0.057***	0.047***	0.042***	0.042***	0.029***	0.021***	0.036***	0.048***	0.062***	0.052***
	-0.005	-0.005	-0.01	-0.007	-0.004	-0.005	-0.004	-0.005	-0.005	-0.009	-0.007	0.010
Observations	51	51	51	51	50	50	51	51	51	51	51	51
R-squared	0.104	0.0113	0.073	0.0377	0.0115	0.01	0.194	0.271	0.552	0.277	0.564	0.582
Adj. R-squared	0.0861	-0.00892	0.0542	0.0181	-0.00913	-0.0103	0.178	0.241	0.524	0.247	0.536	0.546
F statistic	5.708	0.558	3.865	1.921	0.557	0.5	11.83	8.933	19.340	9.191	20.230	16.010

Source: Author's elaboration based on EBA (2016).

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Table A2. OLS-regression results explaining the components of the adverse scenario

	Profits (% of RWA) (excl. impairments and market risks)				Impairments (% of RWA)				Market risks (% of RWA)			
	14	15	16	17	18	19	20	21	22	23	24	25
Exposure to Governments	0.058				0.001				0.054**			
	-0.035				-0.034				-0.022			
Exposure to corporates		0.001				0.000				-0.047***		
		-0.029				-0.027				-0.018		
Nominal GDP Growth			-0.058				0.330***				0.114*	
			-0.097				-0.079				-0.061	
Non-performing exposures				-0.101*				0.301***				0.026
				-0.052				-0.029				-0.035
Constant	-0.036***	-0.029***	-0.031***	-0.024***	0.038***	0.038***	0.047***	0.022***	0.003	0.024***	0.013***	0.008***
	-0.005	-0.01	-0.004	-0.004	-0.005	-0.009	-0.003	-0.002	-0.003	-0.006	-0.003	-0.003
Observations	51	51	50	51	51	51	50	51	51	51	50	51
R-squared	0.053	1.78E-05	0.00728	0.0707	0	1.14E-08	0.266	0.695	0.111	0.131	0.0682	0.011
Adj. R-squared	0.0341	-0.0204	-0.0134	0.0517	-0.0204	-0.0204	0.251	0.688	0.0933	0.113	0.0487	-0.00917
F statistic	2.764	0.000873	0.352	3.727	0.00153	5.58E-07	17.43	111.4	6.143	7.354	3.511	0.545

	Dividends (% of RWA)				Risk exposures (% of RWA)			
	26	27	28	29	30	31	32	33
Exposure to Governments	-0.027*				0.020			
	-0.016				-0.019			
Exposure to corporates		-0.002				-0.015		
		-0.013				-0.015		
Nominal GDP Growth			-0.149***				-0.157***	
			-0.039				-0.046	
Non-performing exposures				-0.032				-0.094***
				-0.024				-0.025
Constant	0.006**	0.003	-0.001	0.004**	0.011***	0.018***	0.010***	0.019***
	-0.002	-0.004	-0.002	-0.002	-0.003	-0.005	-0.002	-0.002
Observations	51	51	50	51	51	51	50	51
R-squared	0.0545	0	0.235	0.035	0.022	0.019	0.199	0.217
Adj. R-squared	0.0352	-0.0201	0.22	0.015	0.00205	-0.00057	0.182	0.201
F statistic	2.823	0.0172	14.78	1.770	1.103	0.971	11.93	13.62

Note: Asterisks indicate the significance levels at 1% (***), 5% (**) and 10% (*) respectively.
Source: Author's elaboration based on EBA (2016).

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