

9. MARKET RISK

The trading book is composed of positions held with the purpose of obtaining short-term gains, via sales or revaluations. These positions are actively managed and rigorously and frequently evaluated.

In a letter dated 30 April 2009, Banco de Portugal authorised the Group to use the internal models approach to compute own funds requirements in terms of generic market risk of the trading book.

This authorisation encompassed all the sub-portfolios of the trading book that are part of the perimeter that is centrally managed from Portugal, which includes all the trading operations related with financial markets and products, namely those carried out by Banco Comercial Português, S.A..

Thus, as at 31 December 2017 and 2016, own funds requirements for generic market risks of the Group's trading book were calculated in accordance with the internal models approach for generic risk, within the universe of entities centrally managed from Portugal. For the remaining entities, the own funds requirements were calculated in accordance with the standardised approach.

MARKET RISKS	
Generic risk over debt instruments and equity securities	Internal Model
FX risk	Internal Model
Commodities risk and specific risk over debt instruments and equity securities	Standardised Approach

For specific risk, the bank does not use an internal model. Also, the Bank does not have a correlation trading portfolio (CPT). Hence, incremental risk capital charges, migration risk or specific risk measurement for the CTP do not apply.

The RWA and own funds requirements for market risks, as at 31st of December 2017 and calculated through the Standardised Approach are shown in the following table .

TABLE 56 – TEMPLATE MR1 - MARKET RISK UNDER THE STANDARDISED APPROACH

(Thousand euros)

	RWA	Capital requirements
OUTRIGHT PRODUCTS		
Interest rate risk (general and specific)	18,902	1,512
Equity risk (general and specific)	4,883	391
Foreign exchange risk	334,188	26,735
Commodity risk	245	20
OPTIONS		
Simplified approach	633,773	50,702
Delta-plus method		
Scenario approach		
SECURITISATION (SPECIFIC RISK)		
TOTAL	991,992	79,359

9.1. CALCULATION METHODOLOGIES

The calculation of own funds requirements for generic market risk, via the standardised approach, was based on the following methodologies, according to the specific type of financial instrument:

- Debt instruments: in this portfolio, own funds requirements for generic market risk were calculated in accordance with the duration-based approach, as defined by article 340, Section 2, Chapter 2, Title IV, Part III of the CRR. These positions have been treated in accordance to the provisions of Section 1 of the same chapter.
- Capital instruments: for this portfolio, own funds requirements for generic market risk were calculated in accordance with the methodology described in Section 3, Chapter 2, Title IV, Part III of the CRR.

In addition, for the application purposes of the internal models approach, the Group applies a VaR methodology to measure generic market risk – including interest rate risk, foreign exchange risk and equity risk – for all sub-portfolios covered by the previously mentioned authorisation for internal modelling.

The valuation procedures are established in terms of the potential negative impact of market conditions, in both normal and stressful circumstances, on the trading book of the Group's business units.

As already mentioned, with respect to risk measurement models used in the Group, the Bank is authorized to use the internal models approach in assessing the generic market risk capital requirements of the trading sub-portfolios that are part of Portugal's centrally managed perimeter (by Banco Comercial Portugues, SA). All trading transactions related to markets and financial products are considered in this perimeter. The transactions carried out by Banco Comercial Português, S.A. account for approximately 64% of the total market risks of the Group's trading portfolio.

The methodology used to measure market risk is the Value-at-Risk (VaR), which indicates the maximum losses that can occur in the portfolios, with a certain level of confidence and time horizon. The VaR calculation is based on the analytical approach defined in the methodology developed by RiskMetrics, and is calculated considering a time horizon of ten business days and a significance level of 99%.

This methodology is widely used in the market and has the advantage of summarizing, in a single metric, the inherent risks of the trading activity, taking into account the relationships between all of them, providing an estimate of the trading book losses as a result of changes in the stock markets' prices, interest rates, FX rates and commodities' prices. In addition, for some positions, other risks are considered, such as credit spreads' risk, base risk, volatility risk and correlation risk.

The daily VaR is determined by calculating the impact, on the current value of the portfolio, of the historical changes of last years' risk factors, with a daily update of the observation window. As of December 31, 2017, the Bank did not apply any weighting system to the seniority of historical variations. The holding period is modelled through multiplying the 1-day VaR by the square root of 10.

In accordance with the implemented methodology, the Bank carries out a total revaluation, using the logarithmic returns of the risk factors; for interest rates, the logarithmic returns of the discount factors are used.

As a complement, other metrics are used for the remaining types of risk, namely, a non-linear risk measure that incorporates the options' risk not covered in the VaR model, with a confidence interval of 99%, and a measure defined by the standard methodology in the VaR model for commodities' risk. These measures are integrated into the market risk indicator with the conservative assumption of perfect correlation between the different types of risk (worst-case scenario).

In what concerns the capital requirements calculation, the VaR amount measured is increased by the amount measured for SVaR (stressed VaR). For both the VaR and the SVaR, pursuant to Article 366 of the CRR, a regulatory multiplier is additionally applied.

The SVaR calculation process consists of calculating historical VaR, with a confidence interval of 99%, based on the daily variations of market prices during a stress period of 12 consecutive months. The analysis to define the stress period is carried out weekly, and may lead to a review of the period to be considered as the one that maximizes the VaR of the portfolio at the time of analysis. As of December 31, 2017, the stress period considered was between 16/04/2011 and 16/04/2012.

The SVaR calculation is based on the same methodology and structure used for the VaR, the only difference being the historical period used. Regarding the process of determining the holding period, this also results from multiplying the 1-day VaR by the square root of 10.

Table 57 shows the main VaR and SVaR statistics, calculated in accordance to the approved internal model methods, exclusively for the universe of entities managed centrally from Portugal, in 2017:

TABLE 57 – TEMPLATE EU MR3 – IMA VALUES FOR TRADING PORTFOLIOS

(Thousand euros)

VaR (10 day 99%)	
Maximum value	5,858
Average value	3,065
Minimum value	975
Period end	2,666
SVaR (10 day 99%)	
Maximum value	10,073
Average value	7,411
Minimum value	4,488
Period end	4,794
IRC (99,9%)	
Maximum value	
Average value	
Minimum value	
Period end	
COMPREHENSIVE RISK CAPITAL CHARGE (99.9%)	
Maximum value	
Average value	
Minimum value	
Period end	

Own funds requirements for specific market risk continued to be calculated in accordance with the standardised approach, including those of the sub-trading books regarding which Banco de Portugal authorised the use of the internal models approach to calculate the generic market risk, as previously mentioned.

These requirements were determined, for all the positions of the Group's trading book, pursuant to Sub-Section 1, Section 2, Chapter 2, Title IV, Part III and article 342 of Section 3, Chapter 2, Title IV, Part III of the CRR, according to the type of financial instruments at stake (debt instruments or capital instruments, respectively).

The 2017 average for the stressed VaR of the Trading Book positions amounted to € 7.84 M. Regarding the stressed VaR as at 31st of December 2017, the amount measured was of € 4.75 M.

9.2. STRESS TESTS ON THE TRADING BOOK

Besides calculating the VaR, and aiming at identifying the concentration of risks not captured by that metric and to assess other possible losses, the Group continually tests a wide set of stress scenarios on the trading book, analysing the results of those stress tests.

Table 58 summarises the results of these tests on the Group's global trading book on 31 December 2017, indicating that the exposure to the various risk factors is limited and that the main risk to take into account, under the standard scenarios tested, is an increase in interest rates, especially when accompanied by an increase in the slope of the yield curve.

TABLE 58 - STRESS TESTS OVER THE TRADING BOOK

		(Thousand euros)	
Standard tested scenarios with reference to 31 December 2017		Negative results scenarios	Result
Parallel shift of the yield curve by +/- 100 bp		+ 100 bp	-11.0
Change in the slope of the yield curve (for maturities from 2 to 10 years) by +/- 25 bp		+ 25 bp	-2.2
4 possible combinations of the previous 2 scenarios		+ 100 bp and + 25 bp	-13.0
		+ 100 bp and - 25 bp	-9.0
Variation in the main stock market indices by +/- 30%		+30%	-0.2
Variation in foreign exchange rates (against the euro) by +/- 10% for the main currencies and by +/- 25% for other currencies		-10%, -25%	-6.5
Variation in the swap spreads by +/- 20 bp		- 20 bp	-1.2
Non-standard tested scenarios with reference to 31 December 2017		Negative results scenarios	Result
Widening/Narrowing of the Bid-Ask Spread		Widening	-7.3
Customised scenario ⁽¹⁾			1.7
Historical scenarios ⁽²⁾		06/10/2008	-0.9
		12/09/2011	1.1

⁽¹⁾ The main historical risk factors (within a 3 year horizon) are applied as a simulation over the current portfolio, so that the potential impacts of those factors are measured.

⁽²⁾ In these scenarios, past crises market changes are applied over the current portfolio.

9.3. BACKTESTING THE INTERNAL MODELS APPROACH

The Group carries out backtests of the internal models approach results, in relation to the theoretical results obtained by the target portfolio of the calculation, unchanged between two consecutive working days and revaluated at market prices of the second day. In parallel, the Group has a complementary process to verify the results of the model in relation to the actual results obtained, excluding the effects of operations carried out via intermediation.

The evaluation of the financial assets and liabilities included in the trading book is carried out by a unit that is totally independent from the negotiation of those assets, and the control of the evaluations was assured, in 2017, by the Models Monitoring and Validation Unit. The evaluation and control procedures are documented in the Group's internal regulations. The segregation between position-taking and position-evaluation duties is also contemplated at the level of information technology systems that intervene in the global process involving the management, evaluation, settlement and accounting of operations.

In what concerns the ex-post verification of the model's results, the number of excesses registered in 2016 and 2017, relative to the global trading book of companies centrally managed from Portugal, for which Banco de Portugal has approved the use of the internal models approach to compute generic risk capital requirements, is shown in Table 59.

TABLE 59 - BACKTESTING OF THE VAR APPROACH APPLIED IN MARKET RISK CALCULATION

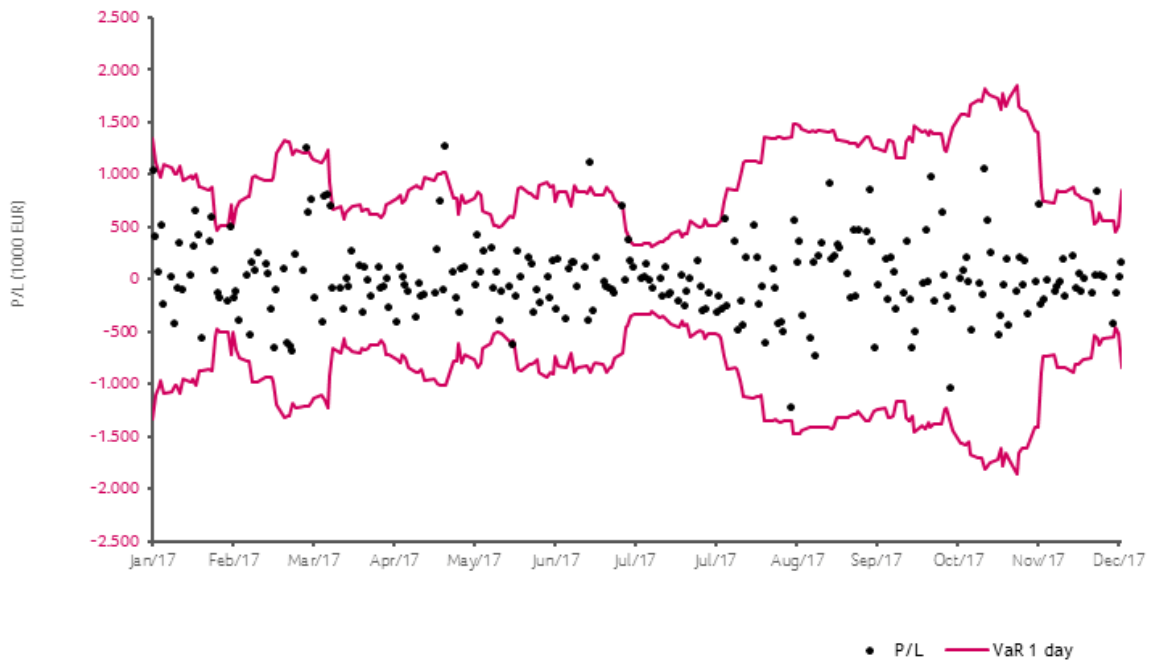
Year	Result	
	Positive	Negative
2016	1	5
2017	4	1

Note: The model used for the purpose of a posteriori verification is focused on the excesses occurred in both sides of the distribution and the expected number of excesses, according to the significance level applied, is 5 per year (2% x 250 annual observations).

The adequacy of the model used to estimate generic risk is monitored on a daily basis by the backtesting process that compares the risk values computed on a given day (VaR) with the (theoretical) result of applying the following day's market rates to those exposures.

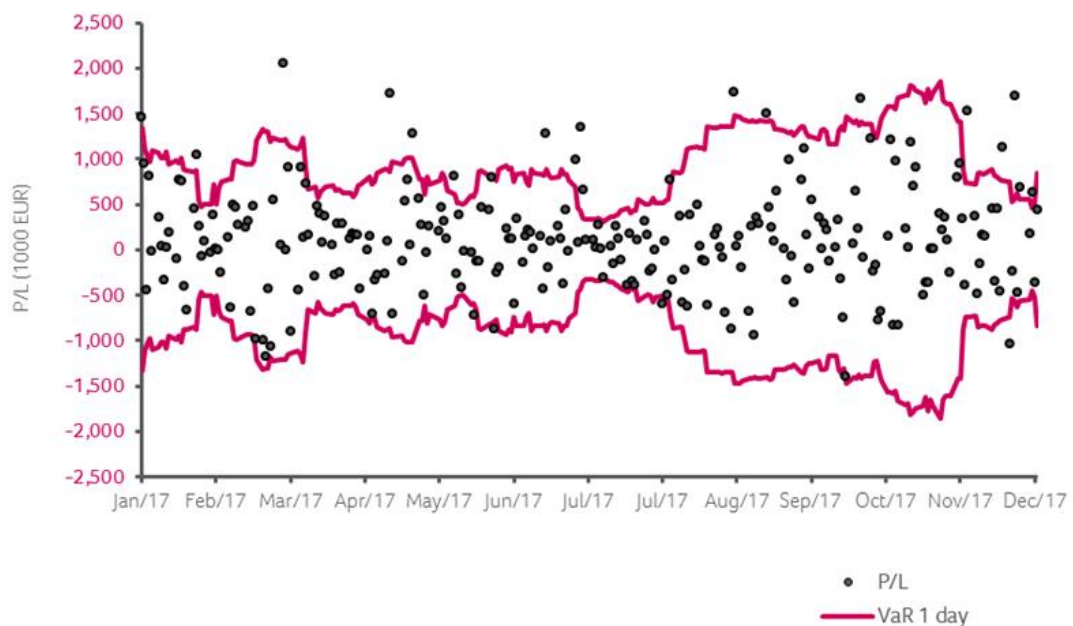
The following charts show the results of the hypothetical and real backtesting, for the trading book centrally managed from Portugal, in 2017.

GRAPH 1 – HYPOTHETICAL VAR BACKTESTING (TRADING BOOK)



As illustrated by Graph 1, there were five excesses in 2017 (four positive and one negative) over the hypothetical results of the model, representing a frequency of 1.95% in 257 daily observations. This result is aligned with the theoretical amount expected for bilateral excesses; hence, the model is considered to be adequate.

GRAPH 2 – REAL VAR BACKTESTING (TRADING BOOK)



In addition, Table 60 presents the detailed results of the daily backtesting of the trading book centrally managed from Portugal in 2017. An excess occurs when the return registered for the portfolio is higher (in absolute value) than the theoretical result of the VaR model:

TABLE 60 - HYPOTHETICAL BACKTEST OF THE TRADING BOOK (PORTUGAL) – 2017

(Thousand euros)

Date	VaR	Hypothetical result	Date	VaR	Hypothetical result	Date	VaR	Hypothetical result
02/01/2017	1,337	1,044	06/03/2017	1,110	-401	10/05/2017	512	68
03/01/2017	1,112	403	07/03/2017	1,153	803	11/05/2017	497	-388
04/01/2017	1,027	65	08/03/2017	1,232	805	12/05/2017	515	-112
05/01/2017	971	525	09/03/2017	925	698	15/05/2017	599	-61
06/01/2017	1,094	-236	10/03/2017	663	-83	16/05/2017	589	-619
09/01/2017	1,068	22	13/03/2017	701	-86	17/05/2017	657	-156
10/01/2017	1,011	-420	14/03/2017	572	-275	18/05/2017	863	273
11/01/2017	1,010	-80	15/03/2017	642	18	19/05/2017	876	26
12/01/2017	1,087	355	16/03/2017	666	-62	22/05/2017	819	206
13/01/2017	949	-104	17/03/2017	697	277	23/05/2017	813	152
16/01/2017	990	43	20/03/2017	710	140	24/05/2017	793	-312
17/01/2017	951	314	21/03/2017	653	-313	25/05/2017	766	-92
18/01/2017	1,011	662	22/03/2017	671	124	26/05/2017	893	-225
19/01/2017	881	431	23/03/2017	658	-5	29/05/2017	933	20
20/01/2017	876	-565	24/03/2017	623	-158	30/05/2017	884	-176
23/01/2017	855	368	27/03/2017	623	124	31/05/2017	901	174
24/01/2017	876	591	28/03/2017	587	-87	01/06/2017	743	-289
25/01/2017	546	84	29/03/2017	629	-72	02/06/2017	833	198
26/01/2017	468	-123	30/03/2017	714	16	05/06/2017	840	-372
27/01/2017	505	-173	31/03/2017	721	-267	06/06/2017	744	98
30/01/2017	506	-197	03/04/2017	771	-407	07/06/2017	703	162
31/01/2017	716	509	04/04/2017	804	118	08/06/2017	891	163
01/02/2017	506	-181	05/04/2017	725	31	09/06/2017	841	-74
02/02/2017	674	-119	06/04/2017	756	-58	12/06/2017	835	126
03/02/2017	745	-388	07/04/2017	846	-110	13/06/2017	822	-388
06/02/2017	783	40	10/04/2017	889	-353	14/06/2017	888	1,120
07/02/2017	784	-527	11/04/2017	884	-33	15/06/2017	818	-290
08/02/2017	976	169	12/04/2017	858	-162	16/06/2017	797	218
09/02/2017	982	92	13/04/2017	965	-141	19/06/2017	810	-25
10/02/2017	975	258	17/04/2017	948	-135	20/06/2017	886	-60
13/02/2017	940	142	18/04/2017	999	291	21/06/2017	838	-82
14/02/2017	938	55	19/04/2017	1,010	754	22/06/2017	836	-94
15/02/2017	940	-275	20/04/2017	1,016	-96	23/06/2017	756	-122
16/02/2017	978	-646	21/04/2017	1,016	1,270	26/06/2017	699	696
17/02/2017	1,204	-96	24/04/2017	779	67	27/06/2017	465	0
20/02/2017	1,323	110	25/04/2017	778	-176	28/06/2017	437	378
21/02/2017	1,305	-608	26/04/2017	617	-313	29/06/2017	353	180
22/02/2017	1,306	-632	27/04/2017	804	107	30/06/2017	330	116
23/02/2017	1,189	-681	28/04/2017	719	119	03/07/2017	331	12
24/02/2017	1,229	239	02/05/2017	768	-48	04/07/2017	341	31
27/02/2017	1,207	81	03/05/2017	841	426	05/07/2017	343	143
28/02/2017	1,205	1,258	04/05/2017	796	74	06/07/2017	340	-11
01/03/2017	1,212	639	05/05/2017	652	274	07/07/2017	308	-76
02/03/2017	1,160	767	08/05/2017	618	303	10/07/2017	359	14
03/03/2017	1,139	-169	09/05/2017	517	-76	11/07/2017	358	-153

(Continues)

(Continuation)

Date	VaR	Hypothetical result	Date	VaR	Hypothetical result	Date	VaR	Hypothetical result
12/07/2017	381	124	13/09/2017	1,413	230	15/11/2017	1,776	-49
13/07/2017	391	-143	14/09/2017	1,325	333	16/11/2017	1,653	197
14/07/2017	427	-134	15/09/2017	1,322	309	17/11/2017	1,723	-439
17/07/2017	462	-198	18/09/2017	1,314	55	20/11/2017	1,852	-113
18/07/2017	403	48	19/09/2017	1,303	-170	21/11/2017	1,652	205
19/07/2017	437	-247	20/09/2017	1,289	467	22/11/2017	1,614	-57
20/07/2017	433	-120	21/09/2017	1,294	-153	23/11/2017	1,607	175
21/07/2017	557	16	22/09/2017	1,262	467	24/11/2017	1,608	-324
24/07/2017	507	185	25/09/2017	1,351	463	27/11/2017	1,412	-18
25/07/2017	495	-71	26/09/2017	1,357	855	28/11/2017	1,411	727
26/07/2017	512	-301	27/09/2017	1,283	372	29/11/2017	884	-240
27/07/2017	572	-281	28/09/2017	1,251	-651	30/11/2017	742	-182
28/07/2017	516	-134	29/09/2017	1,247	-49	01/12/2017	737	-12
31/07/2017	513	-315	02/10/2017	1,224	200	04/12/2017	727	-109
01/08/2017	543	-154	03/10/2017	1,320	-189	05/12/2017	850	-63
02/08/2017	560	-283	04/10/2017	1,323	206	06/12/2017	840	-18
03/08/2017	734	576	05/10/2017	1,307	74	07/12/2017	838	193
04/08/2017	858	-256	06/10/2017	1,164	-280	08/12/2017	840	-159
07/08/2017	850	363	09/10/2017	1,164	-122	11/12/2017	883	234
08/08/2017	857	-480	10/10/2017	1,314	365	12/12/2017	818	-76
09/08/2017	971	-198	11/10/2017	1,358	-191	13/12/2017	808	63
10/08/2017	1,114	-432	12/10/2017	1,309	-658	14/12/2017	775	-117
11/08/2017	1,126	216	13/10/2017	1,465	-495	15/12/2017	768	8
14/08/2017	1,132	513	16/10/2017	1,397	-41	18/12/2017	744	-127
15/08/2017	1,124	210	17/10/2017	1,423	471	19/12/2017	531	44
16/08/2017	1,116	-241	18/10/2017	1,372	-17	20/12/2017	560	835
17/08/2017	1,107	-63	19/10/2017	1,414	977	21/12/2017	627	34
18/08/2017	1,353	-609	20/10/2017	1,386	-209	22/12/2017	563	19
21/08/2017	1,346	100	23/10/2017	1,386	647	26/12/2017	550	-424
22/08/2017	1,342	-77	24/10/2017	1,237	41	27/12/2017	454	-124
23/08/2017	1,351	-415	25/10/2017	1,226	-152	28/12/2017	514	25
24/08/2017	1,363	-407	26/10/2017	1,341	-1,042	29/12/2017	843	171
25/08/2017	1,350	-495	27/10/2017	1,447	-279			
28/08/2017	1,352	-1,226	30/10/2017	1,574	6			
29/08/2017	1,474	558	31/10/2017	1,571	82			
30/08/2017	1,473	159	01/11/2017	1,579	208			
31/08/2017	1,473	361	02/11/2017	1,555	-27			

01/09/2017	1,437	-341	03/11/2017	1,671	-483
04/09/2017	1,417	-558	06/11/2017	1,705	-33
05/09/2017	1,420	164	07/11/2017	1,699	-149
06/09/2017	1,406	-724	08/11/2017	1,817	1,062
07/09/2017	1,412	220	09/11/2017	1,792	558
08/09/2017	1,421	346	10/11/2017	1,753	255
11/09/2017	1,408	919	13/11/2017	1,721	-528
12/09/2017	1,424	202	14/11/2017	1,617	-345

⁽¹⁾ Decrease of 6 b.p. in the interest rates of 7/9-years-term German bonds and depreciation of the kwanza of 0.7%.

Note: VaR for 10 days with 99% unilateral confidence level; hypothetical result obtained by an ex-post validation procedure over the VaR model (daily result scaled for 10 days divided by the square root of time).

TABLE 61 – TEMPLATE EU MR2-A – MARKET RISK UNDER THE IMA

	RWA	Capital requirements
(Thousand euros)		
VaR (higher of values a) and b))	214,869	17,190
a) Previous day's VaR (Article 365(1) of the CRR (VaRt-1))		1,626
b) Average of the daily VaR (Article 365(1)) of the CRR on each of the preceding 60 business days (VaRavg) x multiplication factor (mc) in accordance with Article 366 of the CRR		17,190
SVaR (higher of values a) and b))	418,904	33,512
a) Latest SVaR (Article 365(2) of the CRR (SVaRt-1))		4,488
b) Average of the SVaR (Article 365(2) of the CRR) during the preceding 60 business days (SVaRavg) x multiplication factor (ms) (Article 366 of the CRR)		33,512
IRC (higher of values a) and b))		
a) Most recent IRC value (incremental default and migration risks) calculated in accordance with Articles 370 ^o and 371 ^o of the CRR		
b) Average of the number over the preceeding 12 weeks		
COMPREHENSVE RISK MEASURE (higher of values a), b) and c))		
a) Most recent risk number for the correlation trading portfolio (Article 377 ^o do CRR)		
b) Average of the risk number for the correlation trading portfolio over the preceding 12 weeks		
c) 8% of the own funds requirement in the standardised approach on the most recent risk number for the correlation trading portfolio (Article 338 ^o , n ^o 4 of the CRR)		
OTHER		
TOTAL	633,773	50,702

TABLE 62 – TEMPLATE EU MR2-B – RWA FLOW STATEMENTS OF MARKET RISK EXPOSURES UNDER THE IMA

(Thousand euros)

	VaR	SVaR	IRC	Comprehensive risk measure	Other	Total RWAs	Total capital requirements
RWA AT PREVIOUS QUARTER END	159,961	377,673				537,634	43,011
Regulatory adjustment	110,495	281,758				392,253	31,380
RWA at the previous quarter-end (end of the day)	49,466	95,915				145,381	11,630
Movement in risk levels	-29,143	-39,818				-68,961	-5,517
Model updates/changes							
Methodology and policy							
Acquisitions and disposals							
Foreign exchange movements							
Other							
...							
RWA at the end of the reporting period (end of the day)	20,323	56,097				76,420	6,114
Regulatory adjustment	194,546	362,808				557,353	44,588
RWA AT THE END OF THE REPORTING PERIOD	214,869	418,904				633,773	50,702