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Making sense of the comprehensive assessment

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Viral V. Acharya and Sascha Steffen

Making Sense of the Comprehensive Assessment

Policy Letter No. 32

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Making Sense of the Comprehensive Assessment

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October 27, 2014

Motivation

In an earlier piece (Achary and Steffen, 2014), we have estimated capital shortfalls of European banks that are going to be part of the Single Supervisory Mechanism (SSM) using "benchmark" stress tests. We documented that the comprehensive assessment might reveal a substantial lack of capital in many peripheral and core European banks. The European Central Bank (ECB) has finalized its assessment of the largest banks in the euro area before it commences their regulatory oversight in November 2014. It has now disclosed its own assessment about the solvency of the banking sector.

How do our benchmark capital shortfalls compare to the regulatory shortfall estimates?

Sample

The ECB included 130 banks in the comprehensive assessment. Of these, it will eventually supervise 120 banks directly. This set of banks includes 39 publicly listed financial institutions for which supervisory as well as our benchmark stress test data are available.[3] We use balance sheet data from SNL Financial as of 31 December 2013, which is also the starting point of the comprehensive assessment.

Table 1 shows that these banks have €12.5 trillion in total assets and a market capitalization of €539 billion. Table 1 also provides an overview of the mean regulatory capital ratio Core Equity Tier 1 (C Tier 1) as well as Equity/Asset and Market-to-Book ratios. The mean C Tier 1 capital ratio is 11.68%, the mean Equity/Asset ratio is 5.3% and the Market-to-Book ratio is 0.84 and well below 1. I.e., markets are substantially discounting banks' assets and Cyprus, Italy and Germany lead the table with the banks that show the lowest Market-to-Book ratios.

Methodology

1. **Benchmark stress test results ("SRISK or Capital Shortfall in a Systemic Crisis")**: We assume a systemic financial crisis with a global stock market decline of 40%. SRISK 5.5% VLAB is our measure for a bank's capital shortfall in this scenario, assuming a 5.5%

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[3] Bank of Cyprus was taken private in 2014. Banco Espirito Santo (a Portuguese) lender, failed in August 2014. While the "bad bank" will be wound down, the viable part part of the bank has been transferred into a new entity which was not included in the stress test exercise due to time constraints.

prudential capital ratio with losses estimated using the VLAB methodology to estimate the downside risk of bank stock returns.[4] While this scenario and the resulting SRISK measure uses market data and market equity (instead of book equity) in determining leverage, the approach is conceptually similar to that of the EU stress tests, which is to estimate losses in a stress scenario and determine the capital shortfall between a prudential capital requirement and the remaining equity after losses.

2. **Supervisory stress test results**: We use following outcomes from the comprehensive assessment to relate to our benchmark stress tests:
    a. **Capital shortfall**: Capital shortfall of banks to a threshold of 5.5% Common Equity Tier 1 (CET1) in the adverse scenario in million euros.
    b. **3 year cumulative impairment losses on financial and non-financial assets in the banking book ("Loan Losses")**: The cumulative impairment losses are measured in the adverse scenario.
    c. **3 year cumulative losses from the stress in the trading book ("Trading Losses"):** The cumulative impairment losses are measured in the adverse scenario.
    d. **3-year cumulative total losses:** Total losses are the sum of loan losses and trading losses.

We analyze and compare the benchmark regulatory capital shortfalls along two dimensions: The first dimension is the absolute size of the shortfalls. The second dimension is the rank correlation of banks that incur shortfalls.

The calculation of capital shortfalls considers the losses banks incur in the banking and trading book. The ECB then calculates shortfalls using a regulatory capital ratio (the CET 1 ratio). This ratio incorporates risk-weighted assets in the denominator. Moreover, the numerator is Common Tier 1 capital introduced by the Basel III framework and implemented in the EU in the CRR / CRD IV. These choices are problematic for two reasons:

1. **The use of risk-weights** is questionable as they are based on internal models for banks using the basic or advanced internal ratings based modeling approach (IRB banks). Even in the standardized approach, risk-weights are not necessarily reflecting the true risk of the banks' assets. E.g., sovereign debt still has a zero risk-weight.

2. **Common Tier 1** is a "new" measure of regulatory capital and incorporates a substantial number of transitional arrangements until it is fully implemented, i.e., a number of regulatory deductions from capital are going to be phased-in over time. Subtracting goodwill and other intangible assets is one example; the treatment of deferred tax assets (DTA) is another example. Recognizing these items, however, can be decided by the national competent authorities and thus gives them considerable discretion. This discretion was heavily used in the comprehensive assessment as reported by the ECB.[5]

[4] This capital shortfall measure has been implemented based on Acharya at al. (2012) and Brownlees and Engle (2013) and. The data are provided by New York University's VLAB (http://vlab.stern.nyu.edu/welcome/risk/). The theoretical motivation for the measure can be found in Acharya et al. (2010). SRISK has been documented to be a comprehensive measure that includes losses due to both a bank's investments in assets and its exposure to fragile liabilities, which in the current European context relate, respectively, to holdings of peripheral sovereign bonds and (short-term) funding risk such as U.S. money market fund withdrawals and other wholesale investors (Figure 5).

[5] The removal of the prudential filter on unrealized gains or losses on sovereign exposures held in the available-for-sale (AFS) portfolio is a notable exception. EBA-defined harmonized rules require a transitional phase-in of gains or losses (2014: 20%; 2015: 40%; 2016: 60%) [ECB, 2014]. The ECB recognizes that "there is a need to improve the consistency of capital and in particular the treatment of the deductions and the related quality of CET1 capital. This will be an issue for the SSM to address as a matter of priority".

We thus compare the benchmark stress test results both to the capital shortfalls as calculated by the EBA / ECB and to the actual losses in the banking and trading book under the adverse scenario that form the basis of these shortfalls. The advantage of using these losses is that they are unaffected by risk-weights or regulatory discretion.

Major results

Comprehensive Assessment Outcomes:

- The regulatory capital shortfall as estimated by the ECB is €19.8 billion. Public banks thus account for more than 80% of the total capital shortfall reported by the ECB (€24.6 billion) [Table 2].
- Losses in the banking book (Loan Losses) and in the trading book (Trading Losses) are large and amount to €275 billion and €37 billion, respectively [Table 2].

Comparison of our Benchmark Capital Shortfalls with Comprehensive Assessment Shortfalls:

- Our benchmark capital shortfall estimates amount to €450 billion for the 39 publicly listed banks. The countries with the largest expected shortfalls in a systemic crisis are France (€189 billion), Germany (€102 billion) and Italy (€76 billion). Malta and Slovakia (whose banking systems are among the smallest in the euro area) have no capital shortfalls under our benchmark estimates [Table 2].
- The size of the regulatory capital shortfalls is less than 5% of the estimates using our benchmark stress test [Table 2].
- While the 5 largest banking systems (measured by total assets of banks in our sample), i.e. France, Germany, Italy, Spain and Belgium, have an estimated capital shortfall of €432 billion using our benchmark stress test, they have less than €8 billion shortfall in the adverse scenario of the regulatory assessment [Table 2].
- Capital shortfalls estimated under our benchmark stress tests are weakly but in fact *negatively* correlated with the supervisory shortfalls [Figure 1]. The rank correlations reported in Table 3 support this negative association.

Comparison of our Benchmark Capital Shortfalls with Comprehensive Assessment Losses:

- The capital shortfalls estimated under our benchmark stress tests are highly correlated with the actual losses under the adverse scenario both in the banking book (rank correlation of 0.761) and the trading book (rank correlation of 0.937) [Figure 2 and Table 3].

Implications

Acharya and Steffen (2014) provide a number of benchmark stress testing models to estimate capital shortfalls during a systemic crisis. The analyses suggest possible capital shortfalls between €80 billion and more than €700 billion depending on the respective model. The regulatory capital shortfall disclosed by the ECB on October 26, 2014 reveals a capital shortfall under an adverse scenario of €24.6 billion, of which €19.8 billion can be attributed to publicly listed banks.

The negative correlation between our benchmark estimates and the regulatory capital shortfall, but a positive correlation between our benchmark estimates and regulatory estimates of losses, suggests that regulatory stress test outcomes are potentially heavily affected by a) discretion of national

regulators in measuring what is “capital”, and especially b) the use of risk-weighted assets in calculating the prudential capital requirement.

This highlights the importance of using multiple benchmark leverage ratios, such as market-based approach we employ and simple leverage ratio (which is not affected by regulatory risk weights).

Moreover, the differences between the shortfalls estimated in Acharya and Steffen (2014) and the ECB’s estimates appear to be driven by the large banks in large countries such as France and Germany. No capital shortfall was identified for these banks during the comprehensive assessment. This is possibly due to the fact that systemic risk and feedback effects from the financial sector in the real sector, which are captured in the market data, have been completely ignored in regulatory assessment (Steffen, 2014).

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Figure 1

This figure plots SRISK as of 31 December 2013 against shortfall in the adverse scenario. Shortfall estimates are in million euros and aggregated over all public banks within each country.

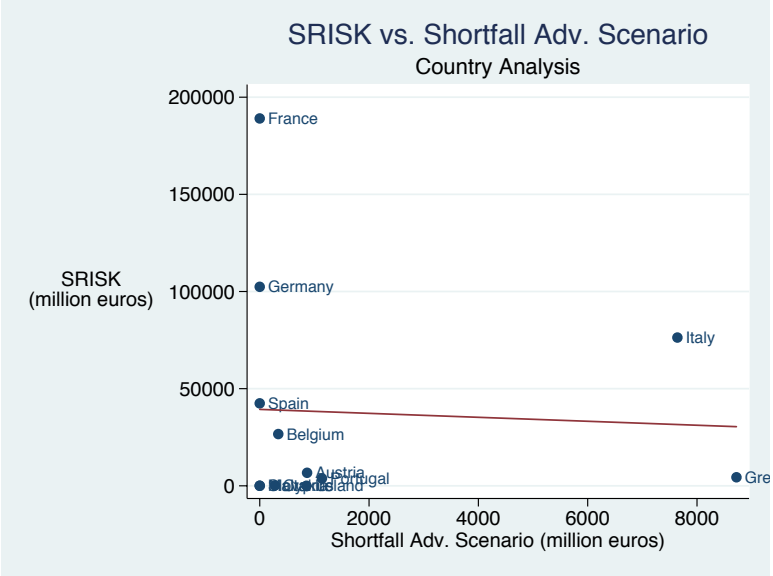

Figure 2

This figure plots SRISK as of 31 December 2013 against 3 year cumulative loan losses, trading losses and total losses (loan losses + trading losses) in the adverse scenario. SRISK and loss estimates are in million euros and aggregated over all public banks within each country.

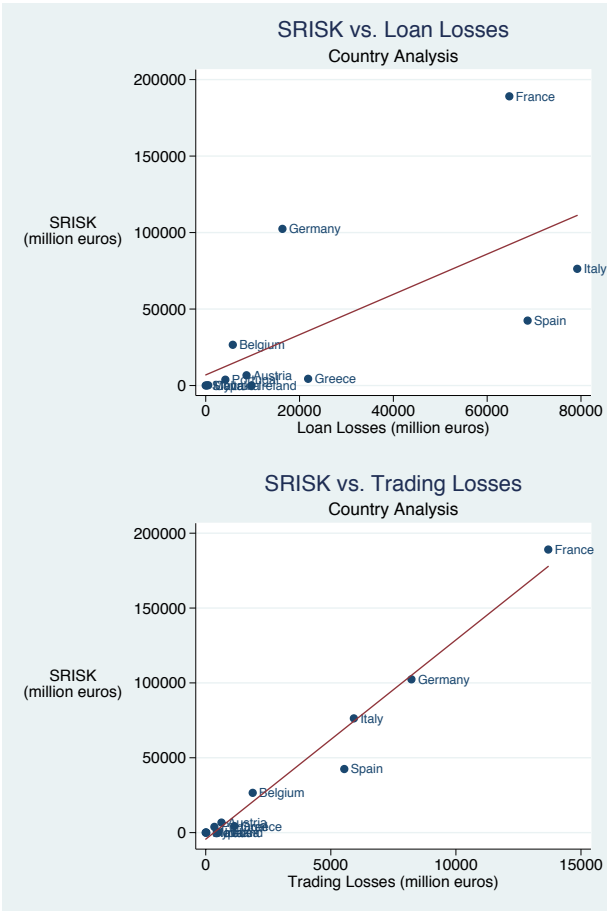

Table 1

Descriptive statistics

This table reports descriptive statistics of the publicly listed banks included in the comprehensive assessment conducted by the European Central Bank (ECB) in 2014. C Tier 1 is the Core Tier 1 ratio and is Core Tier 1 Capital divided by Risk-Weighted Assets (RWA). Equity/Assets is book equity over total assets. Market-to-Book is market value over book value of equity. Market Cap is the market value of equity measured in million euros. Assets are total assets and measured in million euros. Banks are the number of public banks in each country. All data are as of 31 December 2013 and aggregated at the country level. Ratios are weighted using total assets.

Country	C Tier 1	Equity/Assets	Market-to-Book	MarketCap	Assets	Banks
France	10.86%	4.24%	0.68	127,696	4,543,804	3
Germany	12.95%	3.83%	0.61	50,570	2,204,035	3
Italy	10.61%	6.49%	0.61	83,000	2,190,872	11
Spain	11.65%	7.22%	1.00	146,082	2,080,440	5
Belgium	16.31%	4.00%	1.18	17,305	461,622	2
Greece	12.45%	8.27%	0.95	26,945	354,223	4
Ireland	13.30%	7.22%	4.91	68,303	287,468	3
Austria	11.64%	7.24%	0.72	11,453	221,022	2
Portugal	15.00%	4.48%	0.91	4,978	124,707	2
Malta	10.67%	7.70%	1.58	1,557	12,979	2
Slovakia	15.93%	11.94%	0.70	964	11,556	1
Cyprus	7.34%	6.25%	0.57	229	6,384	1
Total	**11.68%**	**5.30%**	**0.84**	**539,083**	**12,499,112**	**39**

Table 2
Shortfall estimates

This table reports capital shortfalls under our benchmark stress test as well as based on the supervisory stress test as disclosed by the ECB. SRISK 5.5% VLAB is calculated assuming a 5.5% prudential capital ratio (which is the measure available on the NYU Stern Volatility Lab website) as of 31 December 2013. Shortfall 5.5% CET 1 is the shortfall to the 5.5% common equity Tier 1 capital ratio in the adverse scenario. Loan Losses are 3 year cumulative impairment losses on financial and non-financial assets in the banking book. Trading Losses are 3 year cumulative losses from the stress in the trading book. Total Losses is the sum of Loan Losses and Trading Losses. Losses are incurred in the adverse scenario. Banks are the number of public banks in each country.

Country	SRISK 5.5% VLAB	Supervisory Stress Test Results				Banks
		Shortfall 5.5% CET 1	Loan Losses	Trading Losses	Total Losses	
France	189,042	0	64,718	13,692	78,410	3
Germany	102,406	0	16,364	8,222	24,586	3
Italy	76,287	7,640	79,196	5,920	85,116	11
Spain	37,914	0	63,243	5,082	68,325	5
Belgium	26,616	339	5,766	1,877	7,642	2
Austria	6,677	865	8,694	626	9,320	2
Greece	4,360	8,721	21,836	1,142	22,978	4
Portugal	3,821	1,137	4,189	347	4,536	2
Ireland	3,053	855	9,785	487	10,272	3
Cyprus	167	277	529	11	540	1
Malta	0	0	200	22	222	2
Slovakia	0	0	0	0	0	1
Total	**450,343**	**19,834**	**274,520**	**37,428**	**311,948**	**39**

Table 3
Rank correlations

This table reports rank correlations of regulatory stress test capital shortfalls and losses with SRISK 5% VLAB. SRISK 5.5% VLAB is calculated assuming a 5.5% prudential capital ratio (which is the measure available on the NYU Stern Volatility Lab website) as of 31 December 2013. Shortfall 5.5% CET 1 is the shortfall to the 5.5% common equity Tier 1 capital ratio in the adverse scenario. Loan Losses are 3 year cumulative impairment losses on financial and non-financial assets in the banking book. Trading Losses are 3 year cumulative losses from the stress in the trading book. Total Losses is the sum of Loan Losses and Trading Losses. Losses are incurred in the adverse scenario. ** indicates significance at the 1% level.

	SRISK 5.5% VLAB
Shortfall 5.5% CET 1	-0.058
Loan Losses	0.761**
Trading Losses	0.937**
Total Losses	0.827**

Appendix 1

This table reports descriptive statistics of the publicly listed banks included in the comprehensive assessment conducted by the European Central Bank (ECB) in 2014. C Tier 1 is the Core Tier 1 ratio and is Core Tier 1 Capital divided by Risk-Weighted Assets (RWA). Equity/Assets is book equity over total assets. Market-to-Book is market value over book value of equity. Market Cap is the market value of equity measured in million euros. Assets are total assets and measured in million euros. All data are as of 31 December 2013.

Bank	Country	Ticker	Assets	Market Cap	C Tier 1	Equity / Assets	Market-to-Book
Erste Group Bank	Austria	EBS	200,118	10,922	11.44%	7.39%	0.74
Österreichische Volksbanken	Austria	VBPS	20,904	530	13.56%	5.84%	0.43
Dexia	Belgium	DEXB	222,936	78	21.24%	1.78%	0.02
KBC Group	Belgium	KBC	238,686	17,227	11.70%	6.08%	1.19
Hellenic Bank	Cyprus	HB	6,384	229	7.34%	6.25%	0.57
Crédit Agricole SA	France	ACA	1,519,089	23,316	9.96%	3.15%	0.49
BNP Paribas	France	BNP	1,810,522	70,611	11.73%	5.02%	0.78
Société Générale	France	GLE	1,214,193	33,769	10.68%	4.44%	0.63
Deutsche Bank	Germany	DBK	1,611,400	35,466	12.83%	3.41%	0.65
Commerzbank	Germany	CBK	549,654	13,375	13.06%	4.90%	0.50
Aareal Bank	Germany	ARL	42,981	1,729	15.93%	5.70%	0.71
Eurobank Ergasias	Greece	EUROB	77,586	3,029	10.43%	5.83%	0.67
Piraeus Bank	Greece	TPEIR	92,010	7,770	13.88%	9.28%	0.91
National Bank of Greece	Greece	ETE	110,930	9,242	10.28%	7.10%	1.17
Alpha Bank	Greece	ALPHA	73,697	6,905	16.06%	11.35%	0.83
Bank of Ireland	Ireland	BKIR	132,133	8,170	12.23%	5.97%	1.04
Permanent TSB Group Hldgs Plc	Ireland	IPM	37,601	1,646	13.11%	6.34%	0.69
Allied Irish Banks	Ireland	ALBK	117,734	58,487	14.56%	8.91%	5.57
UniCredit	Italy	UCG	827,538	31,267	10.57%	6.05%	0.62
Intesa Sanpaolo	Italy	ISP	624,179	29,269	11.33%	7.22%	0.65
Banca Monte dei Paschi	Italy	BMPS	198,461	2,056	10.65%	3.11%	0.33
Banco Popolare	Italy	BP	126,043	2,467	9.69%	6.76%	0.29
UBI Banca	Italy	UBI	124,242	4,466	12.60%	9.00%	0.40
Banca popolare dell'Emilia	Italy	BPE	61,758	2,317	8.56%	7.63%	0.49
Banca Popolare di Milano	Italy	PMI	49,353	1,458	7.21%	7.39%	0.40
Banca Carige	Italy	CRG	42,156	974	5.09%	3.90%	0.59
Mediobanca	Italy	MB	72,841	5,495	11.75%	9.54%	0.79
Banca Popolare di Sondrio	Italy	BPSO	32,770	1,295	7.89%	6.14%	0.64
Credito Emiliano	Italy	CE	31,531	1,939	9.94%	6.84%	0.90
Bank of Valletta	Malta	BOV	7,258	797	11.67%	7.95%	1.38
HSBC Bank Malta	Malta	HSB	5,722	759	9.39%	7.39%	1.80
Millennium BCP	Portugal	BCP	82,007	3,285	14.19%	3.99%	1.00
Banco BPI	Portugal	BPI	42,700	1,693	16.54%	5.40%	0.73
VUB banka	Slovakia	VUB	11,556	964	15.93%	11.94%	0.70
Banco Santander	Spain	SAN	1,115,637	73,826	11.71%	7.16%	0.92
BBVA	Spain	BBVA	599,517	51,866	11.59%	7.48%	1.16
Banco de Sabadell	Spain	SAB	163,442	7,590	11.96%	6.37%	0.73
Banco Popular Español	Spain	POP	146,709	8,327	10.69%	7.92%	0.72
Bankinter	Spain	BKT	55,136	4,474	12.85%	6.17%	1.31

Appendix 2

This table reports capital shortfalls under our benchmark stress test as well as based on the supervisory stress test as disclosed by the ECB. SRISK 5.5% VLAB is calculated assuming a 5.5% prudential capital ratio (which is the measure available on the NYU Stern Volatility Lab website) as of 31 December 2013. Shortfall 5.5% CET 1 is the shortfall to the 5.5% common equity Tier 1 capital ratio in the adverse scenario. Loan Losses are 3 year cumulative impairment losses on financial and non-financial assets in the banking book. Trading Losses are 3 year cumulative losses from the stress in the trading book. Total Losses is the sum of Loan Losses and Trading Losses. Losses are incurred in the adverse scenario.

Bank	Country	Ticker	SRISK 5.5% VLAB	Shortfall 5.5% CET 1	Loan Losses	Trading Losses	Total Losses
Erste Group Bank AG	Austria	EBS	5,932	0	7,719	569	8,288
Österreichische Volksbanken	Austria	VBPS	745	865	975	57	1,032
Dexia SA	Belgium	DEXB	21,354	339	1,111	524	1,635
KBC Group NV	Belgium	KBC	5,262	0	4,654	1,353	6,007
Hellenic Bank Public Company Limited	Cyprus	HB	167	277	529	11	540
Crédit Agricole SA	France	ACA	81,523	0	25,138	2,339	27,477
BNP Paribas SA	France	BNP	58,034	0	25,228	6,788	32,016
Société Générale	France	GLE	49,485	0	14,353	4,564	18,917
Deutsche Bank AG	Germany	DBK	76,598	0	9,411	5,312	14,723
Commerzbank AG	Germany	CBK	24,246	0	6,622	2,868	9,490
Aareal Bank AG	Germany	ARL	1,562	0	331	42	373
Eurobank Ergasias SA	Greece	EUROB	2,471	4,628	5,291	189	5,479
Piraeus Bank SA	Greece	TPEIR	1,146	660	4,202	228	4,430
National Bank of Greece SA	Greece	ETE	597	3,433	7,314	518	7,832
Alpha Bank AE	Greece	ALPHA	145	0	5,029	207	5,236
Bank of Ireland	Ireland	BIR	2,161	0	4,289	157	4,446
Permanent TSB Group Holdings Plc	Ireland	IL0	892	855	1,300	4	1,304
Allied Irish Banks, Plc	Ireland	AIB	0	0	4,196	326	4,522
UniCredit SpA	Italy	UCG	30,361	0	25,199	2,096	27,295
Intesa Sanpaolo SpA	Italy	ISP	18,698	0	21,147	1,452	22,599
Banca Monte dei Paschi di Siena SpA	Italy	BMPS	9,865	4,250	8,699	583	9,282
Banco Popolare Societˆ Cooperativa	Italy	BP	5,528	427	5,483	407	5,889
Unione di Banche Italiane SCpA	Italy	UBI	3,881	0	7,106	134	7,240
Banca popolare dell'Emilia Romagna SC	Italy	BPE	1,881	128	2,666	162	2,828
Banca Popolare di Milano Scarl	Italy	PMI	1,845	684	1,706	147	1,853
Banca Carige SpA - Cassa di Risparmio di Genova e Imperia	Italy	CRG	1,725	1,835	1,922	66	1,989
Mediobanca - Banca di Credito Finanziario SpA	Italy	MB	1,028	0	2,943	605	3,547
Banca Popolare di Sondrio SCpA	Italy	BPSO	1,020	318	1,767	209	1,976
Credito Emiliano SpA	Italy	CE	455	0	558	61	619
HSBC Bank Malta Plc	Malta	HSB	0	0	98	1	99
Bank of Valletta Plc	Malta	BOV	0	0	200	22	222
Banco Comercial Portugus SA	Portugal	BCP	2,701	1,137	3,149	337	3,486
Banco BPI SA	Portugal	BPI	1,120	0	1,040	10	1,050
VUB banka	Slovakia	1VUB02AE	0	0	293	32	325
Banco Santander SA	Spain	SAN	23,832	0	36,661	2,758	39,420
Banco Bilbao Vizcaya Argentaria, SA	Spain	BBVA	5,611	0	15,880	2,079	17,959
Banco de Sabadell, SA	Spain	SAB	4,334	0	3,927	92	4,018
Banco Popular Espa–ol SA	Spain	POP	3,690	0	5,194	107	5,300
Bankinter SA	Spain	BKT	448	0	1,581	46	1,627