

## Explanatory Report

### European DataWarehouse (ED) will publish CDRs and lists of defaulted loans for Spanish SME deals

#### Analyst Contacts

**Ludovic Thebault, PhD**

Vice President  
+49 (0) 69 8088 4302  
[ludovic.thebault@eurodw.eu](mailto:ludovic.thebault@eurodw.eu)

**Cesar Fernandez**

Senior Analyst  
+49 (0) 69 8088 4301  
[cesar.fernandez@eurodw.eu](mailto:cesar.fernandez@eurodw.eu)

**Bruno Pereira**

Senior Project Manager  
+49 (0) 69 8088 4312  
[bruno.pereira@eurodw.eu](mailto:bruno.pereira@eurodw.eu)

European DataWarehouse GmbH  
Walther-von-Cronberg-Platz 2  
60594 Frankfurt am Main  
[www.eurodw.eu](http://www.eurodw.eu)

*The CDR or "Constant Default Rate" is a measure of performance representing the annualised default rate on a pool of loans.* Like other default rates, the CDR typically compares the amounts of defaulted loans that occurred over a given period, to the amount of the non-defaulted loans at the beginning of that period. Although crucial for modelling purposes, CDRs are not always shown in investor reports. ED intends to publish CDRs on a regular basis, starting with Spanish SME deals.

*In the future, ED will also eventually publish the lists of defaulted loans used to calculate its CDR.* Lists of defaults are available in some investor reports but not in all jurisdictions.<sup>1</sup> ED default lists not only enable the calculation of CDRs, but should also facilitate the calculation of recovery rates and recovery lags. In the case of SMEs, the lists will additionally help in calculating cumulative defaults for deals that have been closed since the beginning of 2014.<sup>2</sup>

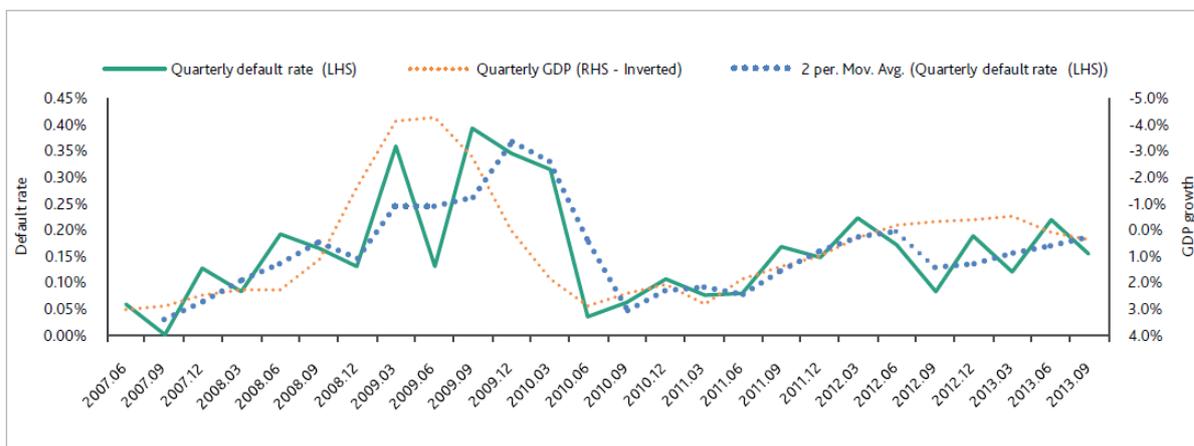
#### The default rate as a measure of performance

*Default rates are useful trend indicators.* Exhibit 1 shows the evolution of quarterly default rates in Belgian ABS SME pools. The quarterly default rate is negatively correlated with GDP growth, as SME defaults increase in a recessionary environment, and decrease when economic growth increases. The quarterly default rate (non-annualised) was calculated as the ratio of the defaults over a quarter to the non-defaulted loan amounts at the beginning of the quarter. This value is easy to understand and easy to calculate because the inputs needed (pool amount and periodic defaults) are typically available in investor reports. By comparison, the CDR is an annualised periodic default rate. This calculation is explained in detail below.

<sup>1</sup> Dutch, Belgian, German and UK investor reports often feature thorough lists of defaulted loans, but Italian and Spanish investor reports typically do not.

<sup>2</sup> ED is more likely to have full historical information for the deals that closed from 2014 onwards and thus reported quarterly LLD since closing.

**Exhibit 1: Default rates in Moody's rated Belgian ABS SME Portfolios**



Source: Moody's Investors Service (CreditInsight – February 18, 2014)

*Concentrated portfolios increase default rate volatility.* Default volatility particularly affects ABS SME pools because of their higher borrower concentration (compared to other asset classes). Thus, a default for a large loan can distort the average default rate. For this reason, using a short period as a basis for the calculation of the default rate can lead to higher default rate volatility, because more defaults occur over a quarter than over a month. Default rates calculated over a quarter will therefore be more stable than default rates calculated over a month. A moving average default rate (as in the dotted line in Exhibit 1) provides a more stable measure of performance.

## CDR calculation

*There are currently a number of CDR formulas used in the market.* Following input from market participants, ED chose a less complex formula described in Exhibit 2, which requires only two commonly available inputs.<sup>3</sup> Alternative formulas sometimes include the scheduled payment and prepayment amounts.<sup>4</sup>

**Exhibit 2: ED CDR formula for quarterly reporting**

$$CDR = 1 - \left( 1 - \left( \frac{\text{Cumulative volume of new defaults over the quarter}}{\text{Non - defaulted pool balance at the start of the quarter}} \right) \right)^4$$

Source: Intex, Moody's Analytics (ABSNet)

<sup>3</sup> See for instance CDR calculation in <http://www.absnet.net/ABSNet/glossary/Index>

<sup>4</sup> See for instance Moody's "Performance Overview User Guide", 23 July 2012: Moody's CDR calculation =  $(1 - (1 - \text{Defaults divided by (Pool Balance plus Unscheduled Principal Payments plus Defaults)})^{\text{reporting frequency}})$  where reporting frequency equals (monthly = 12, quarterly = 4, semi-annual = 2, annual = 1).

*The CDR differs from a simple periodic default rate in that it is an annualised value.* Thus, the ratio “Cumulative volume of new defaults over the quarter/Non-defaulted pool balance at the start of the quarter” represents the “periodic default rate”. Once we subtract the “periodic default rate” from 1, this represents the proportion of the pool that did not default over this period, i.e. the “survival rate”. The exponent applied reflects the reporting frequency (4 if reporting is on a quarterly basis or 12 if monthly) and produces the “survival rate over one year”. When we subtract this value from 1 it, in turn, gives us the proportion of the pool that does not “survive” over the year and therefore defaults, i.e. the constant default rate (CDR).

*The choice of the reporting period (monthly, quarterly, semi-annually or annually) influences CDR volatility.* A longer reporting period makes the CDR less sensitive to noise but also less responsive to an actual performance change. Tracking defaults on a quarterly basis makes the CDR more stable than on a monthly basis but it is also short enough to reflect changes in the macro-economic environment. A more stable default rate can be obtained by using a rolling average indicator.

## **Input selection for the CDR calculation**

*Two different default values could be used to calculate a CDR, a transaction-specific default definition or a standard (90-days) default definition.* Both calculations are feasible using Loan Level Data (LLD). Regardless of the default definition, the numerator should be the cumulative amount of the defaulted principal over the period.<sup>5</sup> The denominator is the principal balance at the beginning of the period, net of defaults. The relevant principal balance amount will, therefore, depend on the default definition used.

*Defaults following the transaction-specific default definition (including subjective defaults)<sup>6</sup> are typically shown in investor reports and are the usual basis for trigger calculations and default rates.* Additionally, because CDRs used in cash-flow modelling are typically meant to model the possible impact of a specific default scenario over transaction cash flows, the calculation of such CDRs should use the deal’s transaction-specific default definition. The main drawback of using this value as a performance indicator, however, is that there can be a long lag before any defaults are observed at all.<sup>7</sup> For example, when calculating a default rate for a deal with an 18-month default definition, the defaulted loan amount (18 months in arrears) is compared with the pool balance on the previous quarter, when this loan was already 15 months delinquent. Comparability is another drawback of this approach, as a CDR based on a 90 days default definition cannot directly be compared to a CDR based on an 18 month default definition, given that a substantial proportion of the loans that become 90 days in arrears might cure before they reach the 18 months mark.

<sup>5</sup> Every defaulted loan is only taken into account once, for its principal amount at the time of default, and as of the first date when it appears to be in default. A defaulted loan stays included in the default list, even if it becomes performing again later, as repayments are then considered to be recoveries. Should the loan default again afterwards, it is not counted a second time.

<sup>6</sup> “Subjective defaults” are loans to be considered as defaulted although they do not necessarily fulfil the transaction-specific default definition. A loan can thus be treated as defaulted if, for instance, the trustee believes that the loan is unlikely to be repaid (if the borrower defaulted on another loan, or if it is about to go bankrupt etc.).

<sup>7</sup> With an 18-month default definition, given that all the loans are typically performing at closing, it will typically take 18 months after closing before defaults are observed. Subjective defaults may occur prior to this, but they generally represent a small proportion of all defaults

*In comparison, a CDR based on a 90-day default definition is useful for benchmarking purposes.* Rating agencies often use a 90-day default definition in their calculations. These 90-day defaults differ from transaction-specific defaults in that the lag until the loan is considered defaulted is normally much shorter. On the other hand, a loan counted as defaulted after 90 days, is more likely to be recovered, or become current again, than a loan counted as defaulted after 18 months. A 90-day default definition, thus, gives a more conservative estimate of the “true” default rate, but the corresponding recovery rates would also be higher.<sup>8</sup> Defaults following a 90-day default definition are typically not reported in investor reports unless the deal default definition is indeed 90 days.<sup>9</sup> If needed, ED data could be used to generate lists of defaults and CDRs based on a standard 90-day default definition.

## Lists of defaults for SME deals

*ED CDR calculation relies on a query generating a list of defaulted loans.* This list makes it possible to find the total amount of loans that defaulted over a given period and thus provides the numerator for the CDR calculation. Given that actual reporting does not always follow the official taxonomy published by the ECB and that reporting can be creative even when the official taxonomy is followed, deal specific adjustments to the calculations must be made to account for reporting specificities. In compiling these lists, if needed, ED will make adjustments to the number of days/months in arrears, loan balance etc. so as to make the data comparable.<sup>10</sup>

*ED list of defaults includes all the loans that ever fulfilled a default criteria in a given pool, selecting each loan once only, at the earliest date of default observed for this loan, and counting its principal amount on the first default date.*<sup>11</sup> In an SME deal, a loan that appears only once as defaulted in one of the LLD submissions and is then removed (having been redeemed, repurchased, or having become performing again), actually remains in ED list of defaulted loans.

*Due to data quality and completeness issues for some deals, lists of defaults used for CDR calculations only include loans that defaulted from 2014 onwards.* For deals that closed from Q1 2014 onwards, the list of defaults should be complete in that it provides the entire list of cumulative defaults. For deals that closed before Q1 2014, the list of defaults is only complete from Q1 2014 onwards as, prior to this, defaults may have occurred, become liquidated and therefore were not reported to ED in a LLD submission. This is notably the case for SMEs, as reporting entities had the option to withdraw inactive defaulted loans from LLD. Hence, the default info in these early submissions must be ignored unless it is also the first LLD after closing.

<sup>8</sup> A 90-day default definition typically captures more defaults than the transaction-specific default definition. Some of the loans that become more than 90 days overdue can become performing again or can be refinanced or repurchased before they are defaulted according to the transaction definition. Thus, the choice of a default rate assumption typically needs to be paired with a recovery rate assumption based on a comparable default definition.

<sup>9</sup> We note that the Spanish management companies EdT and Gesticaixa provide both default information (defaults following the transaction definition and defaults following the 90 days definition for benchmarking purposes)

<sup>10</sup> See [ED Commentary on Spanish RMBS LLD](#) on this topic which shows that delinquencies and defaults can be reported in very different ways. See also [ED Spanish SME Index comment](#) for a practical application.

<sup>11</sup> ED analysis flags a loan as “defaulted” if either the field “Default or Foreclosure on the loan per transaction definition” (AS121) is populated with Yes”, or if either the field “Number of Days in Interest Arrears” (AS116) or “Number of Days in Principal Arrears” (AS118) exceeds the specific default definition of the deal.

## Appendix 1: ED list of defaults compared to investor reports

*ED verifies the accuracy of its list of defaults by reconciling it with the amounts of periodic defaults published in investor reports.* The pool balance in ED LLD has already been compared to the corresponding investor reports and they generally match. Thus, discrepancies are more likely to come from the reporting of defaulted loans. Before publishing a new batch of CDRs, ED will compare its automatically generated list of defaults to those obtained from investor reports, and liaise with data originators and providers for their feedback. Exhibits 3a and 3b below compare the defaults reported over the past year in investor reports to the list generated by ED over the same period. For this, we only selected currently active deals with a minimum of two years of seasoning so that a full year of defaults can be observed.

### Exhibit 3a: Cumulative defaults over 1 year LLD vs Investor Reports<sup>12</sup>

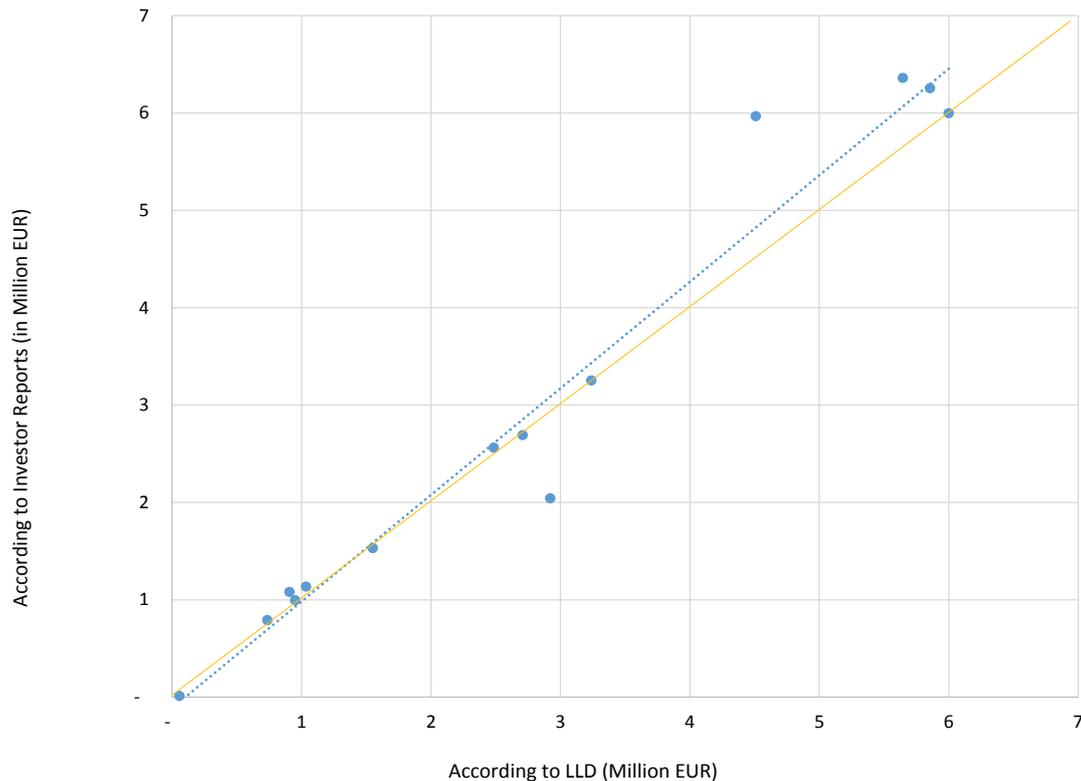
	Defaults of last year to Q2 2016		Defaults LLD/ Defaults IR
	LLD	IR	
BANKIA PYME I FTA	5,999,117	5,998,287	100.0%
BANKINTER 2 PYME FONDO DE TITULIZACIÓN DE ACTIVOS	2,920,597	2,042,218	143.0%
BANKINTER 3 FTPYME FONDO DE TITULIZACIÓN DE ACTIVOS	906,967	1,080,054	84.0%
BBVA EMPRESAS 4 FTA	1,549,477	1,530,023	101.3%
CAIXA PENEDES PYMES 1, FTA	1,033,552	1,136,005	91.0%
FONCAIXA FTGENCAT 3, F.T.A.	950,960	994,841	95.6%
FONCAIXA FTGENCAT 4, F.T.A.	2,484,162	2,561,749	97.0%
FONCAIXA FTGENCAT 5, F.T.A.	5,854,965	6,255,423	93.6%
FONCAIXA FTGENCAT 6, F.T.A.	3,239,317	3,251,837	99.6%
FTPYME TDA CAM 2, FTA	55,760	12,498	446.1%
FTPYME TDA CAM 4, FTA	735,788	790,647	93.1%
IFTPYME TDA CAM 7, FTA	2,707,867	2,691,460	100.6%
IM CAJAMAR EMPRESAS 4	4,508,696	5,966,155	75.6%
IM CAJAMAR EMPRESAS 5	5,644,879	6,359,103	88.8%

Source: European DataWarehouse

<sup>12</sup> At the time of writing, Banco Santander SME deals are work in progress

## Exhibit 3b: Defaults over one year to Q2 2016: Comparison investor report vs LLD

Comparison of ideal fit (orange line) to actual fit (blue line)



Source: European DataWarehouse, Management companies (data from Exhibit 3a)

Exhibit 3a and 3b show that the default amounts generated using ED LLD are in the same range as defaults reported in investor reports. Nevertheless, some differences persist, as shown by the deviation of the dots from the “ideal” line in Exhibit 3b. Exchanges with data owners and providers helped us identify the following factors:

1. For investor reports providing a cumulative default figure at a time interval that does not match the reporting frequency of the LLD (as in Appendix 2), timing mismatch may explain differences. Generally, however, reporting should “catch up” over time. Hence, Exhibits 3a and 3b compare defaults that occurred over one year rather than quarter for quarter.
2. In the case of investor reports providing cumulative defaults as a percentage of the original balance with two decimals only, rounding errors lead to discrepancies. In Exhibit 4, a 0.01% change in the cumulative defaults figure on an original pool of EUR1.7billion translates to a EUR170,000 higher default amount.
3. Investor reports should track all the defaults that ever occurred, whereas LLD provides the status (performing, defaulted etc.) of loans at a given point in time, typically quarterly. For example, if a

loan defaults between two LLD submission dates and subsequently becomes performing again (or repurchased or redeemed) before submission of the new LLD, it might not be reported as defaulted in the new LLD. It could, however, be captured in the investor report as a default.

4. ED treats every loan that fulfilled one of its default criteria as defaulted, assuming that a loan for which "Yes" is reported in field "Default or Foreclosure on the loan per transaction definition" (AS121) is indeed defaulted, even if fields "Default Date" (AS124) or "Default Amount" (AS125) are not filled in (as they should be). Thus, in case of inconsistency, ED assumes that there is indeed a default, but the investor report may not.
5. Should a loan default and become performing again, ED analysis will count this loan as defaulted, for the amount at the date of first default. The investor report, on the other hand, may treat such a loan as cured and not count it as a default.
6. Differences between ED defaults and Investor report defaults may also depend on whether one or the other includes non-principal default components or not (unpaid interest, legal costs etc.)
7. For a loan to be selected one time only, it is important that the "Loan Identifier" (field AS3) does not change overtime, or if so, that it keeps track of all the loan IDs that ever identified this loan. As per the ECB taxonomy, loan IDs are not supposed to change. This typically happens in case of a merger or acquisition. In case the data provider does not report all of the prior IDs of a loan in field AS3, ED analysis would count a defaulted loan at every change of loan ID and, thus, would overestimate the number of defaults.

## Appendix 2: CDR of Spanish SME deals

*Exhibit 4a compares the calculation of a CDR using investor report vs LLD data.* For this deal, the investor report provides cumulative default rates as a percentage of the original pool balance, with two decimal places. Using this percentage and the original amount of the pool, it is possible to calculate the Euro amount of new defaults per quarter. This figure can then be compared to the new defaults obtained with ED list of defaults over the same period. Exhibit 4b compares the CDR obtained from both sources, and shows that a close match can be obtained. Due to the fact that the default amounts shown in Exhibit 4a and 4b can be volatile (due to the presence of large loans in SME portfolios), using a rolling average CDR produces a more stable performance measure.

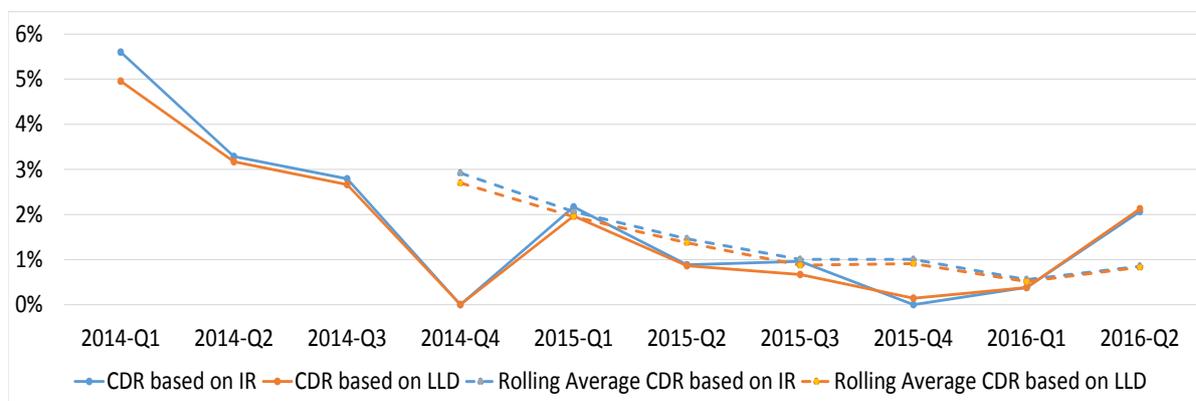
### Exhibit 4a: Comparison of the quarterly defaults and CDRs obtained for BBVA EMPRESAS 4

Quarter	Investor Report (IR) Info					Loan Level Data (LLD) info			CDR Calculation using		1 year	1 year
	IR Date	(B) % Cum defaults	(C) Cum defaults in EUR	(D) New defaults	Non-defaulted Pool	LLD Data	New defaults in LLD	Non-defaulted Pool	IR	LLD	rolling average CDR using IR	rolling average CDR using LLD
2013-Q4	2013-12-31	4.66%	79,220,000	-	380,195,861	2013-11-18	-	397,799,851	-	-	-	-
2014-Q1	2014-03-31	4.98%	84,660,000	5,440,000	347,402,416	2014-02-24	5,023,020	366,813,591	5.6%	5.0%	-	-
2014-Q2	2014-06-30	5.15%	87,550,000	2,890,000	313,428,383	2014-05-23	2,944,611	327,530,837	3.3%	3.2%	-	-
2014-Q3	2014-09-30	5.28%	89,760,000	2,210,000	277,477,090	2014-08-25	2,202,012	299,655,542	2.8%	2.7%	-	-
2014-Q4	2014-12-31	5.28%	89,760,000	0	248,670,810	2014-11-24	3,435	265,040,237	0.0%	0.0%	2.9%	2.7%
2015-Q1	2015-03-31	5.36%	91,120,000	1,360,000	229,896,049	2015-02-23	1,314,120	241,066,172	2.2%	2.0%	2.1%	2.0%
2015-Q2	2015-06-30	5.39%	91,630,000	510,000	211,357,861	2015-05-25	521,760	222,795,949	0.9%	0.9%	1.5%	1.4%
2015-Q3	2015-09-30	5.42%	92,140,000	510,000	193,905,154	2015-08-24	373,750	204,392,186	1.0%	0.7%	1.0%	0.9%
2015-Q4	2015-12-31	5.42%	92,140,000	0	177,303,322	2015-11-23	73,708	188,268,373	0.0%	0.1%	1.0%	0.9%
2016-Q1	2016-03-31	5.43%	92,310,000	170,000	163,476,293	2016-02-23	179,613	171,970,916	0.4%	0.4%	0.6%	0.5%
2016-Q2	2016-06-30	5.48%	93,160,000	850,000	141,252,770	2016-05-23	922,407	148,122,357	2.1%	2.1%	0.9%	0.8%

Source: *Europea de Titulizacion, European DataWarehouse*

*Pool balance at closing was €1.7billion. We denote this as A; Column C at period t is therefore A\*B. Column D at period t is therefore  $C_t - C_{(t-1)}$ .*

**Exhibit 4b: CDR calculated with IR data vs CDR calculated with LLD data for BBVA EMPRESAS 4**



Sources: Europea de Titulización, European DataWarehouse

Using the same procedure as in Exhibit 4a and the same list of deals as in Exhibit 3a, Exhibit 5 shows a series of CDRs for a sample of active deals with two years of history. This list of CDRs will be made available going forward for these and other deals in ED Spanish SME indices.

**Exhibit 5: ED CDR calculation for deals with 2 years of seasoning**

	Quarterly CDR (based on LLD data)				Rolling average CDR over the past year
	2015-Q3	2015-Q4	2016-Q1	2016-Q2	
BANKIA PYME I FTA	2.08%	3.36%	1.66%	1.22%	2.08%
BANKINTER 2 PYME FONDO DE TITULIZACIÓN DE ACTIVOS	4.69%	3.25%	0.86%	1.70%	2.63%
BANKINTER 3 FTPYME FONDO DE TITULIZACIÓN DE ACTIVOS	0.68%	0.00%	1.13%	0.89%	0.68%
BBVA EMPRESAS 4 FTA	0.67%	0.14%	0.38%	2.13%	0.83%
CAIXA PENEDES PYMES 1, FTA	2.16%	1.32%	0.48%	0.02%	1.00%
FONCAIXA FTGENCAT 3, F.T.A.	0.48%	1.06%	0.38%	2.26%	1.04%
FONCAIXA FTGENCAT 4, F.T.A.	0.97%	2.11%	3.29%	1.65%	2.01%
FONCAIXA FTGENCAT 5, F.T.A.	1.96%	1.33%	2.12%	1.77%	1.80%
FONCAIXA FTGENCAT 6, F.T.A.	1.17%	1.30%	1.91%	0.95%	1.33%
FTPYME TDA CAM 2, FTA	0.00%	0.00%	0.94%	0.00%	0.24%
FTPYME TDA CAM 4, FTA	0.54%	0.40%	0.38%	0.22%	0.39%
IFTPYME TDA CAM 7, FTA	0.94%	1.31%	0.88%	0.44%	0.89%
IM CAJAMAR EMPRESAS 4	0.46%	1.28%	1.07%	2.49%	1.33%
IM CAJAMAR EMPRESAS 5	0.92%	1.09%	0.57%	4.66%	1.81%

Source: European DataWarehouse

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