

EUROPEAN DATAWAREHOUSE

EXPLANATORY REPORT ON INDEXED PROPERTY VALUES

The Loan To Value (LTV) ratio is “... the ratio between the principal balance on the mortgage and the appraised value of the property serving as security for the loan itself”, and is a key credit risk indicator for mortgages.

It is used in financial regulation, rating agency methodologies, and bank credit policy. Rating agencies use it to determine mortgage Default Probability (DP)² and Loss Given Default (LGD)³. The LTV is typically used at loan origination, and for ongoing credit risk monitoring, to assess the amount of equity a borrower has in their property. A higher LTV indicates less equity and higher risk, both in terms of default and expected loss. Ideally, the LTV should be updated to reflect both the changing balance of the loan and the changing value of the property used as a guarantee. As our data shows, property values are seldom updated.

In our HYPOSTAT 2017⁴ article, we discussed the importance of considering the changing value of the collateral when calculating the updated LTV. We concluded that it would be beneficial for our data users to have access to updated property values and LTVs. We noted nevertheless that indexation still came with some limitations.

In our HYPOSTAT 2018 article, we calculated indexed LTVs for Spain and compared the performance of mortgages depending on their LTV, using either original or indexed LTVs (Appendix 3). We saw that the indexed LTV is a better explanatory variable for performance and why this may be the case. In both articles, we also showed that the current value of the property is not always reflected in the LTV and that the most common method for revaluation is indexation.

Due to information availability constraints, indexation is also the most practical way to produce updated property valuations and LTVs. This explanatory report explains how we produced our indexed LTVs for Spain and why. Eventually, we plan to make these adjusted values available to our data users, for Spain as well as for other countries.

1 DBRS definition, see also “DBRS Master European Residential Mortgage-Backed Securities Rating Methodology”, August 2010.

2 A high LTV at origination implies higher leverage and therefore, higher risk. It implies that the borrower either had to borrow more to buy the property, or, if he chose to borrow more, that he had more risk appetite. Also, the amount of equity invested in the property can be used as an indicator of willingness to pay. Updated LTVs also have default-predicting power. For instance, a borrower with a low current LTV, facing difficulties can more easily refinance or sell his property than a borrower with a high current LTV. Also, in non-recourse jurisdictions, borrowers are more likely to default when they have no equity left in their property.

3 Calculating the current LTV (using an updated property value) is the typical starting point for an expected loss calculation. Upon default, the property backing the loan is typically repossessed by the lender and sold. The proceeds are first used to pay the liquidation costs and then to repay the senior and then junior loans if any. Losses can occur if the proceeds are insufficient. A given LTV ratio will have different implications depending on country or market-specific variables such as the ranking of the loan, the liquidation expenses, the timing of recoveries etc. Overestimating the value of the property for the updated LTV thus results in an underestimation of the LGD. Beyond a general market decline in house prices, other factors, such as lack of maintenance, can also affect the value of a property. This is particularly relevant for borrowers who are about to default and may have neither the means nor the will to maintain the property.

4 See Hypostat 2018 “[Monitoring the Current LTV](#)”, see also Hypostat 2017 “[The “V” in LTV and why it matters](#)”

CHOICE OF AN INDEX

For our property indexation, for Spain, we will primarily use the Instituto Nacional de Estadística's (INE) regional second-hand dwellings indices, completed before Q2 2007 by the Ministerio de Fomento (Fomento's) regional indices. Fomento's and the INE's house price indices are the most commonly used publicly available house price indices in Spain⁵. These indices differ in the following ways:

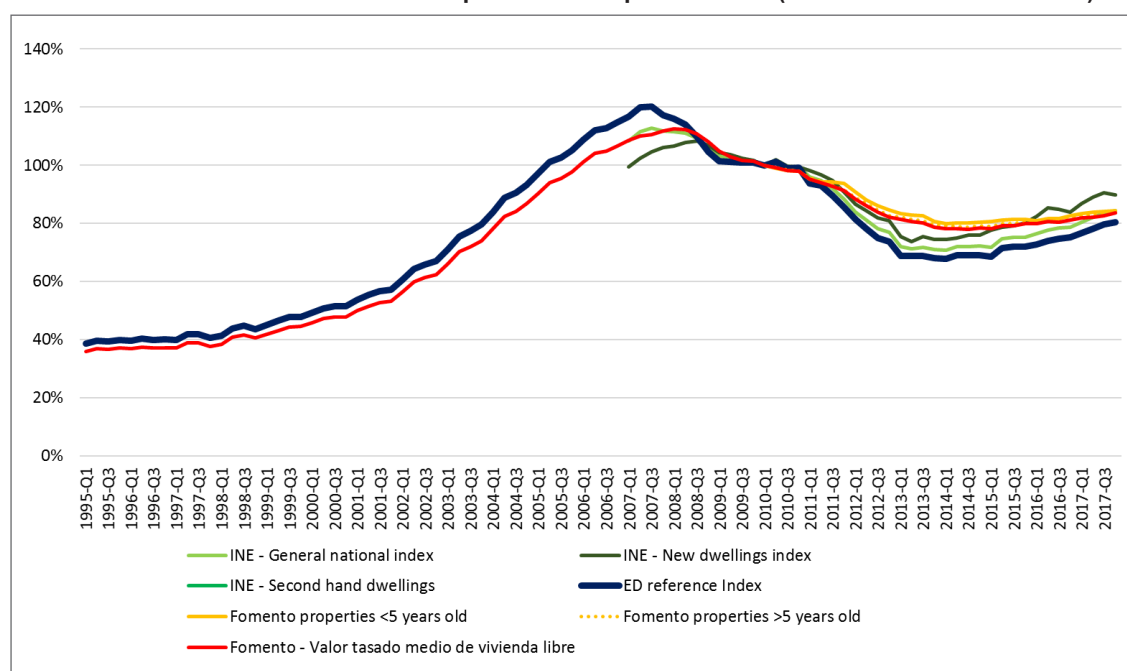
- Fomento's indices are based on property price evaluations, while the INE index covers almost all recorded transactions in the Spanish market.
- Time coverage is also different, Fomento's general index has been available since 1995, to which it added its sub-indices in 2010 Q1. The INE Indices start in 2007 Q1.
- Fomento's indices are also available at the province level (NUTS 3), whereas the INE indices are available at the autonomous community level (NUTS 2) only.
- Further segmentations are available for Fomento's and the INE's indices. Beyond the main index, there are indices tracking new versus older properties.

Exhibit 1 compares the main indices available for Spain to the composite index European DataWarehouse (ED) will use for indexation. All indices show the same general evolution, with a peak in 2007 and a slump afterwards, bottoming in 2013 and recovering after. Nevertheless, the patterns of these indices differ on the following points:

- The INE general index and Fomento's show a comparable evolution until 2011 Q3; after this period, INE indices decrease more severely than Fomento's.
- Fomento's three indices are not as strongly differentiated as the INE's and appear less volatile overall.
- The INE's second hand index shows the most extreme variations in performance, with a higher peak than other indices, and a lower low point.
- The gap between the INE's general index and Fomento's was widest in Q1-2013 but became smaller afterwards.
- The INE's new dwellings index performs better than the other indices from the INE, and Fomento's index for recent properties (<5 years) also performs better than the other Fomento indices.

⁵ For more details, please see [Instituto Nacional de Estadística](#), [Ministerio de Fomento](#), see also [Tinsa](#)

Exhibit 1: Evolution of various official Spanish house price indices (rescaled to 100 in 2010-Q1)



Source : Instituto Nacional de Estadística, Ministerio de Fomento, European DataWarehouse

We found the INE's second hand dwellings index more appropriate for indexation going forward, because in terms of coverage, it considers almost all the properties sold in Spain, reflecting the actual market value of the properties. We considered using a new dwellings index for new properties and then switching to a second-hand index once they have the appropriate seasoning, but we found this solution to be too impractical to implement. Also, most properties either are or eventually become second hand dwellings. Last, because the house price index for second hand properties is more volatile, it is more conservative to assume that all properties are second hand⁶.

One limitation of the INE's second hand dwellings index is that it only started in Q1 2007. ED thus decided to complete it with the main Fomento index until Q2 2007⁷, and use the INE "second hand dwellings" index going forward. This results in the "ED reference index" for Spain shown in Exhibit 4. Similar indices are also calculated and maintained at the Geo_1 level⁸ so that our indexation can be done at the regional level (Autonomous community/NUTS 2).

DESCRIPTION OF THE UPDATE PROCESS

Several mandatory fields in the ECB's RMBS template are related to the property valuation and LTV calculation. Field AR135 "Original Loan to Value", is expected to be the ratio of field AR66 "Original Balance" to AR136 "Valuation Amount". The Valuation Type (AR137) and Valuation Date (AR138) corresponding to AR136 are also mandatory fields. Other fields refer to the Current Valuation Amount (AR143), Type (AR144) and Date (AR145). In case the property value was never re-evaluated, we would expect AR143, AR144, AR145 to match AR136, AR137 and AR138 respectively.

6 Indeed, exhibit 4 shows that the INE's second hand dwellings index decreased more severely than the new dwellings index, while Fomento's Index for properties older than 5 years shows a steeper decrease than the index for properties more recent than 5 years.

7 For this, ED scaled the Fomento's index to be equal to 100 for all regions in 2007 Q2, so as to have a reasonably seamless continuation with the INE's index from that point onwards. The INE Index was scaled to 100 in 2007.

8 Please refer to our explanatory report on the production of regional identifiers for Spanish loans

ED calculates a loan's indexed property value for a given submission date by indexing the last valuation amount available at that date, using the appropriate regional house price index. The flowchart in Appendix 2 describes the calculation process. As a starting point for the calculation of the indexed property valuation "Val_Indexed", ED uses the revised property valuation amount and the corresponding valuation date if available (AR143 – Current Valuation Amount and AR145 – Current Valuation Date, respectively). In case the quarter of the valuation corresponds to the LLD (loan level data) date, the value is left unchanged (Val_Indexed = AR143) because then it is current. If no revaluation is provided, we rely on the value of the property reported in AR136 as of the date reported in AR138 to calculate the indexed property value. The indexation is done using the applicable regional index we calculated. When the province (Geo_1) cannot be ascertained, ED will use the national index instead of the local index.

Exhibits 2a and 2b illustrate our indexation process. ED first identifies the latest valuation date available (F) corresponding to the latest valuation amount available (E). Only the third loan has been revalued since origination, hence it is the only one for which D and F are different (as well as C and E). The ratio of the latest index value for the region (Exhibit 2b) at T1 to the corresponding index value in the same quarter as F (i.e. index factor) is multiplied by the latest valuation amount (E) to find the indexed valuation amount (Val_Indexed). In turn, the indexed LTV (LTV_Indexed) is the ratio of the current loan amount (B) to (H).

Exhibit 2a: Example of update of valuation and LTV

Geo_1	Original Loan Amount (A)	Current Loan Amount (B)	Original Valuation Amount (C)	Original Valuation Date (D)	Current Valuation Amount (E)	Current Valuation Date (F)	Original LTV (A/C)	Index Factor G = I/H	Val_Indexed = E * G	LTV_Indexed = Current Loan Amount / LTV_Indexed
Andalucía	173,000	141,563	205,000	2007-Q2	205,000	2007-Q2	84.39%	0.72	147,489	95.98%
Canarias	165,000	83,324	173,000	2007-Q4	173,000	2007-Q4	95.38%	0.73	126,217	66.02%
Castilla La M.	215,000	105,127	243,000	2007-Q4	195,000	2017-Q3	88.48%	0.99	193,758	54.26%

Source: European DataWarehouse

Exhibit 2b: Index values (INE index rebased to 100 in 2015)

	2017-Q4	2017-Q3	[...]	2007-Q4	2007-Q3	2007-Q2	Index factor*
Andalucía	107.12	106.21	[...]	150.19	151.05	148.89	0.72
Canarias	109.86	107.58	[...]	150.58	152.10	150.97	0.73
Castilla La M.	99.81	100.45	[...]	159.75	164.70	162.85	0.99

Index values at T0 (H)

Index values at T1 (I)

*Values at T1/Values at T0

Source: European DataWarehouse; Fomento (up to 2007-Q2); INE (from 2007-Q2 onwards);

Normally, we use the latest available valuation at the latest valuation date as a starting point. However, if the current valuation date is the same as the original valuation date, we use the original valuation amount at the original valuation date instead.⁹ In case the value was never updated, and given that property value

9 ED endeavoured to make its process robust to deal with data errors and non-standard reporting. Data errors, when found, are flagged for future correction and have become rare, but may be observed in the oldest data submissions. In case either the updated value and updated valuation date is not provided, ED will use the original valuation and original date instead. In case the date provided in AR138 is more recent than the AR145 date, ED will use AR136 as a reference valuation instead. In some cases, the valuation was updated although the valuation date was not. In such case, there is a risk to overcorrect the property valuation. We view this as a data quality issue and are liaising with data provider to have the appropriate valuation date provided.

and valuation date fields are mandatory, it is expected that AR145 (Current Valuation Date) should be equal to AR138 (Valuation Date) and that AR143 (Current Valuation Amount) should be the same as AR136 (Valuation Amount).

THE LIMITATIONS OF INDEXATION

While a LTV based on an indexed value provides a fairer picture than a non-indexed LTV, it is important to note that even a LTV recalculated using an indexed property value (Loan To Indexed Value - LTIV) should be treated cautiously. House price indices are generally only provided at a broad regional level even though there may be important differences in the evolution of property prices within this region. Exhibit 3 shows the LTV calculations that can be obtained when comparing a property in a prime location with a property in a more vulnerable location within the same geographic area (and thus updated with the same index). Assuming similar loan characteristics, including a LTV at origination of 80% and a value at origination of €100,000 for both properties, the current Loan To Original Value (LTOV) would now be 70% for both. If the relevant property index dropped 20% since origination, the indexed property value would then be €80,000 for both loans within this area and the LTIV (using the indexed value) would be 87.5% for both. If, in fact, the value of the property in the prime location only dropped by 10% while the value of the property in the newly developed location fell by 30% (20% on average), a fairer LTV based on an individual revaluation of property prices would show a 77.8% LTV for property 1 and a 100% LTV for property 2. If a buffer of 10% is needed to avoid losses upon liquidation (i.e. a 90% LTV), only the second, more precise calculation implies a risk of loss on property 2. Moody's noted, in a study of Spanish repossessed properties using European DataWarehouse data, that overall, the price depreciation on foreclosed properties was substantially more severe than indicated by house price indices. They attributed this worse than average price depreciation for distressed properties to "...the forced sale process of distressed properties as opposed to sales between willing market participants"¹⁰. Thus, even when using indexed valuations, data users may have to consider the risk that the actual drop in value may be more severe than suggested by the index. Indexed valuations may be correct at the portfolio level overall, and yet still overestimate prices for some loans. Unfortunately, under evaluations on some loans will not compensate over evaluations on other loans.

Exhibit 3: Influence of house price changes on LTV calculation

	Property Value at origination 2006 (A)	Loan Amount at origination 2006 (B)	Loan Amount Now (C)	Property Value Now - Indexed (D)	Property Value Now - Full review (E)	OLT 2006 (B/A)	LTOV 2012 (C/A)	LTIV (C/D)	LTUV (C/E)
Property 1 (10% price drop)	100,000	80,000	70,000	80,000	90,000	80.0%	70.0%	87.5%	77.8%
Property 2 (30% price drop)	100,000	80,000	70,000	80,000	70,000	80.0%	70.0%	87.5%	100.0%

Source: European DataWarehouse; HYPOSTAT 2017

CONCLUDING REMARKS

Updated property valuations are key to LTV monitoring and yet, as we saw, not all property valuations submitted to our database are updated regularly. We intend to fill this gap by providing updated property valuations and LTVs. We will start with the Spanish market and will address other markets at a later stage. We will use some form of indexation to update our valuations, as this is the most practical and widely used procedure. As demonstrated however, please note that even indexed valuations should be looked at critically.

¹⁰ See: [Moody's sector comment](#), "Recovery Rates Remain Within our Assumptions, Amid Weakened Repossessed Property Prices", February 2017.

APPENDIX 1: VALUATION-RELATED FIELDS AND REVALUATION PRACTICES

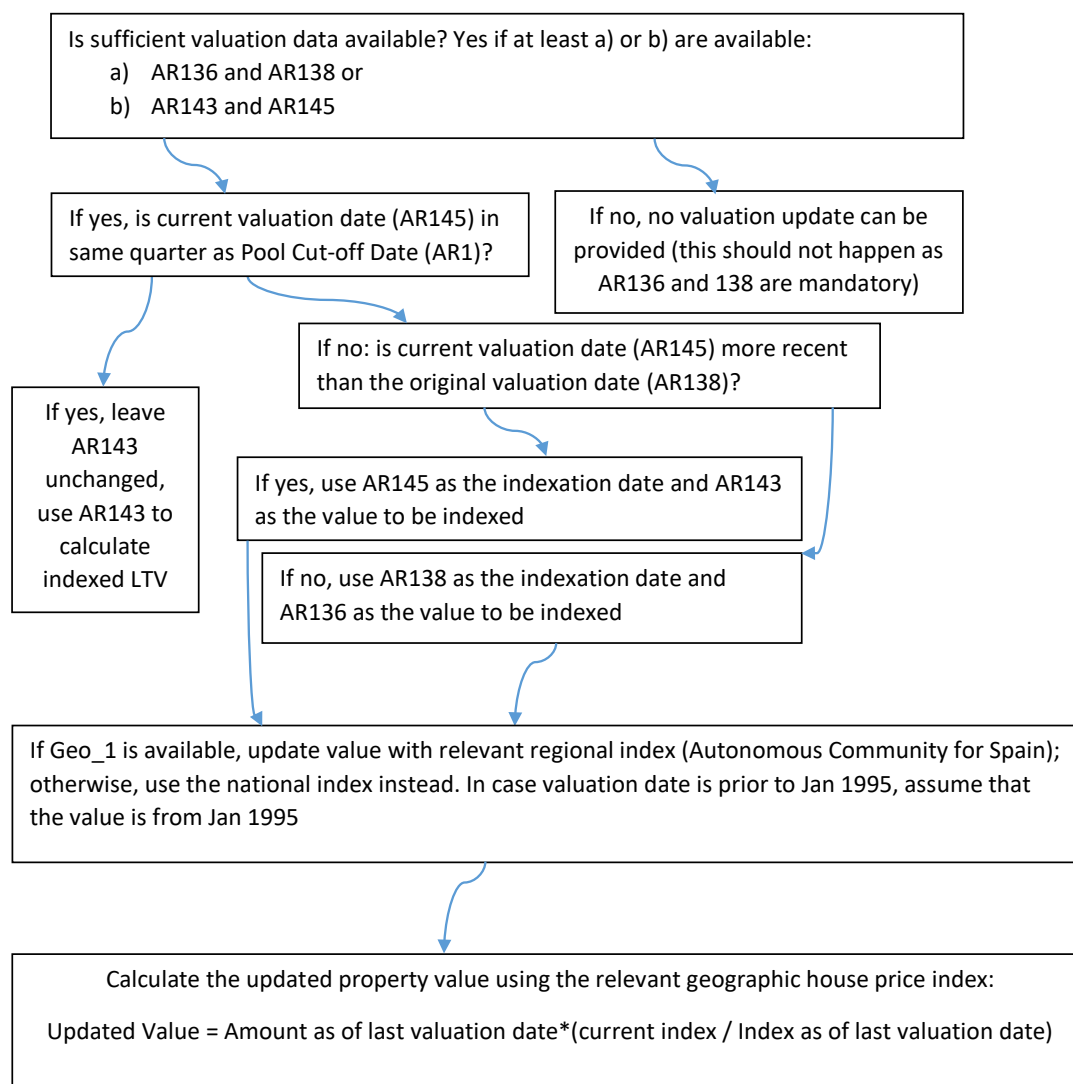
Exhibit 4: Main LTV-related fields in the ECB RMBS template¹¹

Field Number	Priority	TAG	Field Name
AR135	Mandatory	Static	Original Loan to Value
AR136	Mandatory	Static	Valuation Amount
AR137	Mandatory	Static	Original Valuation Type
AR138	Mandatory	Static	Valuation Date
AR139	Optional	Static	Confidence Interval for Original Automated Valuation Model Valuation
AR140	Optional	Static	Provider of Original Automated Valuation Model Valuation
AR141	Mandatory	Dynamic	Current Loan to Value
AR142	Optional	Static	Purchase Price Lower Limit
AR143	Mandatory	Dynamic	Current Valuation Amount
AR144	Mandatory	Dynamic	Current Valuation Type
AR145	Mandatory	Dynamic	Current Valuation Date
AR146	Optional	Dynamic	Confidence Interval for Current Automated Valuation Model Valuation
AR147	Optional	Dynamic	Provider of Current Automated Valuation Model Valuation
AR148	Optional	Dynamic	Property Value at Time of Latest Loan Advance
AR149	Optional	Static	Indexed Foreclosure Value
AR179	Mandatory	Dynamic	Sale Price lower limit

Source: European DataWarehouse; European Central Bank

¹¹ See [ECB RMBS Template and taxonomy](#)

APPENDIX 2: DECISION TREE TO CALCULATE INDEXED PROPERTY VALUES



Source: European DataWarehouse;

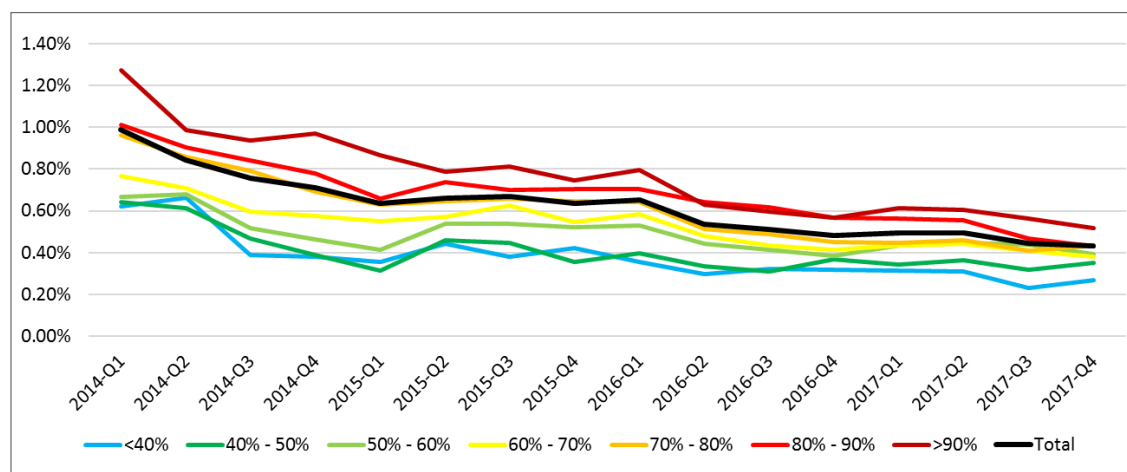
APPENDIX 3: SPANISH RMBS INDICES BY INDEXED LTVs

Our Spanish RMBS indices show the performance of Spanish mortgages depending on their LTV. Mortgages with the highest original LTVs (OLTV) perform worst (Exhibit 5a), but Exhibit 5b shows an even stronger relationship if the loans are classified according to their current LTV (CLTV). Thus, if loans are sorted in a specific category one time only in Exhibit 5a, they can change categories overtime in Exhibit 5b, depending on their deleveraging. Our HYPOSTAT 2018 article discusses the reasons for this relationship. The indices compare the amount of loans more than 90 days in arrears but less than 360 days in arrears to the amount of non-defaulted loans (in Spanish securitisations, loans are typically considered defaulted when they are more than 12 or 18 months in arrears). Because of differences in reporting¹², the number of months in arrears were adjusted, so as to be comparable. Details regarding the calculation of these indices are available in the PDF version of our index.¹³

¹² See [European DataWarehouse Commentary on Spanish RMBS Loan Level Data](#), January 2016

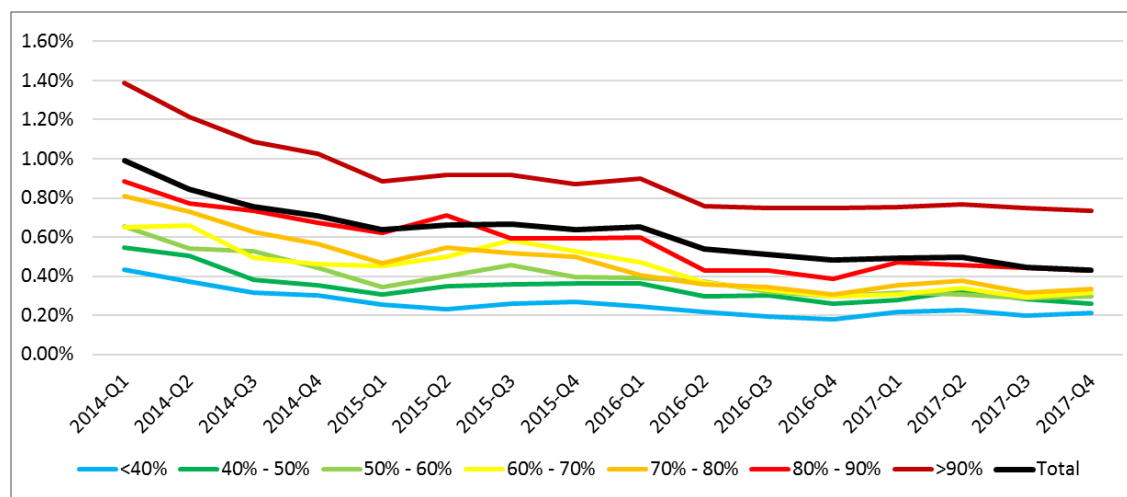
¹³ Please [contact us](#) to receive a copy

Exhibit 5a: Delinquency 90-360 days as % of non-defaulted loans by OLTV



Source: European DataWarehouse SPANISH RMBS INDEX; HYPOSTAT 2018

Exhibit 5b: Delinquency 90-360 days as % of non-defaulted loans by CLTV



Source: European DataWarehouse SPANISH RMBS INDEX; HYPOSTAT 2018

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