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The quality and independence of residential property appraisals

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Authors
Remco van der Molen, Rob Nijskens (DNB)

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De Nederlandsche Bank N.V.
P.O. Box 98
1000 AB Amsterdam
www.dnb.nl
Email: info@dnb.nl

The quality and independence of residential property appraisals

Remco van der Molen, Rob Nijskens (DNB)[1]

1 This study was conducted by De Nederlandsche Bank (DNB), partly at the request of the Ministry of the Interior and Kingdom Relations. DNB wishes to thank the banks concerned for providing the necessary data. DNB and the AFM wish to thank the participants in the roundtable discussion on residential property appraisals and the bidding process in the residential property market, held on 20 November 2018 at DNB, for sharing their expertise and providing valuable comments on the initial results of the analysis.

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Summary

The reliability of appraisals is crucial for accurate valuation of residential and commercial real estate. Systematic overvaluation can lead to overborrowing by homebuyers and an underestimation of the credit risk in mortgage loans. The size of real estate markets and the financial institutions' exposure to those markets make the reliability of appraisals crucial for the proper operation of the financial system. Various stakeholders have recently voiced concerns about the reliability of residential property appraisals.

This research shows that the appraisal value of residential property is equal to or higher than the purchase price in almost 95% of cases. It is higher than the purchase price in almost 60% of cases. The average overvaluation is 5%, with the median at 2.3%. In one-third of cases the appraisal value is exactly the same as the purchase price (down to the last euro). This suggests that in these cases appraisers are influenced by the purchase price. These figures are based on over 200,000 residential property appraisals conducted between 2012 and 2017. DNB's research shows that overvaluation is slightly more common among first-time buyers than existing homeowners. No differences were found between areas with high and lower price pressure, and the observed overvaluation cannot be explained by the fact that most residential property appraisals were conducted in a rising market. Since the introduction of the statutory LTV limit in 2013, appraisals exactly matching the purchase price have become more common, while those above the purchase price have become less common.

Hence there is systematic overvaluation in residential property appraisals. It also appears that in many cases the value is not arrived at independently, but is based on the purchase price. Both these factors can be drivers of overheating in the residential property market and undermine the effectiveness of the LTV limit. Although this LTV limit has been tightened to prevent excessive borrowing, households may still overborrow due to

systematic overvaluation. Financial institutions consequently also tend to underestimate the credit risks attached to their mortgage loans. The incentives in the current system put pressure on the independence of the appraiser. The parties concerned in the purchase of a home – buyer, seller, real estate agent, adviser and credit provider – have an interest in the completion of the transaction, and in receiving the necessary valuation from the appraiser.

The results of this analysis have been discussed with representatives of the sector. While opinions on the causes of overvaluation vary, all parties acknowledge the results. They agree that there are flaws in the current system of residential property appraisal and that these contribute to the volatility in the housing market. However, the sector seems to lack the capability to remedy these flaws by itself. The fact that the various parties involved have different interests also plays a role.

This analysis shows that measures need to be taken to improve the independence and hence the quality of appraisals. DNB and the Dutch Authority for the Financial Markets (AFM) had already concluded that the sector lacked self-regulation capability and therefore recommended imposing statutory standards to improve the quality of residential property appraisals.[2] The efforts made by the Ministry of the Interior and Kingdom Relations to bring about these improvements are therefore to be welcomed.[3]

2 See the 2018 Legislative Letter from DNB, https://www.rijksoverheid.nl/documenten/kamerstukken/2018/04/26/wetgevingsbrief-2018-op-het- terrein-van-de-financiele-markten

3 For further details see the Letter to Parliament from the Minister of the Interior and Kingdom Relations on appraisals for residential property purchases, which was sent to the Dutch Lower House of Parliament at the same time as this study.

1 Background

Various stakeholders have recently voiced concern about the quality and independence of residential property appraisals.[4] It should be noted that all parties involved in a residential property purchase – buyer, real estate agent, adviser and credit provider – have an interest in the completion of the transaction, and therefore benefit from a sufficiently high appraisal value. They can pressure the appraiser to set the appraisal value at least at a level that will allow the transaction (and any financing) to proceed. This makes it more difficult for the appraiser to set a value independently and can lead to high or excessive valuations.

The Financial Stability Committee (FSC) has also been concerned for some time about the quality of valuations and residential property appraisals.[5] From the perspective of financial stability, appraisers are crucial for the correct valuation of residential and commercial real estate. Systematic overvaluations of residential property can result in implicit overborrowing by homebuyers measured by loan-to-value (LTV). Accurate and reliable appraisals also help ensure accurate assessment of the credit risk of mortgage loans and are of great importance for investors in real estate funds. Given the scale of real estate markets and banks' exposure to those markets, good appraisals are relevant to financial stability.

Appraisals play an important role in determining the borrowing capacity of homebuyers and in the risk that mortgage lenders incur. Since 2018 mortgage loans have been capped at 100% of the value of the home. The purchase of a home can therefore only be fully financed with a

4 See for example Trouw, 14 September 2018, "Kopers en banken vragen taxateurs om een zo hoog mogelijke huizenprijs - en krijgen die steeds vaker", https://www.trouw.nl/home/kopers-en-banken-vragen-taxateurs-om-een-zo-hoog-mogelijke-huizenprijs-en-krijgen-die-steeds-vaker~a9da0f0f/ and the Nijboer motion of 14 November 2018, https://www.tweedekamer.nl/kamerstukken/moties/detail?id=2018Z21001&did=2018D54283

5 Report of the FSC of 8 November 2016 and 22 November 2017: http://www.financieelstabiliteitscomite.nl/nl/nieuws/nieuwsbericht/42; http://www.financieelstabiliteitscomite.nl/nl/nieuws/nieuwsbericht/45

mortgage loan if the appraisal value is at least equal to the purchase price. In most cases this value is determined on the basis of an appraisal by an appraiser. The quality of this appraisal is therefore also important for the operation of the LTV limit: the appraisal determines the "V", and hence the effectiveness of LTV regulation. The LTV limit for residential mortgages has gradually decreased in recent years. The importance of the appraisal value has consequently increased, underlining the importance of good and independent valuations. If appraisals are unreliable and the value of a home is overestimated, the risks to the financial sector and consumers will increase.

The sector, NHG (National Mortgage Guarantee) and the supervisory authorities AFM and DNB have made efforts to strengthen the independence and quality assurance of real estate appraisals in recent years. Good regulation can serve as a counterweight to the commercial incentives to which appraisers are exposed and helps to guarantee their independence. In their letter of 14 June 2017 to the NRVT (the Dutch Register of Real Estate Valuers), the AFM and DNB concluded that the chosen self-regulation route had so far proved inadequate and that the valuation profession should be legally regulated. Legal supervision would support the further development of the profession, with a focus on the public interest. In their 2018 Legislative Letter, both DNB and the AFM therefore requested the Minister of Finance to consult with the Minister of the Interior and Kingdom Relations with a view to agreeing legal standards for real estate appraisers.[6] In 2018 the Ministry of the Interior and Kingdom Relations initiated a process to assess the quality of residential property

6 https://www.rijksoverheid.nl/documenten/kamerstukken/2018/04/26/wetgevingsbrief-2018-op-het-terrein-van-de-financiele-markten

appraisals and prepare potential improvement measures. This study was conducted partly in the context of that process.

In this study we analyse the difference between the purchase price and the appraisal value, as a measure of the quality of residential property appraisals. The research approach and the data used are described in the next section. Section 3 describes the results, including checks of the robustness of these results for the different time periods, regions and LTV limits. Finally, we summarise the results and draw policy conclusions.

2 Approach

The difference between the sale price and the appraised value of a home is a good measure of the reliability and quality of a residential property appraisal. The purpose of such an appraisal, after all, is to approximate the market value as effectively as possible. In order to determine the market value of a home, we therefore look at the sale price when it is sold. Although the agreed purchase price is not necessarily the same as the market value, it is normally a good approximation of the market value.[7] When a home changes owner, an appraisal is usually conducted on behalf of the purchaser or prospective purchaser, partly because it is often a condition set by lenders for granting a mortgage loan. In a home sale we can therefore observe both the purchase price (as an approximation of the market value) and the appraised value of a home. Since we need both values in order to carry out our analysis, we have limited our research to residential property appraisals conducted as part of a transaction.

If the sample is sufficiently large, it can be expected that a residential property appraisal focused on a market value approach will on average not differ systematically from the sale price. In addition, in a properly functioning appraisal market that is free of any systematic upward or downward distortion of appraisals, the deviation between the appraisal value and sale price is symmetrically divided, with the number of valuations *below* the sale price being almost equal to the number of appraisals *above* the sale price.

7 The market value is the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion (International Valuation Standards 2017).

This brings us to the next research questions:

- **Main question**: How does the appraisal value differ from the purchase price? Is there a systematic deviation?
- **Subquestion**: How does this difference relate to factors such as the year of issue, the type of purchaser (first-time buyer[8] or existing homeowner), the LTV ratio of the loan, the institution granting the loan, the size of the loan and the location of the home?

Data

For this research we used the DNB Loan Level Data for mortgages (LLD) augmented with an additional data request. The LLD is supplied quarterly by Dutch banks and contains details of the majority of Dutch mortgages.[9] Since the purchase price is not a standard part of this dataset, additional data was requested in April 2018. The sample for this research comprises data from ABN Amro, Achmea, ING, Rabobank, Obvion and NIBC; these are the mortgage lenders that were able to supply the purchase price in the correct way.

In order to create a workable dataset, we have applied a number of criteria. We started with over 2.4 million loans from the above banks. The main requirement for this research was that both the purchase price and the appraisal were available: this was the case for over one million loans. 'We also eliminated all loans not involving a physical appraisal, such as desktop appraisals or the official valuation provided by the local authorities based on the Real Estate Valuation Act (WOZ), since the research focused on physical

8 We cannot identify first-time buyers directly in the data. We define a first-time buyer in this data as an individual below the age of 35.
9 For further information on this dataset see: Mastrogiacomo and Van der Molen (2015), Dutch mortgages in the DNB loan level data, DNB Occasional Study.

valuations. In addition, we eliminated loans used to finance a renovation and loans with an excessive absolute difference (>50%) between the purchase price and the appraisal. This left us with 570,000 loans. Discussions with the banks also showed that the quality of pre-2012 purchase price data was not sufficient in all banks. After eliminating all loans from before 2012, we were left with a total of 290,000 loans. The annex contains more details concerning the data and selection methods.

Because we did not always have access to the sale date, we used additional information to ascertain whether a loan was indeed obtained to purchase a home. We asked banks to state whether a loan was intended for a home purchase (and not, for example, for refinancing or a renovation), and take all these loans into account. We also only used loans in which the appraisal date and the start date of the loan were no more than nine months apart.[10] This selection ultimately yielded 216,000 usable observations.[11]

Method

To answer the research questions we compared the appraisal value with the purchase price for each loan. We assessed the percentage of the loans with an appraisal value below the purchase price, equal to the purchase price and above the purchase price. We did this for the entire sample, but also for different segments: first-time buyers and existing homeowners, the year of issue, the LTV ratio (above or below the LTV limit), the size of the loan and the location of the home. We relied especially on a visual presentation of the results.

10 Over 80% of the appraisals, however, were conducted a maximum of three months before the loan date.
11 This selection procedure could lead to a random sample that is not representative of all residential property appraisals. Later in this document we will show that this does not significantly affect the results.

To obtain a concise overview of the degree of overvaluation, we also calculated a number of spread measures. Such measures are generally also used to test the quality of automated valuation models (model appraisals).

- The ratio of valuation and purchase price, and the median of these, the average and the weighted average.
  The spread coefficient (also referred to as the coefficient of dispersion, COD) in order to quantify the spread of ratios around the median:

$$COD = \frac{\sum_{i=m}^{n} | ratio_i - median |}{n \times median} \times 100\%$$

  The larger the COD, the more skewed is the allocation of the ratio across the sample.
- The confidence interval of the ratio, in order to quantify the accuracy of the measured values in the sample. The smaller this interval, the more representative the measured values are likely to be of the entire population (in this case all appraisals in the Netherlands).

3 Results

Difference between appraisal value and purchase price

Figure 1 shows the skewed allocation of the difference between the appraisal value and the purchase price. In one-third of cases the appraisal value is exactly the same as the purchase price, down to the last euro. It is higher than the purchase price in almost 60% of cases. In these cases the average overvaluation is 5.2% of the purchase price and the median is 2.3%. The fact that the average is over twice as high as the median indicates the presence of a number of extreme observations, which can also be seen in the figure. In 18% of cases the overvaluation is more than 5%. An appraisal value that is lower than the purchase price occurs substantially less often; in barely 8% of cases.

The first striking result from Figure 1 is that the appraisal value is much more frequently above the purchase price than below it. The sample therefore appears to show a systematic overvaluation in residential property appraisals, which we will analyse further below.

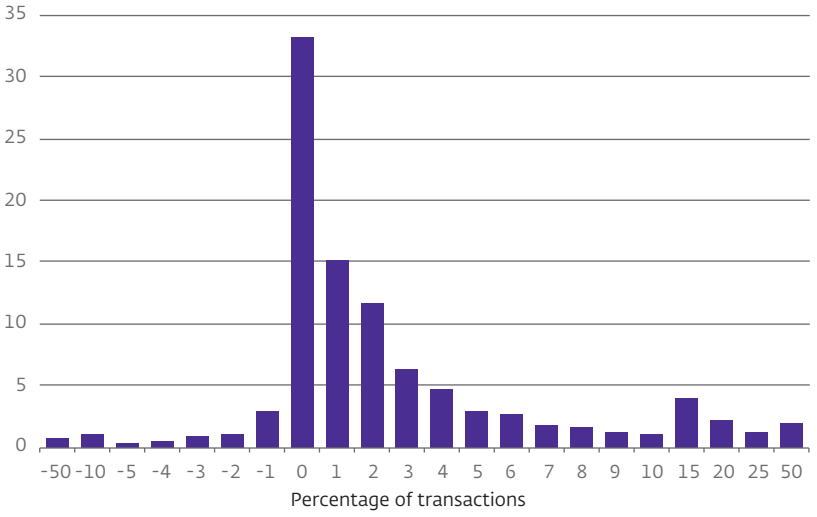
A second striking result is the large number of observations in which the appraisal value is exactly the same as the purchase price. We call these observations "zeros". Although an appraisal value close to the purchase price is in principle a good appraisal in our methodology (because it is a small deviation), it is very unlikely that in one-third of cases appraisers will independently give an appraisal value that is exactly the same as the purchase price.

An obvious explanation for the large proportion of zeros is that the appraiser based the appraisal value on the purchase price. The appraiser can do that because he is usually aware of the agreed purchase price before the appraisal. Without this prior information it is unlikely that the appraised

value would be exactly the same as the purchase price in one-third of cases. If the appraiser determines the appraisal value on the basis of the purchase price, the buyer will determine the value of the home, whereas it is the job of the appraiser to determine it on the basis of objective criteria and guidelines. In that case, therefore, the valuation is not independent.

Figure 1 Distribution of difference between appraisal value and purchase price

Percentage of transactions



Source: DNB

Note: For negative values the bars represent a percentage from this value to the next, and for positive values a percentage up to and including this value. The "0" bar represents a difference of exactly EUR 0.

It is unlikely that the large number of zeros is caused by the fact that banks report purchase prices as the appraisal value. Although in the past it was not uncommon for banks to use the purchase price to determine the value of the home, such a reporting method is unlikely to be the cause of the large number of zeros. In the spring of 2016 the new European Mortgage Credit Directive (MCD) came into force, prohibiting the use of the purchase price as the valuation. The value of the home must be based on an appraisal that is produced independently and fulfils internationally recognised standards for reliable valuations. The purchase price does not meet these criteria. We do not see a steep fall in the number of zeros in 2016 and 2017. This indicates that in the preceding years banks were not systematically using the purchase price as a collateral value: had this been the case, the MCD should have led to a substantial reduction in the use of purchase prices and hence the number of zeros. In addition, when obtaining the data we explicitly asked banks to report purchase prices only if they did not use them to determine the value of the collateral in their systems. Moreover, only appraisal values reported by banks as being based on a full physical appraisal were included. Furthermore, the fact that the results of each bank differ little in terms of the share of zeros (see later in this document), even though banks use very different administrative methods, bears out our conclusion that the large proportion of zeros is not explained by banks' reporting methods.

Table 1 then shows the average, median and weighted average of the ratio of appraisal value to purchase price. This shows that the average overvaluation is 5.2% and the median is 2.3%. The confidence intervals show that on the basis of this sample we can conclude that there is overvaluation in residential property appraisals. The weighted average is higher, showing that the difference between the appraisal value and the purchase price is greater in the case of more expensive homes than less expensive homes.

Table 1 Spread measures of the appraisal/purchase price ratio

Measure	All appraisals	Appraisals below the purchase price	Appraisals above the purchase price
Average ratio	1.029	0.963	1.053
Confidence interval (95%)	[1.0285;1.0291]	[0.9619;0.9637]	[1.0530;1.0538]
Median ratio	1.006	0.986	1.023
Weighted average ratio[a]	1.031	0.974	1.056
Spread coefficient	2.327	1.482	2.829

[a] Weighting based on the appraisal value

The spread coefficients also show that the appraisals with overvaluation have a much greater dispersion than appraisals below the purchase price.

An important question is the extent to which these results are representative of all residential property appraisals. Our sample only covers appraisals used to conclude a mortgage with one of the six banks in our sample and therefore only those cases in which the bank has all the required data. To check whether our results also stand up outside our sample, we asked the Dutch Home Value Institute (NWWI), the largest valuation body for appraisals in the Netherlands, whether it recognised these results. The NWWI said that a comparison of the purchase price and appraisal value in over 300,000 appraisals in the period from April 2016 to April 2018 presented a similar picture to the one in this study. This suggests that our results would also apply outside our sample and if other data sources were used.

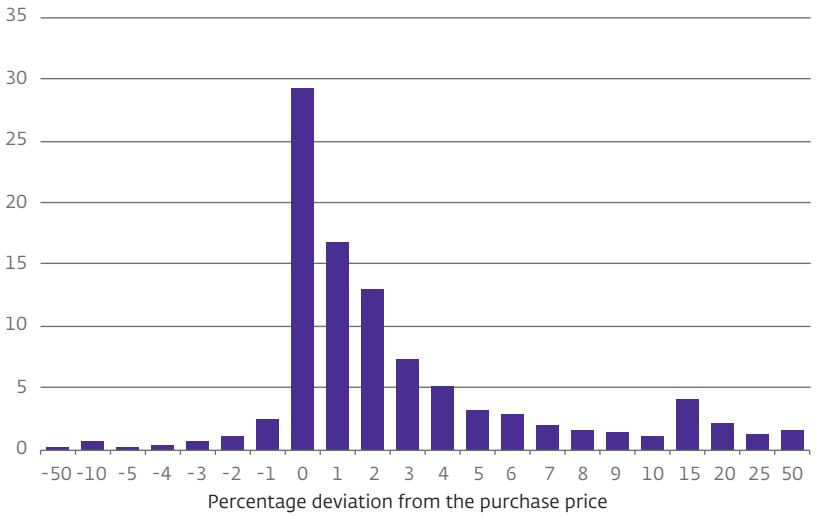
In addition, the sample could possibly be non-random because we include only appraisals that actually led to a transaction. If the appraisal value were much lower than the purchase price, the purchase would be less likely to proceed on the basis of that appraisal. After all, a lower appraisal value would mean less could be borrowed, so a larger proportion of equity would be required. If prospective purchasers were unable or unwilling to provide that equity, the transaction would not be completed. We do not therefore see these appraisals in our dataset, because no mortgage was arranged on the basis of them. It is also conceivable that a homebuyer ordered multiple appraisals and only the highest appears in our sample.

Our assessment is that this potential selection effect does not significantly affect our results. Although we do not have figures, lenders and real estate agents say it is rare for a purchase contract to be cancelled because the appraisal value is too low. A possible explanation is that an appraiser who initially indicates that the purchase price is too high will not be instructed to carry out the appraisal. However, although critical appraisers do exist, an appraiser who will state the required appraisal value can always be found. The NWWI also said it was rare for a client to commission multiple appraisals for the same property in a short space of time.

Overvaluations occur more frequently in transactions of first-time buyers than in those of existing homeowners, but the average overvaluation is smaller (Figure 2). In total we observed over 90,000 transactions by first-time buyers.Around 6% of these had an appraisal value below the purchase price; in 30% of transactions the difference was zero and in almost 65% the appraisal was higher than the purchase price. The proportion of overvaluations among first-time buyers is thus higher than in the case of existing homeowners (55%). At 5.0%, the average overvaluation in these cases among first-time buyers is nevertheless lower than among

Figure 2 Distribution of difference between appraisal value and purchase price for first-time buyers

Percentage of transactions



Source: DNB.

Note: For negative values the bars represent a percentage from this value to the next, and for positive values a percentage up to and including this value. The "0" bar represents a difference of exactly EUR 0.

existing homeowners (5.7%). The median is 2.3% and 2.5%, respectively. The differences are statistically significant to a level of 99%.[12] These results suggest that for first-time buyers the incentives to give a higher appraisal value than the purchase price are stronger than for other transactions. However, this does not lead to a higher average overvaluation.

12 Based on a Wilcoxon rank-sum test.

Development over time

We then looked at how the difference between the appraisal value and the purchase price has developed over time. It should be noted here that the number of observations increases over the years: in 2012 it was 16,000, whereas in 2017 we have 63,000 observations. This is because in recent years banks have kept a record of more purchase prices, so our sample contains relatively more recent observations. The number of residential property transactions has also risen sharply since 2012, so the production of new mortgages has increased.

Since 2013 the proportion of observations in which the appraisal value is exactly equal to the purchase price has increased sharply, while the proportion and extent of overvaluation has decreased (Figure 3). In the subsequent years the proportion of zeros gradually increased, and the proportion of overvaluations gradually decreased. A similar pattern is found in the case of first-time buyers, albeit with more frequent overvaluations and somewhat less frequent zeros. The average difference between the appraisal value and the purchase price in the case of an overvaluation decreases over the years, however: in 2012 it was still 6.3%, whereas in 2017 it fell to 4.9% (the median fell from 4.4% to 1.9%). For first-time buyers the fall is even steeper, from 6.5% to 4.4%, with the median falling from 4.7% to 1.8%. The decrease over the years is statistically significant to a level of 99%, both for the sample as a whole and for first-time buyers.

The decrease in the overvaluation may have to do with developments in the residential property market in the period under review. The sample begins in 2012, when house prices were still falling, and ends in 2017, when prices rose by an average of over 8%. Appraisals usually lag behind the market trend: appraisers base valuations on prices of recent transactions,

but these figures by definition lag several months behind new prices. The sale price is set when the preliminary purchase contract is signed, but only becomes available in the land registry some months later. This implies that during the period of falling house prices (2012 and 2013) appraisers were still giving appraisals above the current market level, which could explain the higher proportion of "overvaluations" in those years. In a rising market with fast-rising sale prices (2016 and 2017) appraisers give a relatively low appraisal, leading to less overvaluation. This is further reinforced by the fact

Figure 3 The distribution of appraisals below, equal to and above the purchase price per year

Percentage of transactions

Source: DNB.

that residential property appraisals for purchases are usually conducted several weeks after the signing of the purchase contract.

This picture is confirmed if we also include available data from the period 2008-2011 and consider the difference between the fall and the rise in the residential property market.[13] We divide the period under review into a bust (2008-2012) and a boom (2013-2017). Figure 4 shows that in 2008-2012 the overvaluation was considerably higher (median = 5.7%) than in 2013-2017 (median = 2.2%).[14] Although there was a gradual decrease in the average deviation and dispersion over time, the decrease in 2013, the year in which the legal LTV limit came into force, is strikingly large. Both periods show a relatively high proportion of zeros, but in the 2008-2012 period the proportion was considerably lower. Moreover, in that period there are also a strikingly large number of appraisals between 5% and 6% above the purchase price.

Appraisals and the LTV limit

The increase in the proportion of zeros suggests that the purchase price has become a more important determinant of the appraisal value. This may have to do with the introduction of the statutory LTV limit from 2013 and its gradual reduction up to 2018. As a result, it became increasingly important for the financing of the home that the appraised value was at least equal to the purchase price.

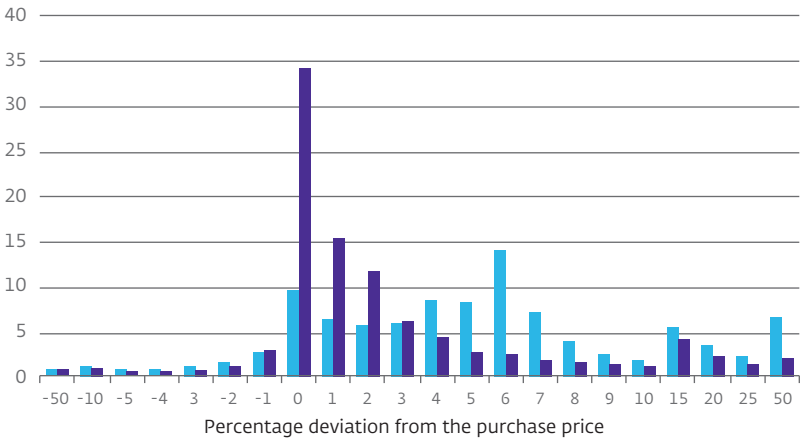
13 Since data for 2008-2011 are less readily available than for the 2012-2017 period, we have not included these observations in our "regular" sample; we only use them to illustrate the difference between rising and falling periods in the housing market.

14 Both the median and the average differ significantly between 2008/2012 and 2013/2017.

The introduction of the LTV limit could also have put pressure on appraisers to issue valuations above the purchase price more frequently. This could help to finance the purchaser's costs, for example. The opposite, however, is the case: the tightening of the LTV limit was actually accompanied by less overvaluation. As we have already stated in this section, the developments in the housing market possibly played a role in this. The lagging nature of residential property appraisals means they are often below the sale prices in a rising market. This makes it difficult to view the effect of the LTV limit reduction in isolation.

Figure 4 Distribution of difference in appraisal value and purchase price for 2008-2012 and 2013-2017

Percentage of transactions



Source: DNB.

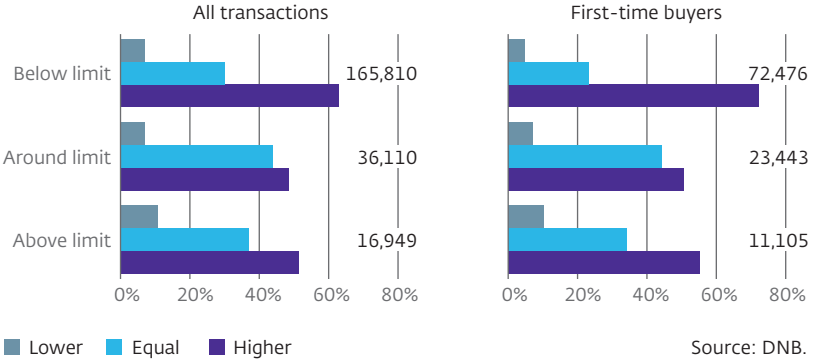
A sufficiently high appraisal value is most important for loans with an LTV around the limit: the LTV limit is more likely to be binding for these loans. In order to investigate the effect of the LTV limit more closely, we therefore draw a distinction between loans with an LTV value that is equal or almost equal to the applicable LTV limit, loans with a lower LTV ratio and loans with an LTV ratio above the limit. The first category, loans with a maximum LTV, has an LTV ratio at the time of concluding the contract that is at most 0.5 percentage points below or above the LTV limit. This concerns 17% of all transactions, and 22% of all transactions by first-time buyers.

In the case of loans with a maximum LTV, the appraised value is more often exactly equal to the purchase price than in the case of loans with a lower LTV (Figure 5). In the case of loans with a maximum LTV it therefore makes no difference whether a first-time buyer or an existing homeowner is buying the property: they have a similar proportion of "zeros". Loans with a lower LTV more often have an overvaluation. Finally, there are also loans with an LTV above the limit (around 17,000, including over 11,000 first-time buyers). These show a similar pattern to the loans below the limit.

In all LTV limit categories, the proportion of loans with valuations above and below the purchase price decreases from 2012. The proportion of loans with an appraisal exactly equal to the purchase price actually increases, analogous to the trend observed in Figure 3. This is most significant for loans around the limit: as noted earlier, for these loans it is most important for the appraisal to not be lower than the LTV limit, nor higher.

Figure 5 Distribution of appraisal value compared to purchase price, for loans around the LTV limit and loans above or below it

Percentage of transactions



Source: DNB.

Note: the horizontal axis shows the percentage of all residential property transactions. The figures in the chart show the number of transactions below, around and above the LTV limit.

A striking detail is that the average difference between the appraisal and the purchase price, i.e. the average of all overvaluations, does not decrease greatly in the case of most loans. For loans below the limit this average has decreased from 6.4% in 2012 to 5.4% in 2017, while for loans above that limit the average has decreased from 5.1% in 2012 to 4% in 2017. Loans around the limit have shown a slight increase in overvaluation: from 4.1% in 2012 to 4.5% in 2017.

Appraisal or purchase price in mortgage lending?

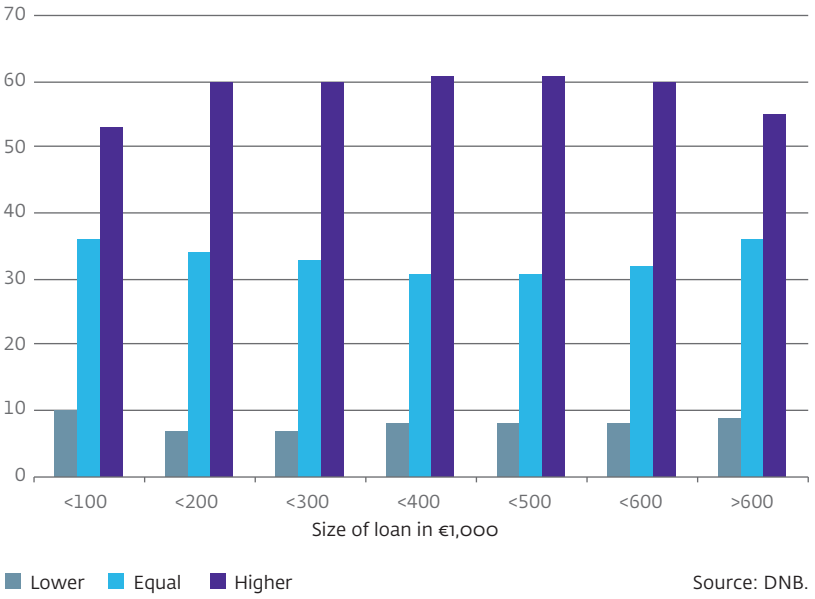
To ascertain the effect of overvaluation on mortgage lending, we can analyse what happens if the purchase price is used instead of the appraisal as a basis for the LTV. Instead of the LTV we then use the term LTP (loan-to-price). If the appraisal is above the purchase price, the LTV of a loan is lower than this hypothetical LTP. This may mean that a mortgage loan is granted based on the apprisal that would not have been granted based on the purchase price.

How would mortgage lending have looked between 2012 and 2017 if the purchase price had been used instead of the appraisal value, i.e. an LTP instead of an LTV limit? This question can be answered by considering all loans granted in the period below or around the LTV limit and calculating their LTP ratio. If this ratio is above the applicable LTV limit, the loan could not in principle have been granted if it had been based on the purchase price.

Around 14% of the loans in the sample would not have complied with an LTP limit (LTV limit based on the purchase price). For first-time buyers this percentage is 18%: this is because they more often borrow around the LTV limit, but also because in the case of first-time buyers we see a higher proportion of appraisals above the purchase price. The average difference between the appraisal and the purchase price in these cases is €21,395, and in the case of first-time buyers €16,813. The median, which applies a correction for extremely high values, is around €10,000, both in the case of all transactions and in the case of first-time buyers. This means that the median residential property purchaser could have borrowed €10,000 less if the purchase price rather than the appraisal had been used for the granting of the loan.

Figure 6 Distribution of appraisal value compared to purchase price, by size of loan

Percentage of transactions



Source: DNB.

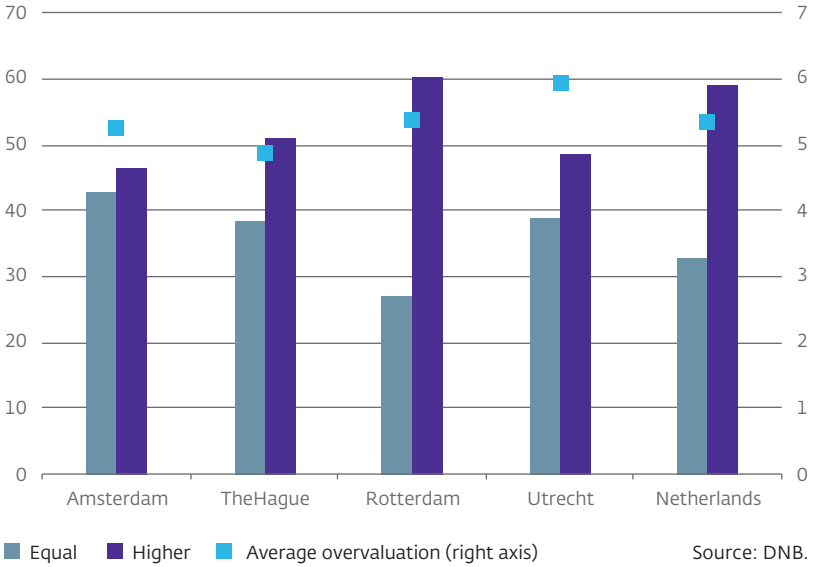
Other loan characteristics and robustness

The size of the loan appears to have no effect on the relative difference between the appraisal value and the purchase price. The proportions of valuations that are too low, too high and exactly the same (relative to the purchase price) are the same overall for the different categories of loan size; see Figure 6. In the case of loans of very high or very low amounts, overvaluation occurs less often and "zeros" occur more often than in the case of the average loan.

The differences between the appraised value and the purchase price can also be analysed at municipality level, but this shows no clear pattern. If we look only at positive differences (overvaluations), these range from 4.4% (Assen) to 7.2% (Lelystad). The proportion of overvaluations ranges from 46% (Amsterdam) to 72% (Spijkenisse); here, too, there is no clear pattern. Figure 7 shows that there are only small differences between the four major cities and the rest of the country. In Amsterdam, Utrecht and The Hague the proportion of overvaluations is below the national average, and the average proportion of "zeros" is higher. The average overvaluation

Figure 7 Distribution of appraisal value compared to purchase price and average overvaluation, G4 cities and the Netherlands

Percentage of transactions



Source: DNB.

in Rotterdam and Utrecht is higher than for the Netherlands as a whole, whereas in Amsterdam and The Hague it is lower. The differences are small, however, and not in all cases statistically significant. The lower proportion of overvaluations in the major cities may have to do with faster house price growth, as a result of which appraisers "lag" further behind. This may also explain why they more often give valuations that are exactly the same as the purchase price, perhaps because the purchase price is the most useful reference point.

More generally we find that in a slack market, appraisals are more often above the purchase price, and in a tight market more often exactly equal to the purchase price. A tight market is defined as a region in which the annual rise in house prices over the quarter in which the loan was granted is higher than the average in the Netherlands. In a slack market the price rise is lower than average. The results show that although appraisals are more often above the purchase price in a slack market, the average overvaluation in those cases is lower than in tight markets. This difference is not statistically significant.

We also repeated the analysis with appraisals in which a purchase date is available; there is no significant difference in the results. If a purchase date is available, it is possible to determine with even greater certainty that the appraisal was conducted around the time of a home purchase. This date is only available for three banks, however, so it was not used to identify transactions in our main analysis. In order to assess whether this choice affects the results, we also carried out the main analyses with a selection based only on the purchase date. This means we can ultimately use the data from three rather than six banks, representing a total of 150,000 appraisals. The proportion of excessive appraisals then increases from

60% to 64%, and the average overvaluation from 5.4% to 6.2%. These results do not differ substantially from the original results.

This also suggests that the differences between individual banks are moderate, which is confirmed when we analyse each bank separately. The percentage of appraisals above the purchase price fluctuates from one bank to the next between 41% and 71%, with most banks deviating by less than 10% from the overall average of 60%. The average overvaluation is largely between 2.4% and 5.9% (total 5.2%), with an outlier at 15%. The median is between 1.3% and 3% (total 2.3%), with an outlier at 12%. These outliers only apply to 5,000 observations out of a total of 216,000, however. Finally, three-quarters of all observations come from one bank, which operates nationwide. The results are not greatly distorted by this bank: even if we exclude these observations (and thus use only a quarter of the sample), the proportion of overvaluations, "zeros" and the average overvaluation are largely unchanged.

4 Conclusion

Our study has shown that in almost 95% of cases the appraised value of residential property is equal to or higher than the purchase price. One-third of appraisals were exactly equal to the purchase price, and almost 60% were above it. In the case of first-time buyers this percentage is even higher. Where the appraisal value is above the purchase price, the average difference (overvaluation) is 5.3% of the purchase price, and the median is 2.3%. The large number of appraisals equal to the purchase price indicates that appraisers use the purchase price as a basis for the appraisal.

The results are similar for different segments in the sample based on the size of the loan, the location of the home or the lender. In all these segments the proportion of appraisals below the purchase price is only a few percentage points, although the breakdown between "zeros" and overvaluations sometimes differs. In a tight market (with high price pressure), for example, the percentage of appraisals that are exactly equal to the purchase price is higher than in slack markets, where appraisals lie more often above the purchase price.

The reduction in the LTV limit appears to have had no major effect on overvaluation: loans around (-/+ 0.5%) the LTV limit more often have an appraisal equal to the purchase price. We would reasonably expect more excessive appraisals in the case of these loans, since the importance of high appraisal value increases around the LTV limit (for example because the buyer's costs also have to be financed). We do not see this effect, however, even with the tightening of the LTV limit up to 2018: between 2012 and 2017 there is no increase in the proportion of overvaluations. The introduction of the LTV limit in 2013 was accompanied, however, by a decrease in the proportion of overvaluations and an increase in the proportion of appraisal values that are exactly equal to the purchase price.

The analysis reveals systematic overvaluation in residential property appraisals. This impacts the effectiveness of the LTV limit, for example: the overvaluation means that households may overborrow and financial institutions underestimate the credit risks of their mortgage loans. Furthermore, the appraisal is too often determined by the purchase price, which contributes to an overheating of the market. It no longer matters how much homebuyers offer to pay, because they can borrow the entire purchase amount on the basis of the appraisal value. Finally, the incentives in the system put pressure on the appraiser's independence. All parties involved in a home purchase – buyer, real estate agent, adviser and credit provider – have an interest in the completion of the transaction. They therefore benefit from a sufficiently high appraisal value and can put pressure on the appraiser to quote a value at least equal to the purchase price.

These results raise doubts about the independence of appraisals, and measures should therefore be taken to improve their independence. After all, independent appraisals are crucial for many financial transactions and lending, and hence for financial stability. DNB and the AFM have previously concluded that self-regulation has not worked sufficiently well, and in their 2018 Legislative Letter they recommended imposing statutory standards for residential property appraisals. The efforts made by the Ministry of the Interior and Kingdom Relations to improve the quality of residential property appraisals are therefore to be welcomed.

Annex 1: description of the dataset

The DNB Loan Level Data mortgages contains detailed information at loan level on over three million Dutch mortgages (over six million individual loans). This dataset is based on regular reporting by banks. The items used from the dataset include the size and start date of the loan, the value and location (first 2 digits of the postcode) of the collateral, the appraisal date and the age of the mortgagor.

In April 2018 an additional data request was sent to banks for this study, in addition to the existing mortgage Loan Level Data, with the reference date 31 December 2017. The additional request included the purchase price, purchase date, renovation and value after renovation. See Table A2 for a full list.

The sample used contains data from ABN Amro, Achmea, ING, Rabobank, Obvion and NIBC.[15] The availability of data varies significantly per variable. There is a particular shortage of information on the purchase price and date, especially for years before 2012.

The initial number of observations based on the LLD and the additional data exceeded 2.4 million. The following observations were then eliminated:

1. Loans without appraisal value or purchase price, or in which one of these two has a value of 0 or a negative value – over 1.4 million.
2. Loans in which the appraisal value is not based on a full physical appraisal (but for example on the WOZ value, a desktop appraisal or a model) – 310,000.

15 Volksbank, Nationale Nederlanden and Delta Lloyd also supplied data, but it contained too little information about purchases that was useful for this research.

3. Loans known to have been partly intended to finance a home improvement. In these cases the purchase price before renovation is not a good measure of the value of the home after renovation, so a comparison of the purchase price and the appraised value would not be meaningful – 130,000.
4. Loans with a start date before 2012 – 270,000.
5. Loans in which the absolute difference between the appraisal and the purchase price amounts to more than 50% of the purchase price – 7,000.

On this basis we are left with 290,000 observations.

Table A1 Spread of number of observations over the years

	2012	2013	2014	2015	2016	2017
All transactions	16,144	13,762	30,598	43,013	52,262	63,090
First-time buyers	8,013	7,628	16,862	21,907	24,147	28,439
% first-time buyers	50%	55%	55%	51%	46%	45%

The next step is identifying residential property transactions. We want to distinguish loans taken out for the purchase of another home from mortgage switching. These are loans taken out to refinance an existing loan, without an accompanying residential property transaction. In such cases the appraisal value of the home is determined at a different time than the purchase price, so a comparison between the two would not be meaningful.

We have different variables on the basis of which we can ascertain whether the loan was taken out in connection with a residential property transaction:

1. Banks state the purpose of the loan. The most common purposes are the purchase of a home, refinancing, construction, renovation and realising equity. A transaction can only have taken place if the purpose of the loan is "purchase of a home".
2. We compare the purchase date of the home with the start date of the mortgage.[16] A transaction can only have taken place if the purchase date and the start date of the mortgage are sufficiently close. The limit we set is nine months.[17]
3. We then do the same with the appraisal date and the start date of the mortgage. There can only have been a transaction if the appraisal date is no more than nine months before the start date of the oldest part of the mortgage loan.

Because only three of the six institutions can report the purchase date of the loans, the criterion we use in identifying a transaction is that the first and third condition must be fulfilled. The loan must therefore be intended to purchase a home, and the appraisal date must not be more than nine months before the start date of the loan.

Based on this definition we are left with around 220,000 observations. The most crucial restriction is the date limit. 70,000 loans were intended for the purchase of a home, but the appraisal date was more than nine months before the start date of the mortgage. Comparing a purchase price with this "old" appraisal would not be very meaningful.

16 We take the start date of the oldest part of the loan, because a mortgage loan can consist of several parts, for example a non-repayment part and a repayment part (but there are many variants). These parts often have the same start date, but where that is not the case we take the date of the first part of the loan to be concluded.

17 We could also use the purchase date and the appraisal date, but the appraisal almost always takes place before the purchase date. The appraisal date will therefore fall within the selection in any event.

Table A2 Overview of variables in additional data request of April 2018

Variable	Definition	Notes
Origination Channel / Arranging Bank or Division	Origination channel, arranging bank or division for the loan: Office / branch network (1) Central / Direct (2) Broker (3) Internet (4) Packager (5) Third channel but underwriting processes performed 100% by the Originator (6) No Data (ND)	
Retained Amount	Amount the Issuer will be obliged to fund to the borrower at a later date, for example construction deposit. If no data available use the following input: ND.	This is often also called "bouwdepot".
Retained Amount Date	Date when the retained amount is to be drawn by. If available until the maturity date, enter the maturity date here. If no data available use the following input: ND.	Date when the retained amount is to be drawn by. If available until the maturity date, enter the maturity date here.
Occupancy Type	Type of property occupancy: Owner-occupied (1) Partially owner-occupied (A property which is partly rented) (2) Non-owner-occupied/buy-to-let (3) Holiday/second home (4) Other (5) No Data (ND)	If there are multiple properties, use the main property here.

Table A2 Overview of variables in additional data request of April 2018 (continuation)

New Property	New property specifications: New build (1) Existing building (2) Other (3) No Data (ND)	If there are multiple properties, use the main property here.
Purchase price	Original purchase price of the property. If no data available use the following input ND	If there are multiple properties, use the aggregated balance. For the case of multiple loans, use a pro-rata balance for each loan.
Purchase date	Date of original purchase of the property. If no data available use the following input ND	
Renovation after purchase	Indicator variable, indicating whether a renovation will take place after the purchase of the property	
Value after renovation	Property value as of date of latest loan advance prior to a securitisation. Valuation amounts should be in the same currency as the loan (field AR65). If no data available use the following input ND	If there are multiple properties, use the aggregated balance. For the case of multiple loans, use a pro-rata balance for each loan.
Purpose purchase	Indicator variable, indicating whether the purpose of a loan is purchase.	

DeNederlandscheBank

EUROSYSTEEM

De Nederlandsche Bank N.V.
PO Box 98, 1000 AB Amsterdam
+31 20 524 91 11
dnb.nl