



EUROPEAN  
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# Joint Paper on the **Use of Automated Valuation Models in Europe**



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# Preface

The first paper on the use of Automated Valuation Models in Europe was published by the European Mortgage Federation (EMF) and the European AVM Alliance (EAA) in 2016 to provide an overview of the key applications and features of AVMs and of the state of the industry across Europe. That was before Guidelines on loan origination and monitoring (EBA/GL/2020/06 – EBA GLOM) were published by the European Banking Authority which for the first time in an EU-wide supervisory framework for financial institutions introduced criteria for advanced statistical models as well as guidance regarding their use for valuation, revaluation and monitoring. More than eight years later, the revised Capital Requirements Regulation (CRR3) has adapted the same criteria for advanced statistical models, bringing their use into first-line legislation on the European level.

It is important to point out that not all AVMs available in the marketplace fulfil the criteria for advanced statistical models as set out in the EBA GLOM and CRR3. Therefore, a clear distinction between different types of AMVs in terms of their technical complexity and accuracy, as well as their actual fulfillment of the criteria required in the new regulatory regime will be introduced in section II. of this paper.

Despite the absence of regulatory guidance regarding the usage of AVMs over many years, their use by financial institutions and other stakeholders has grown widely in the past decade, as the capabilities of the applications have constantly improved, providing accurate, fast and economical valuations, and in many cases even more detailed and up-to-date data compared to publicly available sources. In order to provide an updated overview of AVM use in European markets and to increase market transparency in this regard, EMF and the EAA once again joined forces<sup>1</sup> to publish this follow-up paper.

Established in 1967, the European Mortgage Federation (EMF) is the voice of the European mortgage industry on the retail side of the business, representing the interests of mortgage lenders at European level. The overarching aim of the EMF is to ensure a sustainable housing environment for European Union (EU) citizens. To this end, we are the key talking partner of the European Commission, the European Parliament, the Council of the EU, the European Banking Authority, the European Central Bank and the Basel Committee on Banking Supervision on all mortgage industry-related questions.

The European AVM Alliance (EAA) is a European industry association of leading providers of AVMs for the residential property market. Founded in 2013, the core objectives of the EAA are the establishment of consistently high-quality standards for AVMs across jurisdictions in Europe, the promotion of the characteristics and benefits that AVMs can deliver, and the representation of the interests of the AVM industry in regular exchange with the European institutions. As a standard setting body, the EAA in 2017 published the first ever ‘European Standards for Statistical Valuation Methods for Residential Properties’ (ESSVM), the third edition of which was released in 2022. The ESSVM focus on principles, definitions and minimum requirements for statistical valuation methods applicable across European jurisdiction, and have become a reference point for legislators, regulators, financial institutions and rating agencies alike.

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1 See Annex III for list of contributors

## Summary of findings

For this paper, information on the use of AVM has been collected from 16 countries across Europe. Out of these 16 countries, 10 (Germany, Greece, Ireland, Italy, Netherlands, Norway, Slovenia, Spain, Sweden, UK) reported a shift in the use of AVM in the recent years. Accordingly, the usage of AVMs has increased both in volume and in use cases. There are reports that a general trend can be observed to employ more data driven, consistent and unbiased processes. Key drivers of this have been the EBA Guidelines on Loan Origination and Monitoring (EBA GLOM) and more recently the 2024 revision of the Capital Requirements Regulation (CRR, also referred to as CRR3). Use cases are reported to have widened by replacing indices in the case of portfolio related value update, in particular for portfolio monitoring. More recently and only in a few countries, AVMs also started to be used for scenario calculations to estimate value changes that can be expected because of energy efficiency renovation. More classical drivers of AVM usage are cyclically increasing numbers of NPLs. It is also reported that the increase of usage is accompanied by higher demands regarding documentation and transparency. For benchmarking, most countries use sale prices. Surveyor valuations were also reported to be used where they are considered more reliable than sale prices which can be undermined by incorrect declarations due to tax reasons or the inclusion of accessories, among others. Other reported reasons for using surveyor valuations to benchmark AVM are national regulation and established market practice. Inspections are required in eight of the 16 countries only. Where inspections are not required that is partly so because Desktop valuations compliant with EBA GLOM Art. 210 are carried out.

# I. Defining Terms

## **Automated Valuation Model (AVM)<sup>2</sup>**

A system that provides an estimate of value (a Valuation) of a specified property at a specified date, using mathematical modelling techniques in an automated manner. There are two main types of AVMs: Comparables Based AVMs and Hedonic AVMs.

- Hedonic AVMs are analysis of how various property characteristics influence property value in a given time period and geographic area. Hedonic AVMs typically describe property value as a function of the attributes of both the property itself and of its location.
- Comparables Based AVMs consist of highly sophisticated automated processes and mathematical formulae requiring the deployment of complex bespoke technology and seek to identify recent comparables that resemble the subject property in terms of location and attributes, possibly adjusting their values to compensate for any dissimilarities, to produce an estimate of market value. This comparables based valuation approach is similar to that of surveyor valuations.

## **Portfolio Valuation**

The circumstances where a large number of properties are being valued as a batch and for the same purpose, e.g. for capital modelling, provisioning, whole loan trading, surveyor management etc. Portfolio valuations may be conducted through various statistical, physical or hybrid valuation techniques, including AVMs.

## **Mass Valuation**

The practice of valuing multiple properties as of a given date by a systematic and uniform application of valuation methods and techniques that allow for statistical review and analysis of results. Please note this definition is indeed similar to that of Portfolio Valuation, but the term Mass Valuation is typically used in a taxation context, while Portfolio Valuation is typically preferred in a Financial Services context, hence it is the term used throughout this report.

## **Statistical Valuation Method**

A mathematical tool or approach used to estimate property value (a Valuation) through deterministic computations rather than human judgement. Statistical Valuation Methods can vary widely in the degree of their complexity, both from a mathematical as well as from a technical point of view. They comprise the following main types: Single Parameter Valuation, House Price Index, Hedonic Model (also called Hedonic AVM), Comparables Based AVM.

A schematic overview for the differentiation of Valuation Methods and Valuation Models is displayed in Figure 1.

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<sup>2</sup> For this paper, definitions of technical terms are taken from: European Standards for Statistical Valuation Methods for Residential Properties. 3rd Edition. European AVM Alliance. ISBN 9782960297300.

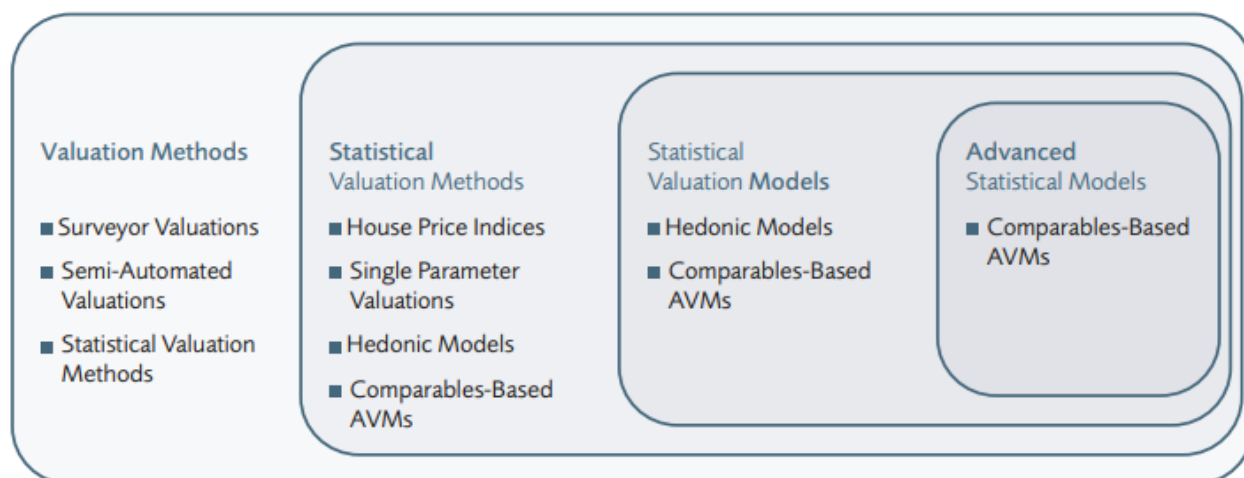


Figure 1: Schematic overview to differentiate Valuation Methods and Valuation Models<sup>3</sup>

## House Price Index (HPI)

A time series capturing the price development of residential properties over time.

## Hybrid Valuation

Sometimes referred to as a Semi-Automated Valuation: Generic term to indicate all valuation solutions that comprise both automated and manual elements, such as Analyst Assisted AVMs, Surveyor Assisted AVMs, AVM Assisted Appraisals etc.

## Surveyor Valuation

The Valuation produced by a qualified surveyor following the full internal physical inspection of a property.

## Desktop Valuation

Term used sometimes to indicate all types of Hybrid Valuations (part automated/statistical, part manual – See Annex I), sometimes to indicate only AVM-assisted surveyor valuations.

<sup>3</sup> ibid, p. 7



## II. Current Use of AVM in the Market

### 1. Are AVMs currently used in your country for valuation purposes in a banking context?

AVMs are currently used in Denmark, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Romania, Serbia, Spain, Slovenia, Sweden (by most banks), and the United Kingdom for valuation purposes in a banking context. This is currently not the case in Montenegro, and Ukraine.

In Denmark, the general rule is that new mortgage loans financed by covered bonds are granted based on property valuations involving an on-site inspection. However, individual mortgage banks may be granted exemptions if they develop statistically sound property valuation models. Exemptions are subject to subsequent manual approval, which means that no value can be approved without prior critical assessment by a valuer. Exemptions must be authorised by the Danish FSA and can only be granted for owner-occupied dwellings for all-year habitation. For covered bond funded lending outside Denmark, the Danish FSA can authorise wider exemptions if market practice in the individual countries can justify it. As there is no commercial AVM provider in Denmark, the models are internal models. For new mortgage loans granted by commercial banks, which are not funded by covered bond, the general valuation rule is an on-site inspection of the property. For residential property in selected areas, where the property market is well-defined and transparent, the valuer can carry out valuation without an on-site inspection and be based on property valuation models. Finally, AVMs are also used by mortgage banks and commercial banks in their continuous monitoring of property values.

In Germany, AVMs are widely used in the banking industry. Nonetheless, a distinction must be made between initial value indications in the context of loan origination and property valuations that fulfill banking regulatory requirements. The former is usually carried out fully or semi-automated, while the latter mostly uses AVMs supporting the valuer and as a source of comparable evidence.

In Greece, AVMs are not used as a primary valuation tool but used as a supporting tool and/or quality control check. Moreover, their usage extension varies between financial institutions.

In Hungary, it is possible to use AVMs, the legal possibility and conditions for the use of AVM are provided by law. The effective use of this option is possible if the credit institution has a credit assessment regulation approved by the Supervisory Authority, in which it lays down the methodology and procedures for the use of the AVM mode. The legal and regulatory references are the follows: Ministry of Finance Decree 25/1997 and the bank's internal regulations.

In Italy, AVMs are used for assessing the performance of valuers.

In Ireland, AVMs are used by lenders for monitoring the back book collateral portfolio for covered bond issuances, internal risk management, and annual reporting. Some of the largest Irish lenders have also used it for buy and side-side due diligence in loan book transfers, for performing, non-performing, and re-performing books. Today, AVMs are also used to support origination functions, such as providing a selection mechanism for desktop vs full visit, and for quality control purposes.

In the Netherlands, AVMs are used for valuation purposes in a banking context, though in a hybrid form (desktop valuation). The outcome of the AVM valuation is then judged by a valuer who approves or rejects the outcome. AVMs are used in the Netherlands for origination, increases/changes in the loan and could be used to move a mortgage into a lower interest bucket. AVMs are also seen as a useful tool to make energy renovation more attractive and cost efficient and encourage homeowners to make those changes. AVMs, particularly desktop AVMs, play a crucial role in the Netherlands and are highly reliable

and objective as a result of the extremely comprehensive data infrastructure in the country. Their use is enshrined in national legislation and are also subject to specific rules laid down by the Association of Appraisers. AVMs also present a cost advantage for clients compared to full onsite valuations.

In Serbia, AVMs are used for re-evaluation of mortgages for housing loans only in the validation process.

In Slovenia, AVMs are most often used for the purposes of portfolio valuations and controls of the value of residential real estate. For the purpose of valuation, a hybrid model is usually used, where the calculation is made using the AVM model and is verified by an authorized valuer. For value control, only the model calculation is used without an valuer verification. AVMs are provided by companies and also developed by the Geodetic Administration for the purpose of mass valuation of real estate. The calculations were supposed to be used for tax purposes, but due to the national court's decision, the law was not enforced. Currently, these calculations are used only for the purpose of social transfers. The models from the Geodetic Administration are not properly updated at the moment. Different models have also been developed by larger valuation companies for their own needs.

In Spain, financial institutions use AVMs, carried out by valuation companies, almost exclusively, for valuation purposes of mortgage stock according to the Circular 4/2017 (CBE 4/2017) of the Bank of Spain.

In Sweden, AVMs models are accepted for residential properties such as detached houses and apartments. Since the beginning of the 1990's have AVMs been used to estimate market values for covered bonds, remortgage and even for originating mortgages. The estimated statistical value from AVM is mostly used as a tool to get a starting point and to estimate the properties market value. To reconcile the value, the bank's credit officer can use the purchase price or taxation value against the bank's internal AVM.

In the UK, since the mid-2000s, AVMs have been used for remortgage origination, replacing physical mortgage valuations. Since 2007, mortgage lenders have been using AVMs for back book monitoring. Around 2014, lenders also started to use AVMs for property purchase origination.

## **2. Mortgage borrower acquisition - Are AVMs used in your country to support mortgage borrower acquisition, e.g. underpinning a credit application or supporting a feasibility check of the requested loan?**

AVMs are used in Denmark, Germany, Greece, Hungary, Ireland, the Netherlands, Norway, Romania, Spain, Sweden (by most banks), the UK to support mortgage borrower acquisition. This is currently not the case in Italy, Montenegro, Serbia, Slovenia and Ukraine.

For Denmark, see previous answer to previous question.

In Greece, there are at least two financial institutions that use AVMs as a supporting tool at an officer level to support credit applications and to run a feasibility check on mortgages.

In Hungary, a free real estate value calculator is available on the website of the real estate brokerage company belonging to one of the financial institutions. With the help of this app, the customer can get an approximate estimate of how much his/her property is worth.

In Italy, AVMs are not yet used to support mortgage borrower acquisition, such as underpinning a credit application or supporting a feasibility check of the requested loan. However, they are used for assessing accuracy of valuations.

In Ireland, AVMs are used for quality control of the external valuations, both desktop and full visit.



In the Netherlands, the use of AVMs is enshrined in legislation. Banks are permitted to use AVMs in a hybrid form; the outcome of the AVM valuation is then judged by a valuer who approves or rejects the outcome. According to Art. 115 of the Decree on Conduct Supervision of Financial Enterprises (BGfo) it is permitted to provide a housing loan based on a hybrid valuation, as long as the loan amount does not exceed 90% of the established value. In the near future, there will be a revision of the BGfo however the 90% limit will not be increased. There will be a link between the certainty of the valuation and the max LTV.

In Slovenia, there is no official data on AVMs being used to support mortgage borrower acquisition, such as underpinning a credit application or supporting a feasibility check of the requested loan. Nonetheless, it can be seen that banks are aware of the importance of a quick response to customer requests and are considering the introduction of this system.

In Spain, a mortgage cannot be originated based on AVMs as the sole means to value the property. However, AVMs are used as a supportive tool and for second opinion.

In Sweden, see answer to the previous question.

### **3. Mortgage Origination - Are AVMs used in your country:**

- **As the sole or primary valuation for Mortgage Origination? e.g.**
  - **Underwriting of property-purchase mortgage**

Denmark, Germany, Hungary (in certain circumstances), the Netherlands (for non-bank lenders; for banks, AVMs are permitted in the hybrid form where the AVM is combined with the judgement of a valuer), Norway, Sweden (by some banks), and the UK have indicated that AVMs are used in the context of the underwriting of property-purchase mortgages. AVMs are not used as the sole or primary valuation for property-purchase mortgage origination in Greece, Ireland, Italy, Montenegro, Serbia, Slovenia Spain and Ukraine.

For Denmark, see answer to question 1.

In Hungary, banks can use AVMs with certain restrictions. Statistical valuation can be applied if the property to be valued is an apartment (not a family house or other type of real estate), the floor area is maximum 150 m<sup>2</sup>, is located in capital or its agglomeration, or in the country's major cities, is located in a settlement where at least 10 properties were sold in the last year, and the registered purchase prices differ by no more than 30%. Finally, the requested loan amount and the encumbrances already registered on the property together cannot exceed 60% of the property's estimated value (mortgage lending value). Moreover, this methodology cannot be used for ongoing constructions, only for completed properties.

In Slovenia, there are no information concerning the usage of AVMs as the primary valuation method used to determine the value of a loan. According to practice, models are used as an aid by valuer, for preparing individual real estate valuation.

In Spain, the mortgage law requires an valuation in compliance with Spanish Order ECO 805/2003 for the underwriting of property-purchase mortgages. Financial institutions use the valuation to study the feasibility of the requested loan. An "Order ECO 805 Real Estate Appraisal" is a real estate valuation conducted by an independent expert and supervised by a valuation company -which is approved and supervised by the Bank of Spain. This valuation is performed in accordance with the provisions laid down in the "Ministry Order ECO 805/2003" and its subsequent amendments. This regulation requires an on-site inspection of the property. Valuers must have specific training in real estate valuations, and are

subject to a strict regime that ensures their independence from banks. The real estate valuation report is valid for a period of 6 months.

In Sweden, see answer to question 1.

- **Underwriting of non-purchase mortgage loan products e.g. equity withdrawal and remortgaging**

In Denmark, Germany, Hungary (with certain restrictions), the Netherlands (for non-bank lenders), Norway, Sweden (by some banks) and the UK, AVMs are used for the underwriting of non-purchase of mortgage loan products. AVMs are not used in Italy, Ireland, Montenegro, Serbia, Slovenia, Spain, and Ukraine for this purpose.

For Denmark, see answer to question 1.

In Greece, all mortgages originations are accompanied by certified surveyor valuations. A small number of those use AVMs as a supporting tool, used by the mortgage provider and not in the valuation per se.

- **As a supporting tool for Mortgage Origination? e.g.**

- **For Desktop Valuations**

In Denmark, Germany, Hungary (with certain restrictions), Ireland, the Netherlands (by all lenders), Norway, Slovenia, Sweden (by some banks) and the UK, AVMs are used as a supporting tool for desktop valuations in the context of mortgage origination. In Greece, Italy, Montenegro, Serbia, Spain and Ukraine, AVMs are not used in this context.

In Ireland, AVMs are used as guidance on our desktop valuations by early adopters at mortgage origination.

In Slovenia, AVMs, together with other IT solutions for the collection of public data, are used to assist valuers in desktop valuation but this is limited primarily to residential properties.

In Spain, desktop valuations are not permitted for mortgage origination, so the use of AVMs for desktop valuation at mortgage origination is not relevant.

In the UK, AVMs are used both as an audit tool and to determine market valuation with the desktop process focused on identifying property risks.

- **For Surveyor Valuations**

In Germany, Greece, Hungary (with certain restrictions), Ireland, Norway, Slovenia, Spain, Sweden, and the UK (as an audit tool) AVMs are used as a supporting tool for surveyor valuations in the context of mortgage origination. This is not the case in the Netherlands, Montenegro, Serbia, and Ukraine.

In Spain, some valuation companies provide their valuers with information about AVM-produced values for the properties they are valuing, as an additional input for their consideration. Moreover, AVMs are used as a supporting tool alongside surveyor valuations in the mortgage origination process.

In Ireland, AVMs are used as guidance on full visit valuations, in accordance with EBA GLOM (art. 214), allowing for quality control of the work of external valuers.

- **As a quality control tool in the mortgage origination process? e.g.**

- **For fraud detection**

AVMs are used as quality control tool in the mortgage origination process for fraud detection in Germany, Greece, Hungary (with certain restrictions), Italy, Ireland, the Netherlands, Norway, Spain, Sweden, and the UK. This is not the case in Montenegro, Serbia, Slovenia, Spain and Ukraine.

In Greece, there is at least one bank which utilizes AVMs as a quality control mechanism in the mortgage origination process. The idea is that if the valuation amount varies significantly (c.20%) from the valuation at origination a further review is required. Internal processes exist within the institution which further guide which assets are going through this mechanism and which are not. The latter case refers to « high risk » properties.

In the Netherlands, Surveyor Valuations are validated and checked against an AVM. The use of AVMs for quality control and fraud prevention was made mandatory in 2010 by the government (WEW: Stichting Waarborgfonds Eigen Woningen) for every government guaranteed mortgage loan application.

In Spain, banks use AVMs to double check valuations provided by their clients and through that, identify fraudulent values.

- **For auditing/assessing the performance of valuers**

AVMs are used as quality control tool in the mortgage origination process for assessing or auditing the performance of valuers in Denmark (for some institutions), Germany, Greece, Hungary (with certain restrictions), Ireland, Italy, Montenegro, the Netherlands, Norway, Serbia, Spain, Sweden, and the UK. AVMs are not used for this purpose in Montenegro and Ukraine.

In Greece, there is one bank that uses AVMs as quality control in situations where the valuation amount varies significantly (c.20%) from the valuation at origination. In which case, a further review is deemed necessary. Internal processes exist within the institution which further guide which assets go through this mechanism and which do not. The latter case refers to « high risk » properties.

In Italy, AVMs are utilized to audit and assess the performance of valuers, providing a supplementary means of evaluating valuations' accuracy and consistency.

In the Netherlands, surveyor valuations are validated and checked against an AVM which is used for quality control and fraud prevention and was made mandatory in 2010 for every government guaranteed mortgage loan application.

In Slovenia, this information is not explicitly available, the valuation models and IT solutions could be enough when auditing/assessing the performance of valuers.

In Spain, AVMs are used by some valuation companies as an input in the process of quality and accuracy control of the valuation performed by the valuer itself.

#### 4. Monitoring of property values, review and revaluation:

- **Are AVMs used by financial institutions/mortgage lenders:**
  - **To monitor property values in accordance with Article 208(3) CRR?**

AVMs are used by financial institutions/mortgage lenders to monitor property values in accordance with Article 208(3) CRR in Denmark, Germany, Hungary, Ireland (together with EBA GLOM), Italy, the Netherlands, Norway, Slovenia (for housing loans), Spain (as long as they meet the regulatory criteria), Sweden (by most banks) and the UK. This is not the case for Montenegro, Serbia, Spain and Ukraine.

In Denmark, in addition to AVMs, indexation of a previous physical valuation can also be used if it is approved by the Danish FSA.

In Germany, historically, monitoring is carried out at the market level using House Price Indices to identify properties, that need review on the property level. Some banks introducing AVMs for monitoring property values to fulfill CRR3.

In Greece, the most common “tool” for monitoring/updating values in the local market is HPIs. Nonetheless, financial institutions have been known to utilize AVMs for property value monitoring under specific projects scopes.

In Hungary, institutions can use AVMs with certain restrictions. For certain revaluations, indexation methodology is applied.

In Spain, property values have been monitored so far using HPIs. This is currently changing due to the new requirements in the CRR according to which properties in need of revaluation need to be identified by means of advanced statistical models.

In Italy, some banks use AVMs for specific clusters of NPLs and on a small scale to monitor property values following Article 208(3) of the CRR. CRR3 has given new momentum to this.

- **To review property values and determining the need for revaluation?**

AVMs are used by financial institutions or mortgage lenders to review property values and determine their need for revaluation in Denmark, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Romania, Serbia, Spain, Slovenia (housing loans and price index monitoring), Sweden (by at least some banks), and the UK. It is not the case for Montenegro and Ukraine.

In Greece, there is at least one financial institution/mortgage lender that utilizes AVM as a reviewing mechanism towards the identification of further actions such as revaluation.

In Ireland, the output of AVMs in terms of value and confidence score are then compared to property-specific risk factors, to determine escalation to other valuation types such as desktop or physical revaluations.

In Italy, AVMs are used by financial institutions/mortgage lenders to review property values and determine the need for revaluation. Because of CRR3 there is already increased interest in using AVM for this purpose.

In Spain, monitoring of property values to identify assets in need of revaluation so far was carried out using HPIs. This is currently changing to AVM because of the changes from CRR2 to CRR3. Revaluation is done using AVM or Surveyor Valuations.

- **To revalue properties in case of substantial market declines?**

AVMs are used by financial institutions/mortgage lenders to revalue properties in case of substantial market declines in Denmark (as a supporting tool), Germany (as a supporting tool), Greece, Ireland, Norway, the Netherlands, Spain, Sweden (by at least some banks) and the UK. This is not the case in Hungary, Montenegro, Serbia, Slovenia and Ukraine.

In Denmark, AVMs are used as a supporting tool in compliance with the EBA Guidelines on Loan Origination and Monitoring.

In Greece, AVMs are not the standard practice but in the aftermath of the financial crisis during which property prices declined materially within a few years, major revaluations were carried out using AVMs by at least one financial institution.

In Hungary, institutions must carry out normal, full-scope valuations with site visits when the value difference is over 20%.

In Ireland, the output of AVMs in terms of value and confidence score are then compared to market-specific risk factors, to determine escalation to other valuation types such as desktop or physical revaluations.

In Norway, revaluation is done by AVMs regularly regardless of market conditions.

In Spain, revaluation of properties due to significant market declines are carried out using AVMs or Surveyor Valuations.

**5. Are AVMs used in your country within internal rating models of lenders, e.g. supporting the LGD calculation or other components of the models?**

AVMs are used in Denmark (for bank specific issues), Germany, Norway, the Netherlands, Slovenia, Spain, Sweden and in the UK within internal rating models of lenders, e.g. supporting the LGD calculation or other components of the models. This is not the case in Greece, Ireland, Montenegro, Romania, Serbia, and Ukraine.

In Spain, AVMs are used for the valuation of non-performing loans (NPL).

**6. With regard to Q2 to Q5, have you observed a shift in the use of AVMs in your country in recent years, e.g. due to the EBA Guidelines on Loan Origination and Monitoring or the recognition of IRB models? If yes, please describe.**

There has been a shift observed in the use of AVMs in the recent years in Ireland, Italy, Greece, Germany, Norway, the Netherlands, Slovenia, Spain, Sweden (to different degrees) and the UK. No shift has been observed in Denmark, Montenegro, Romania, Serbia, and Ukraine.

In Germany, the use of AVMs has considerably increased in volume and expanded to other purposes in recent years. For example, AVMs have become the default starting point for mortgage origination and were also introduced to perform spot checks of surveyor valuations and to update portfolios on a property-by-property basis and to identify properties in need of revaluation. At the same time, the requirements for their use (the validation of models, the documentation of data sources, and statistical methods, etc) have significantly increased due to the regulatory requirements.

In Greece, a shift has been observed in the market mostly because of the NPL portfolio exchanges that occurred from 2018 onwards. Certainly, the market is more educated and demonstrates a further maturity towards the usage of AVMs. Furthermore, the Greek state has utilized AVMs for property taxation purposes.

In Norway, banks internal credit policies have been updated or modified as a consequence of EBA GLOM. There has been a slight increase in second opinions and/or physical valuations.

In Italy, there has been a shift in the use of AVMs in recent years. This shift can be attributed to several factors, including the implementation of EBA GLOM, as well as the increasing recognition of Internal Ratings-Based (IRB) models. Banks are showing greater sensitivity towards utilizing more sophisticated methods of automated valuation with high accuracy. This shift is driven by the need for improved risk management practices, compliance with regulatory standards, and the desire to enhance the overall quality and reliability of valuation processes within the lending industry. As a result, there is a growing emphasis on adopting advanced AVM technologies that offer enhanced predictive capabilities and robustness, enabling lenders to make more informed decisions in mortgage origination, property valuation, and risk assessment.

In the Netherlands, there has been a shift towards more data-driven, transparent, consistent, and unbiased valuation processes using AVMs. This was already in place before the EBA GLOM, and the GLOM confirmed and reiterated the importance of the current data-driven process for the monitoring and the revaluation techniques used by most lenders.

In Spain, AVMs are a robust model and their reliability improves every year. Slowly, they are being adopted in more processes but at the moment their use is not massive except for the revaluation of the asset portfolio. There are projects in the near future to use AVMs to replace other methods used until now (e.g. House Price Index). Increasing trend in the use of AVM models to test value for all purposes in recurrent transactions (origination) or portfolio valuation can be seen in Spain. AVMs are used more extensively, and the associations are more aware of the fact that they have to know more about the techniques and theoretical background about the AVMs.

In Slovenia, the use of AVMs is increasing significantly. This was helped by the banking regulation which enables the use of models, and in addition, their consistent improvement. Users have realized that the results in developed markets are good. The main benefit from the models is their ability to evaluate a large number of properties in a short time with low costs. Before the EBA GLOM, the AVMs were primarily used by bank subsidiaries (the practice brought from other markets) and by individual appraisers without being disclosed (as a tool for individual valuations). After the Guidelines, the use of AVMs became more openly acknowledged, and the use became accepted on the market for certain purposes.

In Sweden, to different degrees, most banks have moved from only using AVMs to also include a desktop valuation with support from an AVMs in most cases. There is also more awareness that institutions need to know more about the techniques and theoretical background of AVMs.

In the UK, lenders are using AVMs more frequently and broadly across loan origination and monitoring.



# Mass appraisal/portfolio valuation:

7. Are AVMs used in your country for the purposes of mass/portfolio valuation? If yes, to what extent is this the case (exclusively, widely, in a small number of cases) for each of the following contexts?

- **Portfolio transaction purposes**

AVMs are used for the purposes of mass/portfolio valuation for portfolio valuation in Germany, Greece, Ireland, Hungary, the Netherlands (widely), Norway (exclusively), Slovenia (in a small number of cases), Spain (in a small number of cases), Sweden (widely) and the UK (widely). In Italy, this practice is not widely spread. AVMs are not used for the purposes of mass/portfolio valuations in Montenegro, Serbia and Ukraine.

In Hungary, it is possible for financial institutions to use AVMs for mass or portfolio evaluations in densely build areas, for example in the capital Budapest, its agglomeration, larger cities and on popular holiday areas.

In Ireland, AVMs are used for performing loans and non-performing loan books by both buy-side and sell-side parties. This process is very well established and has become the default method for large loan book transactions over the last three years.

In Slovenia, considering the changes in the banking market, models were used to estimate the value of bank portfolios. According to the available information, most model evaluations were performed in a hybrid way (AVMs + valuation). In 2023, residential properties were individually valued (desktop valuation) for the purpose of risk-weighted assets optimization. Three companies were selected for evaluation. The first company used a hybrid model, using modern IT solutions and AVMs. Another used IT solutions to determine the adjustments, analysis and for finding the best comparable transactions, while a third firm use IT solution for collating public data. All valuations were checked and confirmed by an authorized valuer. The bank analyzed and compared the valuations of all companies. It was found that the lowest average values are for the company that uses AVMs. Otherwise, the results of the companies are very comparable in well-liquid locations, while the values from the model are much lower in less liquid locations.

In Spain, the use of AVMs for mass/portfolio valuation has been observed in a small number of cases.

- **Mortgage Funding purposes (securitisation transactions)**

AVMs are used for mass/portfolio valuation for mortgage funding purposes in Denmark, Germany (for a small number of cases), Greece, Hungary, Ireland, Norway (exclusively), the Netherlands (widely), Slovenia (in a small number of cases), Sweden (widely) and in the UK (widely). They are not used for this purpose in Italy, Montenegro, Serbia, Spain, and Ukraine.

In Denmark, AVMs are used for mortgage funding purposes for loan-to-value (LTV) monitoring purposes and reporting and for publishing information on LTV distribution in cover pool reports.

In Germany, banking regulation requires property-specific valuations. For monitoring purposes, non-property specific statistical approaches on portfolio level have mainly been used. A small number of cases is re-valued on the property level using AVMs.

In Slovenia, valuers use AVMs, especially for residential real estate which helps them in the selection of transactions, adjustments, analyses of the legal situation, access review, etc. Valuers make the final selection.

In Ireland, several early adopters are now using AVMs in securitization activities.

- **Risk Management**

AVMs are used for the purposes of mass/portfolio valuation for risk management in Denmark (widely), Germany (for a small number of cases), Greece, Hungary, Ireland, Norway (exclusively), the Netherlands (widely), Slovenia (widely), Sweden (widely), Spain (widely), and the UK (widely). They are not used in this context in Montenegro, Serbia, and Ukraine.

In Ireland, they are used for several purposes to compare with alternative internal and external valuation methods.

- **Scenario calculations for energy efficiency retrofitting**

AVMs are used for the purposes of mass/portfolio valuation for scenario calculations for energy efficient retrofitting in Germany, the Netherlands (in a small number of cases) and in the UK (widely). They are currently not used for this purpose in Denmark, Greece, Ireland (but upcoming interest), Norway, Montenegro, Serbia, Slovenia, Spain, and Ukraine.

In Germany, scenario calculations are becoming increasingly popular to identify properties where energy efficiency retrofitting leads to increases of value that outweigh the amount of investment required.

In Ireland, there has been an increase in interest from various lenders which is directly related to new Energy, Social and Governance lending requirements.

- **Other, please specify:**

In Italy, some banks use AVM for assessing the performance of valuers. Other banks use them in the insurance sector to facilitate a correct definition of the value of the asset covered by the policy or only for specific clusters of NPLs.

In Serbia, AVMs are used by official external valuers for revaluation of mortgages for housing loans as mass statistics valuation.

In the UK, AVMs are used widely for product transfers (internal remortgages).

**8. Where AVMs are used for the purposes of mass/portfolio valuation, are other techniques, such as House Price Indices or other Statistical Valuation Methods, also employed for this purpose? If yes, please list them.**

Where AVMs are used for the purposes of mass/portfolio valuation, House Price Indices (HPIs) are also employed for this purpose in Denmark, Germany, Greece, Hungary, Ireland, the Netherlands, Slovenia, Spain, Sweden (small number of cases) and Ukraine. In the UK, AVMs and HPIs are the only two techniques used. In Norway, no other techniques are used.

In Denmark, indexation of a previous physical or desk top valuations is used.

Traditionally, in Germany, HPIs are used, more banks shift to AVMs.

In Greece, the basic alternative to AVMs are HPIs which are either publicly available (through the Bank of Greece) or privately owned. The interchanging usage of these statistical valuation methods depends on internal policies and practices within each financial institution.

In Hungary, at least two of the largest Hungarian commercial banking groups use indexation for certain valuations.

In Serbia, AVMs are used by official external valuers for re-evaluation of mortgages for housing loans as mass statistics valuation.

In Slovenia, HPIs were used exclusively before AVMs became available. HPI are still most widely used. For the valuation of larger portfolios, AVMs are mostly used as a support for residential real estate. It is a generally accepted rule that revaluation is not carried out if the price index is higher than 1.

In Spain, HPIs are used by the vast majority of banks to monitor property values in accordance with Art 208(3) CRR.

**9. Where a mixture of techniques is used for the purposes of mass/portfolio valuation, if possible, please provide the proportion of mass/portfolio valuations carried out using each technique.**

In Norway and Ukraine, they 100% use AVMs. In Slovenia, 20% AVM, 80% HPI. In Sweden, 80% use AVM, 20% HPIs.

In Germany, HPIs are used most of the time but the share of AVMs is growing.

In Greece, for the residential part of portfolios, the usage of AVMs reached 80%-90% of coverage. The remaining part referred to special residential assets which could not be assessed with adequate confidence level with available solutions. The rest of property types were mostly covered by HPIs and targeted revaluations.

In Italy, for the residential part of portfolios, the use of Automated Valuation Models (AVMs) has reached 50%-60% coverage. The remaining properties are then valued using House Price Indices (HPIs) and targeted revaluations.

In Ireland, 100% of book are valued using AVMs but, depending on the client and use case, a risk-weighted escalation to alternative methods such as analyst review, and desktop is performed.

In the Netherlands, AVMs are used in the vast majority of cases.

In Spain, HPIs is the main technique used as the vast majority of banks use HPIs to monitor property values in accordance with Art 208(3) CRR. Moreover, the regulation mandates banks to use AVMs to calculate accounting provisions for credit risk on non-performing portfolios and foreclosed real estate, prohibiting the use of methods other than an “advanced AVM”. Therefore, HPI or AVMs that are not comparables based are not permitted.

In the UK, some lenders adopt an AVM first approach, with HPI used a secondary support when an AVM is not available (typically <0.5% of the time) and/or when the AVM Confidence Level is below a certain threshold. It varies by lender. We understand that when lenders use AVM it is typically exclusively AVM, and when they use HPI it is typically exclusively HPI. A majority of major lenders use AVM for mass/portfolio valuation.

**10. Where AVMs are not used for the purposes of mass/portfolio valuation, what techniques are currently in use for this purpose? Are there any plans in the near future to use AVM technology for this purpose?**

In Denmark, the indexation of registered values will, for all institutions, probably be sufficient.

In Germany, traditionally HPIs were used in market fluctuation analysis for monitoring. However, in falling markets that method entails high operational costs due to the manual handling of when reviewing problematic cases. Because of that and more recently because of CRR3 financial institutions are now shifting towards AVMs.

In Greece, the basic alternative to AVMs are HPIs. There are plans to further extend AVMs in non-residential assets such as commercial and land properties, while there is a beta-version of an office AVMs built by CPS and used within the company.

In Hungary, in addition to indexing, monitoring procedure is used (mostly for non-residential properties). The Monitoring procedure is a hybrid method, it can be considered a simplified, desktop procedure (with one calculation method), but a site inspection is also carried out.

In Italy, where AVMs are not used for mass/portfolio valuation, techniques such as HPIs are commonly employed for this purpose.

In Ireland, where AVMs are not used for mass/portfolio valuations, indexation, or sometimes desktop valuations are performed. The adoption of AVM usage is increasing, especially for regular quarterly/yearly revaluation work.

In the Netherlands, where AVMs are not used for mass/portfolio valuation, techniques such as HPIs are commonly employed for this purpose.

In Montenegro, there is no AVMs technology available, but there are some announcements about real estate companies working on its development. For re-evaluation, purposed issuers engage a real estate company that provides a report about the average real estate price per Land Register Municipality, which is multiplied by the square meter of the collateral (flats and houses). For business premises desktop re-evaluation methods are used, where each factor determining the value is evaluated separately.

In Norway, AVMs are used exclusively for mass/portfolio valuation.

In Serbia, AVMs are used by official external valuers for re-evaluation of mortgages for housing loans as mass statistics valuation and with no plan of using it as a primary model.

In Slovenia, Some banks used HPIs exclusively up to 2016 and since then also adopted AVMs. It is expected that AVMs will gain in popularity and will be used even more in Slovenian banks.

In Spain, it's mandatory to annually revalue portfolios of non-performing loans and foreclosed assets using AVM. For other purposes, HPIs are used to update portfolios.

In Sweden, HPIs are also used but more and more banks are switching to AVMs.

In Ukraine, for the purposes of mass/portfolio valuation, other techniques are used, such as HPIs. In Ukraine, sales prices are not publicly available.

It is expected that in the UK, most lenders could increasingly use AVMs for mass or portfolio valuation.

### III. Rules, guidance, standards

11. What rules or guidance exist on the use of AVMs in your country? Are there any country-specific guidelines, e.g. supplementing EU guidance like in the EBA GLOM, in relation to the use of AVMs for

- **banking supervisory/regulatory purposes in the context of mortgage origination and/or monitoring of values and revaluation**

There are no country-specific guidelines in relation to the use of AVMs for banking supervisory/regulatory purposes in the context of mortgage origination and/or monitoring of values and revaluation in Greece, Ireland, Montenegro, Norway, the Netherlands, Romania, Slovenia, Sweden, and Ukraine. There are country-specific guidelines in Denmark, Germany, Hungary, Romania, Spain, the UK, and Ukraine.

In Denmark, according to Section 33 of the Danish Executive Order on the valuation of security and loans granted against mortgages on real property provided as security for the issuance of covered bonds, mortgage banks should monitor property values on a regular basis. Section 30(2) provides that the mortgage bank with reference to CRR art.208 (3), may use a documented valuation model approved by the Danish FSA for the continuous monitoring of property values. The statistical data used in AVMs should be based on recognised, documented and publicly available sources. According to Section 5, a property must be inspected prior to final valuation, but Section 5 states that the Danish FSA may grant exemptions from the inspection requirement based on a documented valuation model for owner-occupied dwellings for all-year habitation, which is closely linked to the response to question 1.

In Germany, in addition to European requirements from the CRR, EBA GLOM, the following national requirements exist: MaRisk (Mindestanforderungen an das Risikomanagement), Minimum requirements for risk management: largely identical to the requirements for AVMs in the EBA GLOM; Regulation on the determination of mortgage lending values of properties (Beleihungswertermittlungsverordnung – BelWertV). The BelWertV has permitted the use of AVMs since October 2022.

In Hungary, apart from international standards and recommendations, the only legal reference is the Ministry of Finance Decree 25/1997. Based on this, the detailed rules must be included in the banks' internal regulations. The National Bank of Hungary (as supervisory authority) also has a recommendation in this direction, but it is mostly based on international recommendations (IVS, EVS, RICS) and these recommendations are updated periodically.

In Ireland, there are no laws or country-specific guidance issued by the central regulatory authority, e.g. the Central Bank of Ireland (CBI). However, certain financiers continue to stipulate legacy internal valuation practices, e.g. indexation from previous valuations.

In Italy, the Italian Banking Association has established “guidelines for the evaluation of properties used as collateral for credit exposures”. These guidelines were developed in collaboration with the main national associations of expert valuers, as well as with the Royal Institution of Chartered Surveyors (RICS) and the European Group of Valuers' Associations (TEGoVA). The guidelines are aligned with the EBA Loan Origination and Monitoring (LOM) approach, ensuring a standardised and reliable valuation process. Notably, the guidelines also encompass the use of Automated Valuation Models (AVMs), providing a framework for their application in property valuations. This inclusion reflects the growing role of AVMs in the valuation process, offering a balance between traditional valuation methods and modern technological advancements.

In Montenegro, the Central Bank has not issued any particular guideline related to the AVMs. Laws and

bylaws only prescribe brief guidelines on using indexes for re-evaluation purposes for real estate where it is applicable.

In the Netherlands, the applicable regulatory framework is the banking regulatory framework is the CRR and EBA Guidelines.

In Romania, ANEVAR Standards are used in the evaluation of AVMs.

In Slovenia, there are no additional regulations so the EBA guidelines are applied.

In Spain, in the context of mortgage origination, the law mandates a complete individual valuation, which must be carried out in accordance with the ECO regulations (Orden ECO/805/2003). Regarding portfolio revaluation, accounting regulation approved by Bank of Spain (Circular 4/2017) states the requirement of using Advanced AVM models to calculate annual provisions of Non Performing Asset portfolios and, for this purpose Bank of Spain has issued a Supervisory Guide for the Use of AVMs by Valuation Companies. Finally, the AEV has published the Standard for the use of AVMs, compulsory for AEV's associates.

In the UK, the Prudential Regulation Authority (PRA) set out rules for valuation at origination and monitoring though it is less specific than EBA GLOM. In the UK, current practice and precedent is that AVM is permitted for origination as long as there are clearly defined practices and policies, overseen by an individual in the lender who acts as the independent authority for valuation and property risk.

- the purposes of mass/portfolio valuation?

There are no country-specific guidelines in relation to the use of AVMs the purposes of mass/portfolio valuation in Germany, Greece, Ireland, the Netherlands, Norway, Slovenia, Spain, Sweden, and Ukraine. The UK and Hungary do have guidance.

In Hungary, apart from international standards and recommendations, the only legal reference is the Ministry of Finance Decree 25/1997. Based on this, the detailed rules must be included in the bank's internal regulations. The National Bank of Hungary (as supervisory authority) also has a recommendation in this direction, but it is mostly based on international recommendations (IVS, EVS, RICS) and these recommendations are updated periodically.

In Ireland, there are no laws or country-specific guidance issued by the central regulatory authority, e.g. the Central Bank of Ireland (CBI). However, certain financial institutions continue to stipulate legacy internal valuation practices, e.g. indexation from previous valuations.

For Italy, see previous question.

In the Netherlands, the applicable regulatory framework is the CRR and EBA Guidelines.

In Slovenia, there are no additional regulations so the EBA guidelines are applied.

In Spain, accounting regulation approved by Bank of Spain (Circular 4/2017) states the requirement of using Advanced AVM models to calculate annual provisions of Non Performing Asset portfolios and, for this purpose Bank of Spain has issued a Supervisory Guide for the Use of AVMs by Valuation Companies. revaluation of portfolios is regulated by Circular 4/2017 and guidelines by Bank of Spain on the use of AVM. The AEV has published the standard for the use of AVM, compulsory for AEV's associates.

In Sweden, the FSA requires financial institutions to comply with the EBA Guidelines on LOAM by all possible means.

For the UK, see previous question.



## **12. Do banks in your country have any internal guidelines/procedures related to the use of AVMs:**

- **as the primary property value for mortgage origination**

Banks have internal guidelines/procedures related to the use of AVMs as the primary property value for mortgage origination in Denmark, Germany, Hungary, the Netherlands (but not all), Norway and the UK. In Greece and Sweden, the existence of guidelines differs from one financial institution to another. There are no bank specific guidelines in Greece, Ireland, Italy, Montenegro, Slovenia, Spain, and Ukraine.

In Denmark, with reference to the response to question 1, in order to obtain FSA approval of a valuation model, internal guidelines/procedures are a prerequisite.

In Germany, the banking supervisory authorities require a specification of the regulatory requirements regarding the specific tools used and processes implemented in the bank.

In Greece, a financial institution can impose rules on the asset type and the property value amount collaterals but there are no internal guidelines.

In Hungary, it is mandatory to include internal rules and procedures regarding AVM in the collateral valuation policy. Such policy may enter into force with the approval of the Supervisory Authority.

In Ireland, and as per the EBA GLOM (art. 209-210), AVMs are not permitted on a standalone basis. There needs to be an accredited valuer signing off on each valuation at mortgage origination, for example as they do on a (TEGOVA / RICS surveyor signed) desktop valuation, which is indeed acceptable under EBA GLOM (art. 210).

In Slovenia, according to the valid instructions, an on-site visit by a valuer and an individual assessment are required, and it has been noticed that larger valuation companies use various IT solutions and models to help with the assessment.

In Spain, financial institutions have internal procedures related to the use of AVMs in the valuation update process. In the banking sector, there are no further guidelines recommending the use of AVMs. Although some entities may use AVM for specific uses, it is not the majority practice. Moreover, the use of AVM as the primary property value for mortgage origination is forbidden. Only a surveyor valuation conducted after an internal inspection to the property is allowed for this purpose.

In the UK, all banks set up risk frameworks on their use of AVMs and the AVMs model, design and databases must meet stringent requirements on quality and approach, matching best practices set by the lenders and auditors. AVMs usage is permitted under certain requirements (maximum LTVs, minimum CLs, restrictions on certain locations and property types, and maximum and minimum property values are set). Moreover, AVMs can only be used when they achieve a certain level of accuracy given the risk profile of the loan and to avoid using the AVMs on non-standard property.

- **as an additional source of market data and/or back-testing tool at mortgage origination.**

Banks have internal guidelines/procedures related to the use of AVMs as an additional source of market data and/or back-testing tool at mortgage origination in Denmark, Germany Hungary (Regulation on determining mortgage lending value), Ireland, Norway, the Netherlands (but not all), Slovenia, Spain, Sweden (varies between banks) and in the UK. Montenegro and Ukraine do not have internal guidelines or procedures.

In the UK comprehensive and detailed model documentation and performance data is required, updated on an ongoing basis, to support adoption and continued use of AVMs for all the above purposes

- **as a tool to monitor property values, to process reviews of values and carry out revaluations.**

Banks have internal guidelines/procedures related to the use of AVMs as a tool to monitor property values, to process reviews of values and to carry out revaluations in Denmark, Germany, Greece, Hungary (Regulation on determining mortgage lending value), Ireland, Italy, the Netherlands (but not all), Norway, Romania, Slovenia, Spain, Sweden (varies between banks) and the UK. Banks in Montenegro, Slovenia, and Ukraine do not have internal guidelines.

In Germany, the banking supervisory authorities require a specification of the regulatory requirements with reference to the specific tools used and processes implemented in the bank.

In Greece, some rules are imposed by financial institutions based on the asset type and property value.

In Norway, revaluation is done by the AVM regularly regardless of market conditions.

In Spain, the whole portfolio for Art 208(3) CRR is carried out using HPIs and revaluation using Advanced AVMs.

In the UK comprehensive and detailed model documentation and performance data is required, updated on an ongoing basis, to support adoption and continued use of AVMs for all the above purposes

- **in the context of mass/portfolio valuation?**

Banks have internal guidelines/procedures related to the use of AVMs in the context of mass/portfolio valuation in Denmark, Germany, Hungary (Regulation on determining mortgage lending value), Ireland, the Netherlands (but not all banks), Italy, Serbia, Slovenia, Spain, Sweden (varies between banks), and the UK. There are no internal guidelines in this context in Montenegro and Ukraine.

In Serbia, it is prescribed by the internal banks' procedure that AVM methodology is acceptable for (re) valuation of mortgages for housing loans only, model/methodology is applied by an external valuer, and values are validated by the bank itself.

In the UK comprehensive and detailed model documentation and performance data is required, updated on an ongoing basis, to support adoption and continued use of AVMs for all the above purposes.

### **13. Are there specific national rules or market practices with regards to Hybrid Valuations in your country?**

There are specific national rules or market practices regarding Hybrid Valuations in Denmark, Germany, Ireland, Hungary, the Netherlands (but not all), and Spain. There are no country specific rules in Germany, Greece, Ireland, Italy, Norway, Montenegro, Romania, Slovenia, the UK, and Ukraine. In Sweden, it varies between banks.

In Denmark, all model valuations need valuer approval, and the extent of overrides will be part of the model validation.

In Germany, in addition to European requirements from the CRR, EBA GL LOAM, the following national requirements exist: MaRisk (Mindestanforderungen an das Risikomanagement) - Minimum requirements for risk management: largely identical to the requirements for AVMs in the EBA GL LOAM; Regulation on the determination of mortgage lending values of properties (Beleihungswertermittlungsverordnung – BelWertV).

In Greece, the usage of hybrid valuations is not common. In the event that a surveyor has access to AVMs this is used as a supportive tool but not documented in the valuation process hybrid valuations have been utilised only within project scopes such as that of Mass/Portfolio Valuations.

In Hungary, there are no specific national rules with regards to Hybrid Valuations, but at least one of the

largest Banks has a so-called “Monitoring” methodology. The Monitoring procedure is a hybrid method, it can be considered a simplified, desktop procedure (with one calculation method), but a site inspection is also carried out. (But this cannot be considered a statistical methodology!)

In Ireland, there is no national rule, as a consequence, we see increased adoption of this valuation method at the time of both origination and revaluation.

In Montenegro, hybrid valuations are only present in for example, residual method.

In the Netherlands, hybrid valuations are used for mortgage origination in line with art 210 of the EBA GLOM. At the moment there is only one approved and accepted hybrid valuation product used by lenders.

In Slovenia, EBA guidelines have to be followed; external valuers have used AVMs as support to evaluate a large number of residential properties.

In Spain, the National Bank supervisory guidelines for the use of AVMs require that, for every AVM valuation exercise, a back-testing of the values with individual valuation is carried out. This allows us to assess the reliability of the AVM.

In Sweden, banks and real estate agents have developed guidelines for hybrid valuations.

## IV. Data

### 14. What data is used to Benchmark the performance of AVMs in your country (e.g. Surveyor Valuations, Sale Prices,)

In Denmark, Ireland, Italy, the Netherlands, Norway and Slovenia sale prices are used.

In Germany, sale price data are mainly used and preferred. Surveyor valuations are also included as a supplement. Asking prices are not accepted by the national supervisory authority.

In Greece, benchmark values comprised of surveyor valuations are used due to the lack of quality data of transactions (sale prices).

In Hungary, to benchmark the performance of AVMs supply databases, tax authority databases (list of sales and purchases of real estate), data from valuation reports, data of major consulting companies and construction cost databases can be used.

In Ireland, sales transaction prices are used, as they are openly provided by the national Property Price Register Database.

In Italy, sales prices, asking price and market values are used.

In Serbia, the following benchmark is used; price index, transactions and asking prices.

In Spain, the models used by AVMs providers can be tested using both kind of data (Surveyor Valuations or Sale Prices.). When valuing portfolios for the purpose of accounting provisions of NPAs (Circular 4/2017) it is mandatory to backtest against surveyor valuations to validate the AVMs accuracy for each specific portfolio.

In Sweden, sale prices are taken into consideration and compared with the AVMs outcome in terms of values.

In the UK, AVMs performance is measured against both surveyor valuations and sale prices, either together or separately. Established practice has been to measure against survey valuations for two primary reasons: first, sale prices have a lag between sale and current date, which means current performance is harder to measure if the benchmark data is six months old and then, sale prices are available in an open source format, making it difficult to enforce robust blind testing.

### 15. Are these data publicly available in your country?

The data used to benchmark the performance of AVMs is public, in some cases with some limitations in Hungary, Ireland, the Netherlands, Norway, Serbia, Slovenia and Sweden. This data is not available publicly in Germany, Italy, Romania, Slovenia, Spain, and Ukraine. In the UK only sale prices are publicly available. In Denmark, sales prices are available publicly. For the case of Greece, the data is proprietary of private companies.

In Germany, some of this data is published by the expert committees at the municipal level (Gutachterausschuss). However, there is no publicly accessible database at the national level that could be used as a basis for AVMs. Thus, with regard to database solutions, initiatives by private data providers and associations are being pursued. For testing and as a basis for AVMs valuations, providers have set up data sharing agreements between banks and other market participants where data is accumulated and mutually used.

In Hungary, with the exception of inner bank data, the data is publicly available, but larger databases

may have an access fee.

In Italy, the only public data available are the real estate prices of the OMI (Real Estate Market Observatory of the Public Revenue Agency – Agenzia delle entrate). Surveyor Valuations are not publicly available but owned by banks and valuation entities.

In the Netherlands, sale prices have to be acquired from the land registry (Kadaster).

In Serbia, the data is available only for transactions.

In Slovenia, the data is collected by the state through the tax and geodetic administration.

In Spain, sale prices and surveyor valuations are not publicly available and are made available by valuation companies and banks.

In Sweden, the data is not freely available but available on request, which can be denied in certain cases.

## **16. Are property inspections required in your country for mortgage origination?**

For mortgage origination, property inspections are required in Greece, Hungary, Italy, Serbia, and Ukraine. Inspections are required but exceptions exist in Denmark, and Germany, Serbia. This is not the case in Ireland, the Netherlands ( Art 210 EBA GLOM applies), Norway, Romania, Slovenia (Art 210 EBA GLOM applies) Sweden, and the UK (but it is common).

In Denmark, regarding the use of AVMs for residential property, the general rule is that new mortgage loans financed by covered bonds are granted based on property valuations involving an on-site inspection. However, individual mortgage banks may be granted exemptions allowing them to carry out valuations without inspection in selected areas if they develop statistically sound property valuation models. Exemptions which must be authorised by the Danish FSA and can only be granted for owner-occupied dwellings for all-year habitation are subject to subsequent manual approval, which means that no value can be approved without prior critical assessment by a valuer. For covered bond-funded lending outside Denmark, the Danish FSA can authorise wider exemptions if the market practice in the individual countries can justify it. As there is no commercial AVMs provider in Denmark the models are internal models. For new mortgage loans (not funded by covered bonds) granted by commercial banks, the general rule is an on-site inspection of the property. For residential property in selected areas where the property market is well-defined and transparent, the valuer can carry out valuation without on-site inspection and be based on property valuation models. AVMs are also used by the mortgage banks and commercial banks in their continuous monitoring of property values.

In Germany, property inspections are required, but there are some exceptions. Moreover, video inspections can be done under certain conditions.

In Ireland, physical inspections are not required for mortgage origination, as Ireland follows the EBA GLOM (art. 210) which allows for desktop valuations at origination. However, some financiers still have legacy internal practices in place, which means they continue to rely on full visit valuations as the default.

In Serbia, there is a property inspection for first valuation and then every third year, another inspection must be done. Within this three years period for monitoring purposes re-valuation (second and third) can be done as a desktop.

In Slovenia, inspections are generally required, but for residential properties, the option is for an appraiser to prepare a valuation by using advanced statistical models. In that case, the inspection is not mandatory.

In Spain, the valuer for mortgage origination is made in compliance with a specific regulation (Spanish Order ECO/805/2003). This regulation requires an on-site and inside inspection of the property.

In Sweden, if an AVM is not available, another valuation method must be used (e.g. photographs, inspection, additional information).



# Annex I – Glossary of Terms and Definitions

Term	Definition	Remarks
Advanced Statistical Model	A Statistical Valuation Model fulfilling the criteria laid out in the »Guidelines on loan origination and monitoring« by the EBA (EBA/GL/2020/06).	<p>The term with its definition has been incorporated into CRR3.</p> <p>The criteria relate, among other things, to uncertainty, Granularity, Accuracy, validity, Property-Specific Characteristics, representativeness, data quality and regular quality assurance. Following from the above, Comparables Based AVMs can be regarded as Advanced Statistical Models.</p>
Accuracy	Collective term referring to the ability of an AVM to produce results close to the respective Benchmark Values.	<p>Accuracy incorporates the following broadly separate dimensions:</p> <ul style="list-style-type: none"> <li>• Bias (typically quantified by the Average Error or preferably by the Median Error)</li> <li>• Dispersion (typically quantified by the Standard Deviation, or the Average Absolute Error, or the percentages of AVM results within 5%, 10% etc of the Benchmark Value).</li> </ul> <p>Some widely used accuracy measures may capture elements of both dimensions, e.g. the percentages of AVM results less than 5%, 10% etc above the Benchmark Value.</p>

Term	Definition	Remarks
Automated Valuation Model (AVM)	A system that provides an estimate of value (a Valuation) of a specified property at a specified date, using mathematical modelling techniques in an automated manner.	<ul style="list-style-type: none"> <li>As it only requires a property to be specified, an AVM can function merely based on property address, or cadastral reference or other forms of unique property identification (and possibly a few basic property characteristics), but it does not necessarily require any Previous Values of the property to be provided as input. An AVM, just like a Surveyor Valuation, can therefore value even properties that have never transacted before or whose history is not known to the user. This feature is one of the key differentiators between AVMs and HPLs.</li> <li>As it deploys modelling techniques, hence the »M« in the acronym, an AVM is typically a lot more complex and therefore more accurate than just applying a simple adjustment to a Previous Value: again, this is one of the key differentiators between AVMs and HPLs. Typically, an AVM consists of sophisticated mathematical formulae requiring the deployment of bespoke technology and it includes elements of a Comparables based valuation approach, similar to Surveyor Valuations.</li> <li>As it is an automated solution, hence the »A« in the acronym, an AVM operates without any human intervention post-initiation, making it an entirely objective tool, whose results are completely independent of the circumstances of the Valuation. Clearly this rules out, for example, any manual selection of Comparables or any other ad-hoc subjective adjustments and it is one of the key differentiators between AVMs and Surveyor Valuations.</li> </ul>
Comparable	A property used during the Valuation Process as evidence in support of a Valuation of a different property.	The description of the Comparable typically includes its address, some value information such as Sale Price at a particular date and some indication of the similarities with, or differences from, the Subject Property.

Term	Definition	Remarks
Comparables Based Model	A Valuation Model seeking to identify recent Comparables that resemble the Subject Property in terms of location and attributes, possibly adjusting their values to compensate for any dissimilarities, to produce an estimate (a Valuation) of Market Value.	
Confidence Level (CL)	A predictive measure expressing the estimated Accuracy of each result of a Statistical Valuation Method, typically only offered for Comparables Based AVMs, and as such directly translatable into a Forecast Standard Deviation. It is typically given on the EAA's 0 to 7 proprietary scale.	Please note that the degree to which the Confidence Level actually correlates with the Accuracy of the results of a Statistical Valuation Method when compared with the Benchmark Value is key to the assessment of AVM Accuracy
Benchmark Value (BV)	The property value against which the Accuracy of a Statistical Valuation Method is measured.	It is intended as the correct Market Value; hence it typically consists of either a reliable Surveyor Valuation or Sale Price, which of the two often depending on the established market practice in different jurisdictions.
Hedonic Model	An analysis of how various Property Characteristics influence property value in a given time period and geographic area. These Valuation Models typically describe property value as a function of the attributes of both the property itself and of its location.	
House Price Index (HPI)	A time series capturing the price development of residential properties over time.	This can be used as a set of multipliers to be applied to a Previous Value in order to update it to a subsequent point in time, thus producing an Indexed Value. An HPI can be computed following different methodologies, e.g., Repeat Sales, Hedonics, Weighted Averages or other techniques adjusting for differences in location, characteristics and condition of the properties available as data: this often results in contrasting figures from different HPI providers. Also the use of an HPI within an Indexation Model to produce an Indexed Value clearly requires a Previous Value and Previous Valuation Date to be known for the Subject Property and to be provided as input. As a result, this technique cannot be applied to properties that have never transacted before or whose history is not known to the user. This feature is one of the key differentiators between AVMs and HPIs.

Term	Definition	Remarks
(Open) Market Value	For the purposes of immovable property, the estimated amount for which the 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	This definition is taken from CRR2 and remains unchanged in CRR3.
Sale Price (SP)	The price agreed between buyer and seller within an Arm's Length Transaction.	
Surveyor Valuation (SV) or Appraisal	The Valuation produced by a qualified surveyor following the full internal physical inspection of a property.	The term Surveyor Valuation is preferred and more widely used in Europe than Appraisal
Second Opinion	The circumstance where an AVM is used at origination as a check for, not as a replacement to, a Surveyor Valuation.	
Statistical Valuation Method (SVM)	A mathematical tool or approach used to estimate property value (a Valuation) through deterministic computations rather than human judgment.	Different Statistical Valuation Methods can vary widely in the degree of their complexity, both from a mathematical as well as from a technical point of view. They comprise the following main types: Single Parameter Valuations House Price Indices Hedonic Models (also called Hedonic AVMs) Comparables Based Automated Valuation Models (also called Comparables Based AVMs or simply AVMs) The techniques underlying the various Statistical Valuation Methods can comprise a variety of different analytics approaches, such as linear and non-linear regressions, genetic algorithms, neural networks and fuzzy logic, among others. Statistical Valuation Methods are entirely objective in the sense that the values are calculated on the basis of measurable characteristics of the property and its location without applying any element of subjectivity.

## Annex II - Summary of the Usage of AVM across Markets

Country	Portfolio Monitoring	Mortgage Origination	Quality Control	Scenario calculations for energy efficiency retrofitting	Other
Denmark	Yes	As supporting tool and as sole means (subject to subsequent manual approval)	For auditing/assessing the performance of valuers	No	For internal rating models (for bank specific issues), mortgage funding purposes, widely for risk management
Germany	Yes	As supporting tool and as sole means	For fraud detection and auditing/ assessing the performance of valuers	Yes	For internal rating models, portfolio transaction purposes, securitisation (small number of cases), risk management (limited usage)
Greece	Yes	As a supporting tool	For auditing/assessing the performance of valuers	No	Portfolio transaction purposes, securitisation, risk management
Hungary	Yes	As sole means and as supporting tool in certain circumstances	For fraud detection and auditing/ assessing the performance of valuers	No	Portfolio transaction purposes, securitisation, risk management
Ireland	Yes	As supporting tool	For fraud detection and auditing/ assessing the performance of valuers	No, but upcoming interest	Portfolio transaction purposes, securitisation, risk management
Italy	Yes		For auditing/assessing the performance of valuers	No	Portfolio transaction purposes (small number of cases), for insurance purposes
Montenegro	No	No	No	No	Not reported

<b>Country</b>	<b>Portfolio Monitoring</b>	<b>Mortgage Origination</b>	<b>Quality Control</b>	<b>Scenario calculations for energy efficiency retrofitting</b>	<b>Other</b>
Netherlands	Yes	Non-bank lenders and as supporting tool by all lenders	For fraud detection and auditing/ assessing the performance of valuers (mandatory since 2010) for every government guaranteed mortgage loan application	Yes	For internal rating models, portfolio transaction purposes, widely for securitisation and risk management
Norway	Yes	As supporting tool and as sole means	For fraud detection and auditing/ assessing the performance of valuers	No	For internal rating models, exclusive valuation method for portfolio transaction purposes, securitisation and risk management with portfolios
Romania	Yes	As a supporting tool	Not reported	No	Portfolio transaction purposes, securitisation, risk management
Serbia	No	No	No	No	Avms are used by official external valuers for revaluation of mortgages for housing loans as mass statistics valuation
Slovenia	Yes	As supporting tool	Assessing the performance of valuers	No	For internal rating models, in small number of cases for portfolio transaction purposes, securitisation and widely for risk management
Spain	Starting because of CRR3	As supporting tool	For fraud detection and auditing/ assessing the performance of valuers	No	For internal rating models, portfolio transaction purposes and widely for risk management
Sweden	Yes	As supporting tool and as sole means	For fraud detection and auditing/ assessing the performance of valuers	No	For internal rating models, widely for portfolio transaction purposes, securitisation and risk management



<b>Country</b>	<b>Portfolio Monitoring</b>	<b>Mortgage Origination</b>	<b>Quality Control</b>	<b>Scenario calculations for energy efficiency retrofitting</b>	<b>Other</b>
United kingdom	Yes	As supporting tool and as sole means	For fraud detection and auditing/ assessing the performance of valuers	Yes	For internal rating models, widely used for portfolio transaction purposes, securitisation, product transfers (internal remortgages) and risk management
Ukraine	No	No	No	No	No

## Annex III – List of Contributors

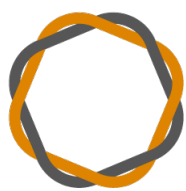
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