RICS

Quality Assurance (QA) assessment of current zone values using Mass Appraisal Systems-EPS Case Study

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Based on the results of the SRSS (Structural Reform Support Service) funded project

"Tax policy reforms – Property tax base valuation review and Quality Assurance (QA) assessment of current zone values, review of boundaries and improvement for the future."

aiming at reviewing the recent reform of the objective values system in Greece

The Greek Property taxation system

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In brief

- The *Objective Property Value Determination* system (Α.Π.Α.Α.) is based on the idea of zone values and set of adjustment coefficients
- The entire country is split in 10216 zones
- For each one a zone value is used that corresponds to the value of a property with given characteristics (newly constructed, 100sq.m, 1st floor, 2 bedrooms)
- For all properties we adjust based on relevant coefficients for the characteristics of the property to derive an objective value
- This objective value is the basis of several property related taxes.

Background

- In June 2018, the MoF run a big project to update the zone values of the system
- The purpose was to define new ones closer to the market values
- Valuers were asked to give their values (at most 4 for each zone)
- Based on them the MoF determined new zone values
- Our project aimed at several quality assurance exercises
- The underlying assumption is that the **EPS AVS** can provide a glimpse to the market values and thus we may compare the “objective values” to them

Background

- After the successful completion of a pilot project for 829 zones distributed all over the country, EPS was selected by the SRSS to run a full scale project for the system of objective value calculation

- The first scope of the project was to run a QA analysis that would facilitate a *comprehensive cross-check of the zone values and will allow potential appropriate adjustments to be made in the final proposed estimates of the new objective values.*

- On a second level a series of analyses were run in order to provide a broader review of the existing objective value system and propose further improvements in the design and implementation of a revised property tax and valuation system.

Methodological Approach

Our approach was based on combining different inputs in order to get back a representative range for each zone. These inputs were based on:

- Usage of the previous zone value
- Real estate experts (valuers) hired from Ministry of Finance (MoF)
- Real estate experts (valuers/agents) from Eurobank Property Services (EPS)
- Usage of the Automated Valuation system (AVS) of EPS which is based on historical valuation data. Note that since the AVS was not built for this purpose we also created some new models more suitable for such a task
- Usage of the market reports of EPS wherever available

This methodology was successfully applied on the “829 project” and was a strong driver for the current project. It also provided great expertise with respect to the kind of problems that could occur.

Data used

During the project several datasets were used:

- Data provided by MoF Zone Values provided for all zones were aquired, including all available estimates given by the MoF's external valuers,

- Historical Valuation Data from the Eurobank Property Services Database

- Shape polygons for the zones: this was perhaps the most difficult task since MoF does not have available data for all zones and shape polygons were key-ingredient of the zone system and our approach. They were purchased by EPS from a third-party geoprovider.

- Market Reports' insights in the form of price ranges as those provided by EPS

Methodological Approach

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The basic steps for our methodology were :

- Given the shape polygon of each zone, a number of hypothetical typical properties' locations was simulated. In particular the simulation spread within the whole polygon as long as on its borders.

- Usage of the AVS technologies in order to estimate the price of each simulated property.

- Combine values to measure the mean price but also the variability within the zone.

- Use the derived values for quality assurance of the values given by MoF. This task combined information from different sources, including valuers' estimates of EPS itself. This task of combining information is a delicate task involving Bayesian update approach.

- Use of the data collected to infer and check several issues for the current zonal system.

AVS methodologies

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- AVS of EPS uses different approaches to estimate the property values.
- Based on historical (cleaned) data we apply a series of models to estimate the value and then combine the results with state of the art methods for forecasting.
- System offers a series of functionalities, including VaR, indexation, visualizations, confidence estimation etc
- IMPORTANT: the purpose of the system was very different than providing “objective values”
- Various models include
    - Hedonic Models
    - Spatial Models
    - Artificial Neural Networks
    - etc

Quality Assurance

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Quality assurance was based on (among others)

- Descriptive work on the data from MoF
- Comparison of MoF values with that from EPS method
- Check for the quality of data used from MoF
- Methods for examining the effect of merging zones and values
- Measures of spatial variability
- Sensitivity analysis on the objective system's adjustment coefficients
- Measures of deviation of objective values from Market values

We present some selected results

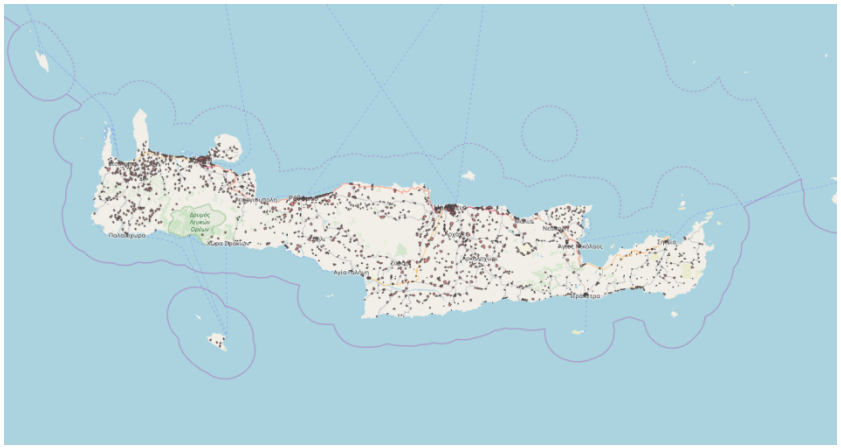


Figure 3.3: Zones of Crete Region

Table 3.1 : Distribution of Zones per Administrative Region & Number of MoF estimates

Administrative Region	Number of MoF Estimates				Number of Zones
	1	*2*	*3*	*4*	
Attica	16	79	217	878	1190
Central Greece	42	457	602	37	1138
Central Macedonia	6	146	278	329	759
Crete	73	739	776	52	1640
Eastern Macedonia & Thrace	32	275	431	61	799
Epirus	4	127	436	27	594
Ionian Islands	6	61	15	0	82
Northern Aegean	1	109	216	0	326
Peloponnesus	167	670	879	128	1844
Southern Aegean	14	375	135	33	557
Thessaly	4	169	390	102	665
Western Greece	0	49	74	26	149
Western Macedonia	0	281	178	14	473
Sum	**3,6%**	**34,6%**	**45,3%**	**16,5%**	10216

Zonal System Characteristics – Visualizations and descriptive statistics

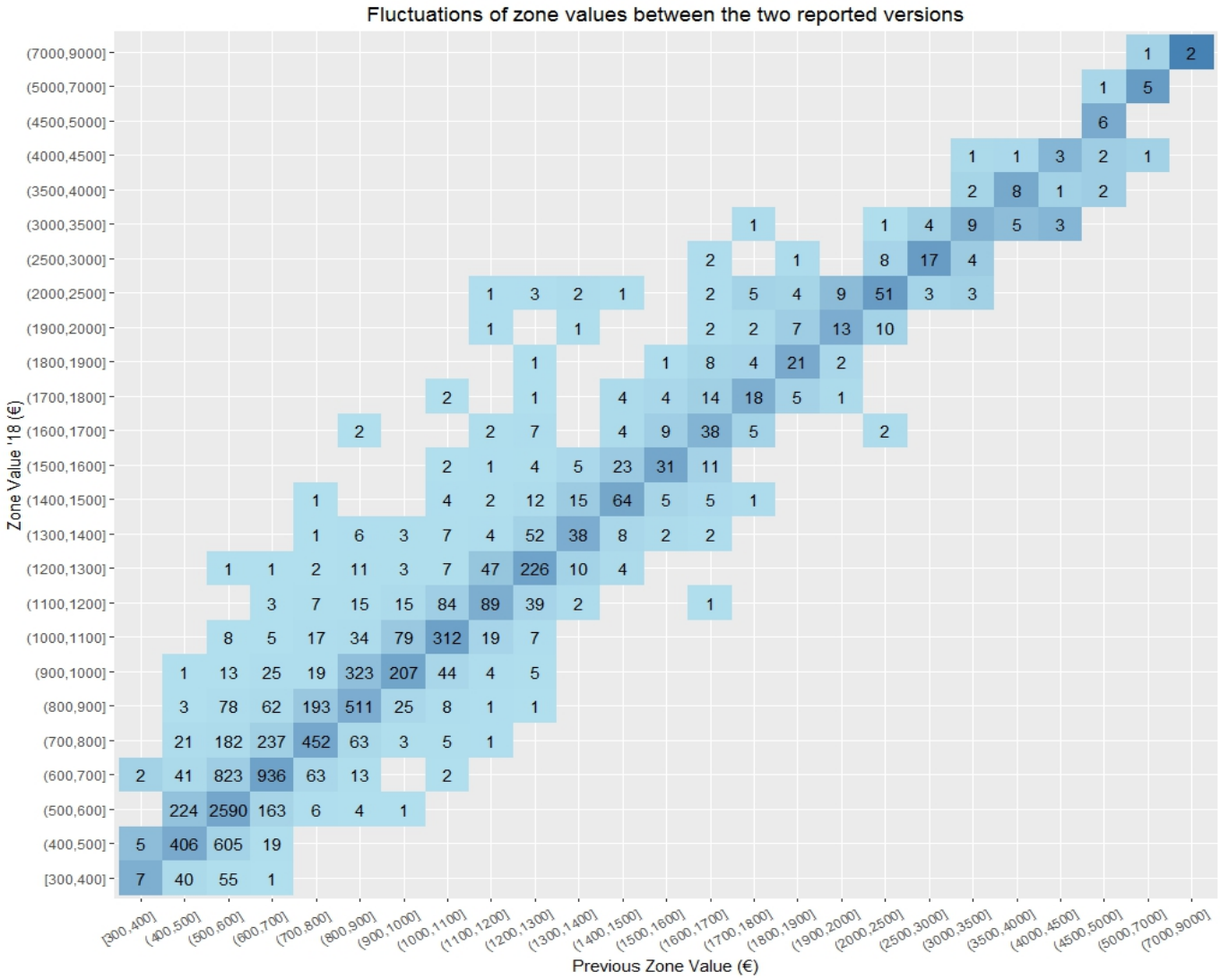
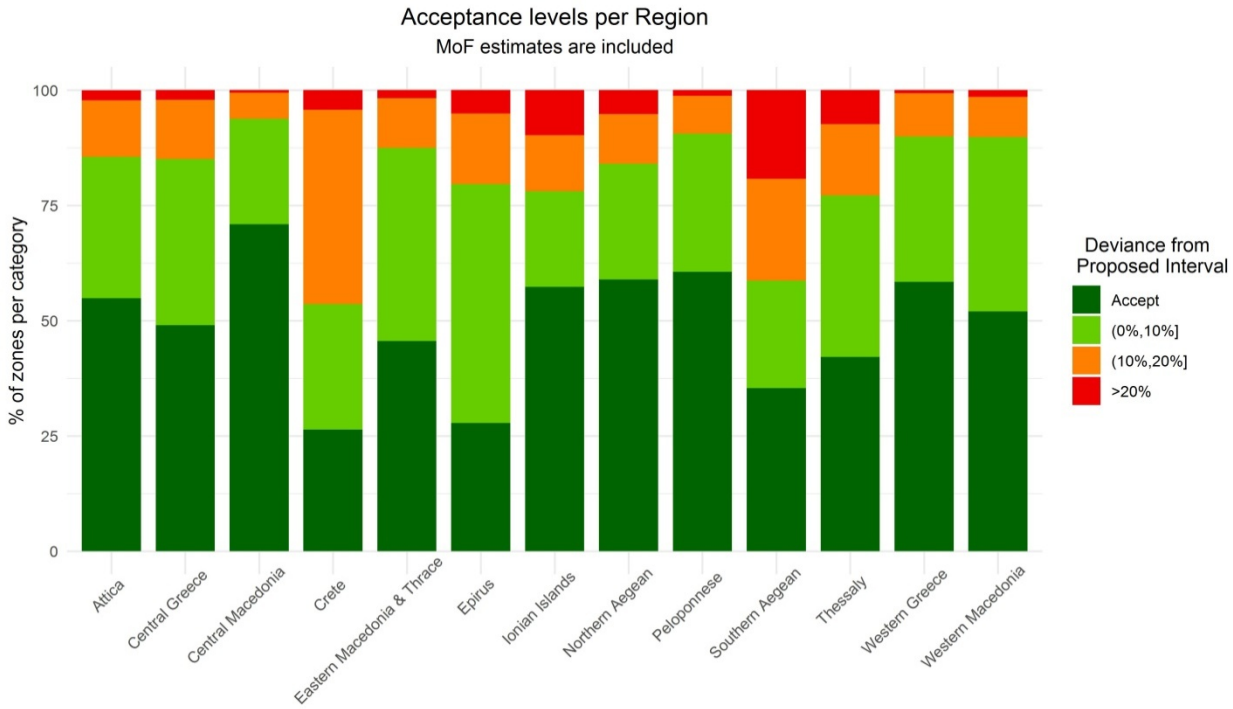


Figure 3.4: Heatmap of new and old reported zone values

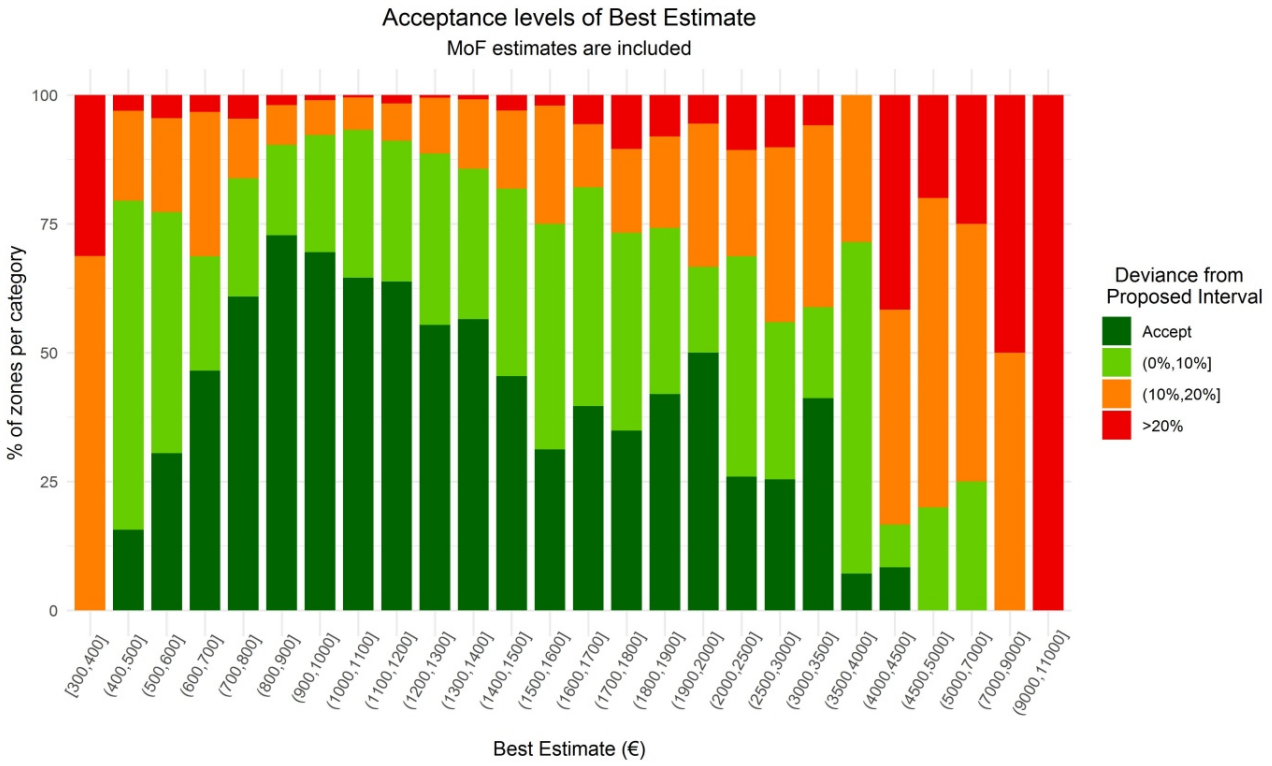
Quality Assurance Exercise: Comparison with the best estimate

Version	Accept	(0%,10%]	(10%,20%]	>20%
Including MoF Estimates	48%	32%	16%	4%
Excluding MoF Estimates	47%	17%	20%	16%

Table 4.1 :Overall Assessment of QA Results



Quality Assurance Exercise: Comparison with the best estimate



Adjustment Coefficients Analysis

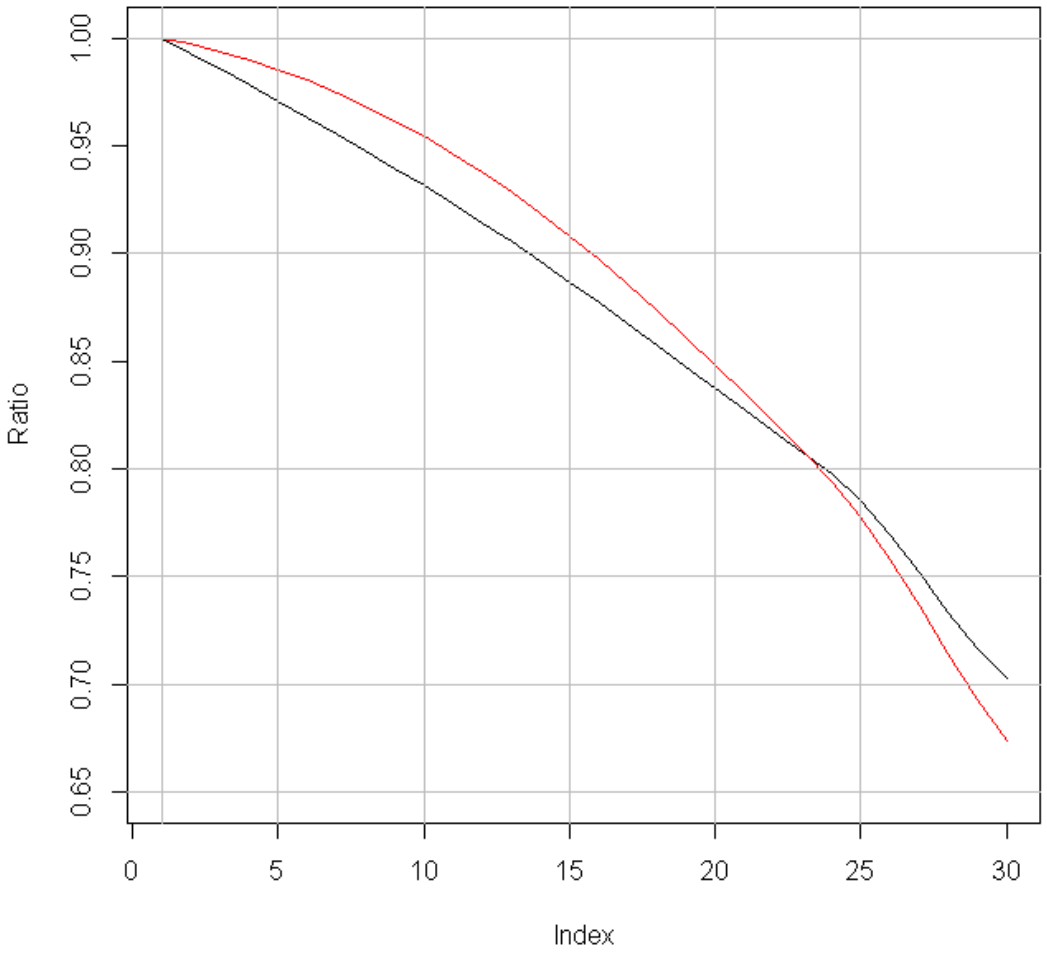
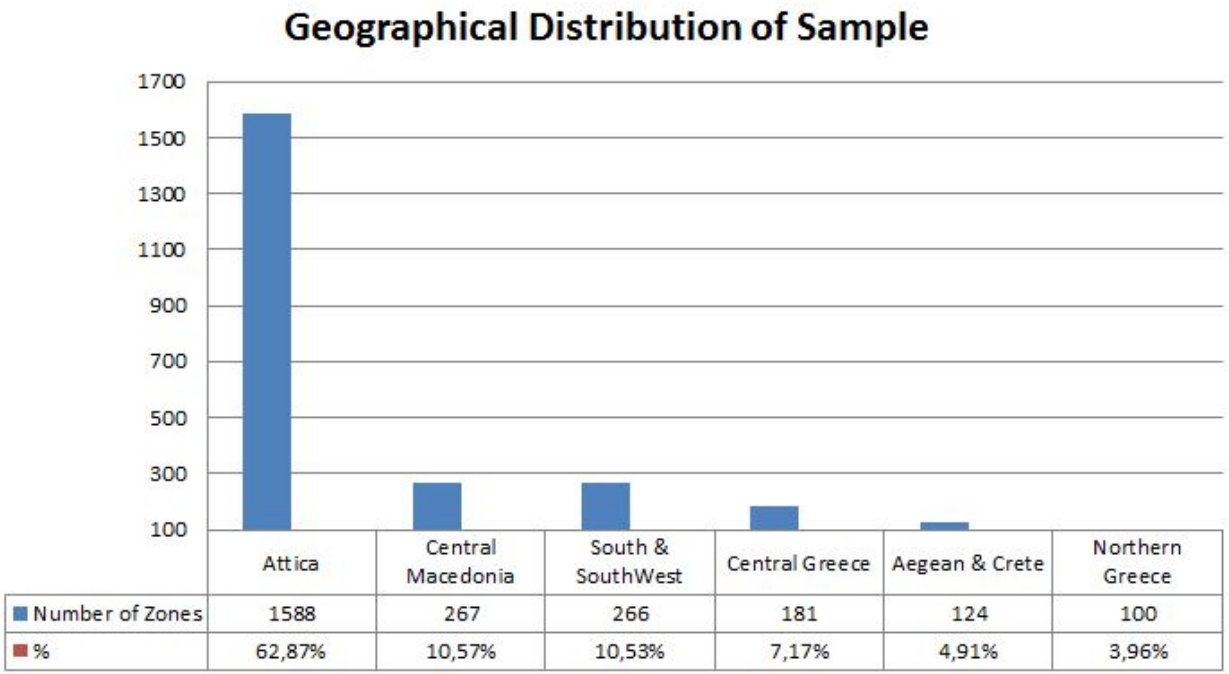


Figure 4 1: Smoothed versions of the way the price of the property decreases with respect to the age of the property based on a recent portfolio of properties. Red line is the one from the EPS Historical Database (market values) and the black line the objective values

Zonal System Review as a whole

- Selected 2526 flats that have been valued be EPS's experts from 2016 onwards



	Attica	Central Macedonia	South & SouthWest	Central Greece	Aegean & Crete	Northern Greece
Number of Zones	1588	267	266	181	124	100
%	62,87%	10,57%	10,53%	7,17%	4,91%	3,96%

Figure 6 1: Geographical Distribution of Sample

Zonal System Review as a whole

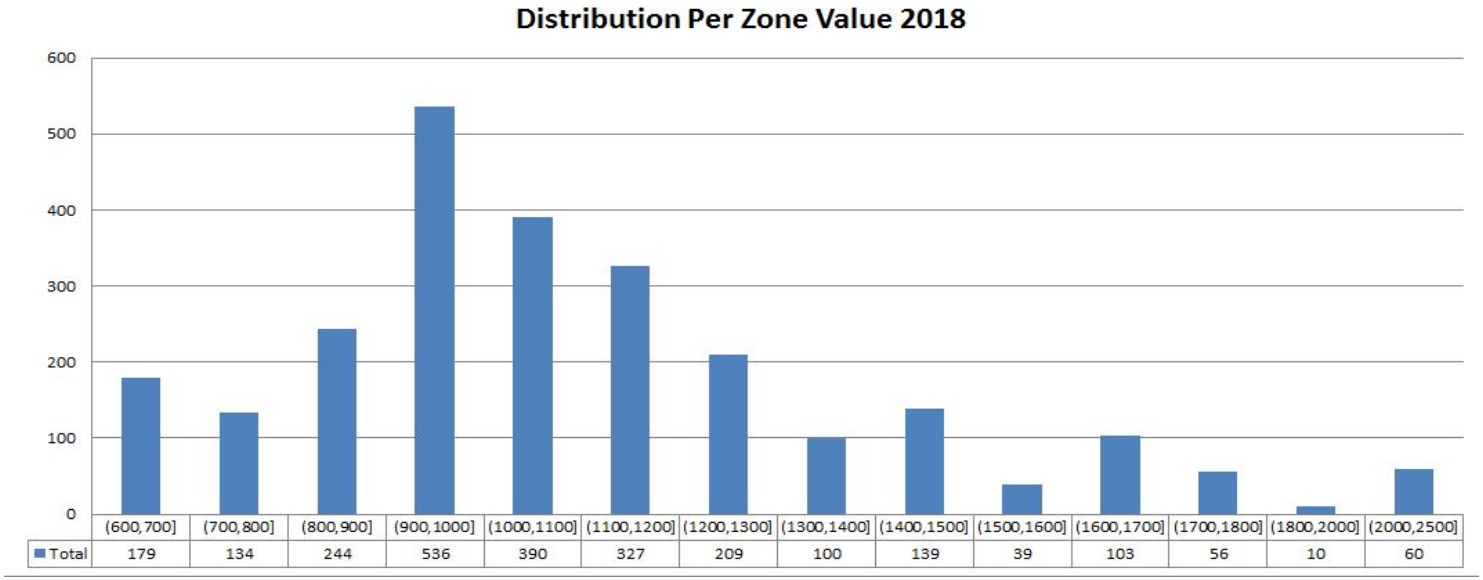


Figure 6 2: Sample Distribution per 2018 Zone Values

Zonal System Review as a whole

- A series of different values were produced and compared to the market value of each property:

1. Objective value based on the zone value of 2016
2. Objective value based on the zone value of 2018
3. Objective value based on the Best Estimate value
4. AVM value based on “objective” assumptions

The AVM value of each property was calculated with modifications of the “Quality of Construction” and “Condition of Maintenance” variables. These variables were both set to the level of “Good” (the second highest level of our system), in order to reflect a more “objective” nature of a valuation per asset. This was also a rule that has been used, though not explicitly stated on the instructions of MoF, by the individual valuers that reported an estimation for the value of each zone.

5. AVM value

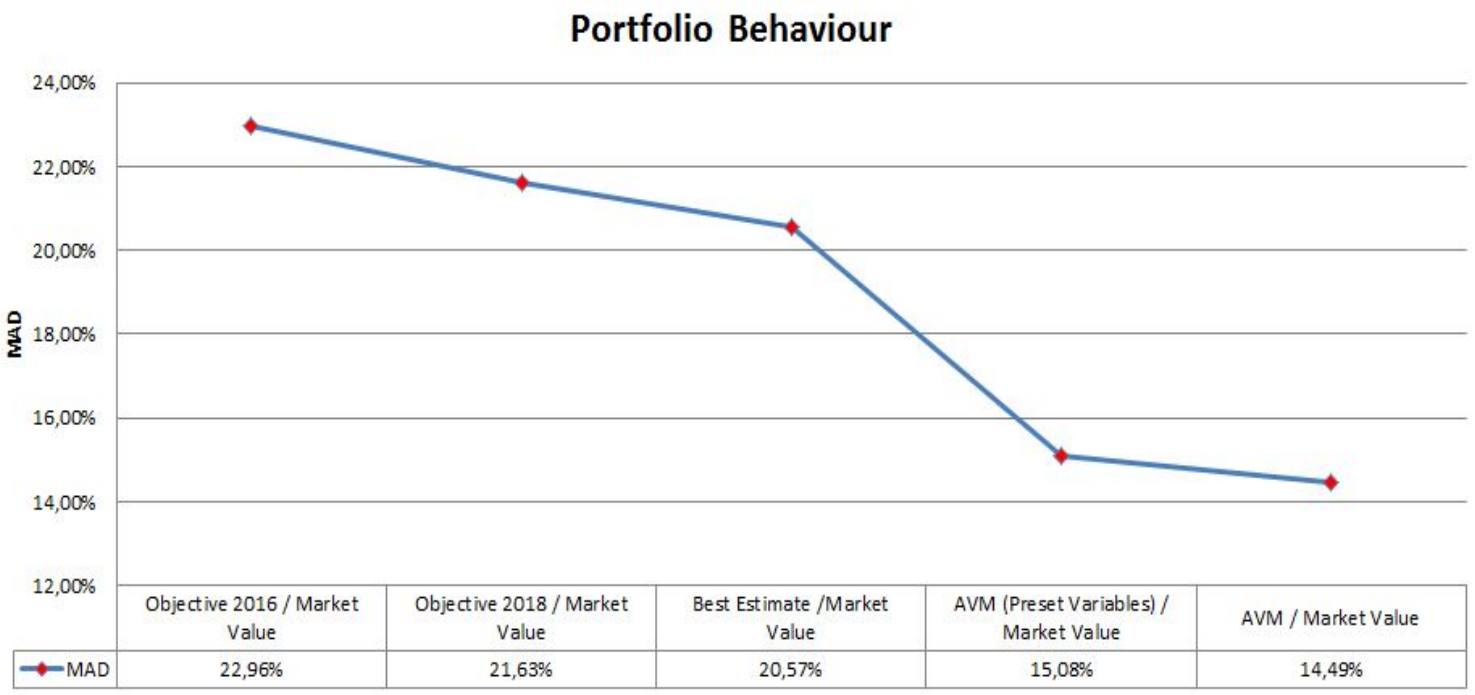


Figure 6.3: Portfolio Behavior based on different approaches

Recommendations about the Procedure

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The work done by MoF was very good given the time restriction. The current procedure can be benefited by changes like

- No more than 100 zones per valuer must be assigned to each valuer
- Restriction to the different areas
- One month to provide results
- Retain the exclusion of the area of business of the valuer
- Allow the use of cost replacement valuation method.
- In both the cost replacement & the comparables valuation method a table of detailed comparables has to be delivered (in the first case for the land valuation and in the latter for the actual property). Also the valuer should state why he/she chose the respective method.
- Submission of the values through an electronic system that allows for logical checks online and double checks the entries to avoid misspelling errors.
- Each valuer can have a number of zones that he/she asked for but also few zones that are given automatically from the system. This will help to assess and calibrate his/her behaviour.

Further Recommendations

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Some findings

- Reduction of the number of zones is possible
- Values ranges can be reduced
- Adjustments need to be reconsidered
- Typical property approach has some problems due to the market crisis
- The updated values are closer to the market values but still there is room for improvement

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A new approach based on AVS

Advantages

• It does not depend on zone values and adjustments.

• It can provide values closer to the market value if the AVM is based on good data to reflect the current values.

• It needs less effort to determine the values; in the current exercise we needed almost 30,000 valuations.

• It is easier to adjust in time since only the model needs to be recalibrated.

• It can incorporate some state to the art procedures for AVM.

Disadvantages

• Needs careful calibration based on good dataset and also it must be kept updated.

• It is unclear what the liability is after that: It has been stated by the MoF representatives that in numeral occasions a legal obligation to provide clarifications and support on how a zone value has been set rises.

• The underlying model must be sufficiently clear to be reproducible.

• Such kind of system requires proper infrastructure and back-end support.

Thank you very much

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