



ACADAMETRICS RESIDENTIAL ASSET CALCULATOR (ARAC) METHODOLOGY

MONTHLY HOUSE PRICE DATA AT COUNTY/LONDON BOROUGH AND PROPERTY TYPE LEVELS FOR RESIDENTIAL PROPERTY PORTFOLIO REVALUATION

In this paper, we outline the Acadameetrics Residential Asset Calculator (ARAC) methodology employed in providing a stand-alone collateral revaluation service or as an element of our Stress and Scenario Testing (SST) Methodology.

The Acadameetrics Residential Asset Calculator, using prices for each property type at county or London borough level, provides a refined but inexpensive tool for indexing values at portfolio level. ARAC takes a portfolio of known past prices and updates them with current prices. The results include standard deviations, attached to the value of each property. These deviations enable properties to be identified which require a closer estimate of current collateral than ARAC can provide at individual property level. This enables a lender to refer such properties only, rather than the whole book, for a surveyor valuation or one by an Automatic Valuation Model (AVM).

Based upon our Acadameetrics Prices and Transactions (APAT) data, themselves based upon Land Registry transacted prices, ARAC in-fills blank cells, at e.g. unitary district level, for months when no sales of a particular property type occurred, using a price calculated from regional data. The ARAC prices can be supplied as a time series for use in-house by portfolio owners.

In our Testing Indexation paper, we show that ARAC using county data measured the value of 405,023 properties within 0.9%, and, using London borough prices, within 0.3% of the totals shown by the relevant duplicate sales prices taken from the Land Registry.

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1. PREAMBLE

ARAC comprises house price data based upon Land Registry (LR) average prices for transactions from 1995 in England and Wales and Nationwide House Price Index data from 1973 to 1995. In addition ARAC provides Nationwide prices for e.g. Scotland and Northern Ireland as described below. As well as house price data, ARAC provides software, enabling data relating to a set of properties, comprising a portfolio, to be entered at e.g. postcode level and a series of procedures to be carried out which: check the data; relate post codes to counties/London boroughs and regions; update the prices to those current; provide revaluations of each property with accuracy measures in the form of standard deviations; a current portfolio value. The ARAC price data without the procedures are available for portfolio owners for use in-house.

1.1 Coverage Acadametrics Residential Asset Calculator (ARAC) employs the Acadametrics Prices and Transactions (APAT) data, described in our [Acadametrics Prices and Transactions \(APAT\) Methodology](#) paper. APAT is based upon the prices reported to the Land Registry (LR) following the sale of a property in England and Wales and includes properties bought with cash. LR does not hold data for properties in Scotland, Northern Ireland, Isle of Man, Guernsey or Jersey; nor does LR hold data for properties sold prior to 1995, except for all property types and all regions combined. For such properties and periods, APAT and ARAC use the Nationwide House Price Index series.

1.2 Average house prices For properties in England and Wales, from 1995, LR calculates prices averaged by region, county, unitary district and London borough. We accordingly prepare separate series of prices for regions, counties, unitary districts and London boroughs and use these, with the estimations described in 1.4 below, when the volumes of transactions available for particular house types and localities fall below minimum levels.

1.3 Data limitations The value of an individual house will be affected by factors, such as the number of bedrooms, which are not collected within LR data. Furthermore, an ARAC calculated current value reflects only the change in average values for the relevant property type and London borough, county, unitary district or region in respect of which we hold and have used price data. The process is described below. Such changes may well not apply to a particular postcode area. In addition, ARAC will not distinguish any change in value resulting from improvements or dilapidations.

1.4 Estimation LR records every residential property transaction between a willing buyer and a willing seller in England and Wales, apart from commercial sales. With the exception of prices for a property type within a local area which have fallen below three in any one month (the minimum number required for LR to calculate an average), APAT uses the complete dataset of national transactions, as opposed to a sample. In ARAC, the prices which are not provided by APAT are estimated, such that ARAC provides a complete data series for revaluation purposes. ARAC allows closely accurate assessment of the current value of a portfolio of properties, based upon known past prices for the properties concerned. For each individual property, however, ARAC provides only an estimate of the change in value for the specified property type and locality over the period between the revaluation date and that of the known initial price. How wide of the mark this estimate might be is revealed by the standard deviations allocated to each individual estimate and which we describe in 2.6 below. These deviations inform lenders and indicate for which properties they may wish to engage a professional surveyor or provider of an Automatic Valuation Model (AVM) to obtain a reliable current value for e.g. arrears management reasons.

1.5 Procedure We take client data, uploaded to our secure server, and return a valuation within an agreed timescale, based upon the methodology set out below.

2. METHODOLOGY

2.1 Postcodes ARAC includes a postcode look-up routine that validates the input postcode and identifies in which London borough, county, unitary district or region a property is located, using the postcode without the two last characters. Depending upon the area into which the postcode falls, the following routines are then utilised.

2.2 London Boroughs First, ARAC estimates:

- the number of sales in a three month period, centred on the month of purchase or of the initial valuation, for the appropriate property type and borough, and checks that this equals or exceeds 50 over this period
- the number of sales in a three month period, centred on the month of the most recent index value for the appropriate property type and borough, and checks that this equals or exceeds 50

If both of the above criteria are met, the London borough data series is used. If not, the borough data series is updated on the basis of the price change for the property type using the county data series (which includes London as a county) below. This updated borough price is then used in the ARAC calculations.

2.3 Counties and unitary districts First ARAC estimates:

- the number of sales in a three month period, centred on the month of purchase or of the initial valuation, for the appropriate property type and county or unitary district, and checks that this equals or exceeds 50 over this period
- the number of sales in a three month period, centred on the month of the most recent index value for the appropriate property type and county or unitary district, and checks that this equals or exceeds 50

If both of the above criteria are met, the county or unitary district data series is used. If not, the county or unitary district data series is updated on the basis of the price change for the property type using the regional data series below. This updated county or unitary district price is then used in the ARAC calculations.

2.4 Regions Depending upon the relevant region, APAT and hence ARAC uses the LR regional, LR UK aggregate or Nationwide data series as follows:

- if one or more of the criteria for use of the county data series is not met, the LR regional data series is used to update the prices for the particular county or unitary district, on the basis of the price change for the property type in the region concerned
- if the region is Scotland or Northern Ireland, monthly values, derived by interpolation from the Nationwide Regional Quarterly Indices (post 1973) table up to Q1/1991, are used; thereafter, values are taken from one of the Detached (post 1991), Flats (post 1991), Semi Detached (post 1991) or Terraced (post 1991) tables (n.b. none of these tables are seasonally adjusted)
- if the region is Unknown (which will include Guernsey, Jersey and the Isle of Man), the LR average property price for the property type for all England and Wales is used

2.5 Counties/London boroughs pre-1995 For a London borough, county or unitary district with a month and year of purchase or initial valuation earlier than February 1995, the Nationwide data are used for the period up to January 1995 (as for Scotland and Northern Ireland); however, values for all property types and regions are adjusted by the ratio of growth in the LR average property price for all property types and for all England and Wales to that in the UK column in the Nationwide Regional Quarterly Indices (post 1973) table (as monthly interpolated).

2.6 Standard Deviation Bands ARAC provides bands, defined in terms of the number of estimated standard deviations, as a guide to the accuracy of valuations. In general, where a distribution is roughly normal, one standard deviation below and one above should take in two thirds of the data and two standard deviations below and above should take in about 95% of the data.

As explained in our [Testing Indexation](#) paper, the estimates of standard deviation were derived using data from LR for 2006 and part of 2007 for properties for which LR held records of two or more sales transactions for the same property. In the case of multiple transactions, only the first and last were included. A large number of ratios were constructed by dividing the first sale price revalued to the date of second sale by the second sale price. Because the distribution of these ratios was markedly skew, the ratios were replaced by their logs and standard deviations obtained for all the various combinations of property type and location in the three house price index data series used (i.e. London borough, county and region). A mean of zero was assumed in each case and values were calculated for two standard deviations below, one standard deviation below, one standard deviation above and two standard deviations above this mean. Antilogs of all these results were calculated to provide factors that could be applied to the ARAC revaluation to produce the bands that appear as part of the output.

2.7 Caution Standard deviations were calculated at a time when APAT and hence ARAC data prior to January 2000 did not include prices at county, unitary district or London borough level, as is now the case. For properties with an initial price prior to January 2000, such deviations were calculated using APAT regional prices. Furthermore, APAT and hence ARAC county, unitary district and London borough prices prior to January 2000 are estimated for areas for which LR data, prior to January 2000, were the subject of the boundary changes, fully described in our [APAT Methodology](#) document. For all these reasons, care should be exercised in applying the standard deviation bands where the date of purchase or of initial valuation falls before January 2000, since these bands may not be appropriate for the data series used to estimate growth before that date.

ABOUT ACADAMETRICS

Acadametrics is an analytics consultancy focussed upon house prices and property portfolio risk. We conduct research, led by Dr Stephen Satchell, Economics Fellow, Trinity College, University of Cambridge, develop solutions to assist lenders and are expert in the measurement of house prices, preparing our own house price index launched in 2003 by the Financial Times as FTHPI. In a step to expand coverage, LSL Property Services PLC agreed to support the index, known from June 2010 and widely published as the LSL Property Services/Acadametrics House Price Index (LSL Acad HPI). Whilst backed by LSL, the index retains its authority as independently prepared and providing an independent News Release commentary. As FTHPI, the index was chosen by the Chicago Mercantile Exchange for a possible future residential house price derivative.

Our past work has included the analysis of pre-payment risk, the pricing of mortgage books and the assessment of the performance of credit score models for mortgages, credit cards and unsecured loans under changing macroeconomic scenarios. Much of our early work involved forecasting the mortgage and MIG losses arising from the 1989-1991 housing crisis. As a result, we hold what we believe to be the largest available downturn default database, which enables our stress and scenario testing methodologies, developed by Dr Satchell.

Since early in 2009, we have worked closely with MIAC Analytics from New York. Our joint company, [MIAC | Acadametrics](#) Limited, provides our data and models on the MIAC DataRaptor data management platform with the WinOAS cash flow tool. These can now be downloaded from our secure UK server, for use in-house. Our models assist on-balance sheet lenders, together with participants in securitisations and in the sale and purchase of loan portfolios. We offer:

- **House Price Data Series** entitled Acadametrics Prices and Transactions (APAT) providing monthly house price trends from 1995 at national, county, unitary district and London borough level, based upon Land Registry data, with interactive charts for every participant in the housing sector; we offer expertise and data for all those investing in or advising on house prices and extensive analytical capability
- **Collateral Valuation** using our Acadametrics Residential Asset Calculator (ARAC) based upon APAT, incorporating data entry and calculation software to provide loan level confidence measures used in our Residential Property Portfolio Revaluation service and SST (below). The house price data are also available as a series for use by lenders and owners of residential property portfolios for their in-house revaluation use
- **Loan Level Stress and Scenario Testing** comprising our:
 - **Arrears and Possessions Forecasting (UKAPF)** using our Satchell Wongwachara model to forecast at UK level, accounting for forbearance; for benchmarking purposes and economists; our related Macro-Risk Model assesses national risk levels
 - **Stress and Scenario Testing (SST)** with ARAC revaluation as standard, or AVM revaluation, to provide forecasts of loan by loan possessions and losses, employing Macro-Risk Model output to reflect alternative scenarios
- **Custom Data and Model Development** which includes the provision of loss data from our downturn default database for client LGD benchmarking, model validation and model development, by Dr Satchell, bespoke to customers' needs. We have considerable expertise in index construction, available for clients

Our website includes numerous descriptive papers. Acadametrics services have an academic foundation in econometrics, statistics and decision theory and are developed from our own resources under our "research first" policy. Further detail is provided on our website www.acadametrics.co.uk.

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