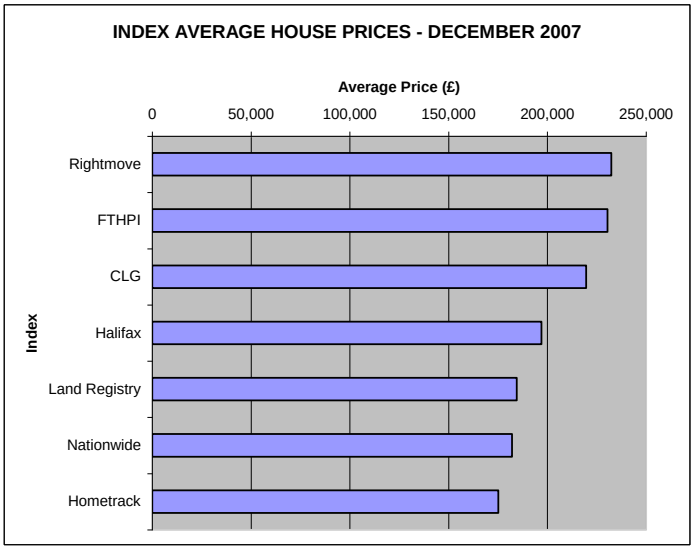
HOUSE PRICE INDICES – FACT OR FICTION?

Ten years ago the Bank of England said that "the recent divergence between the rates of house price inflation implied by the Halifax and the Nationwide indices is both puzzling and unfortunate". There are now seven house price indices, each of which provides a wealth of alternative information. But we ask 'how factual is any index in reporting house price movement or an average house price?' The variety of available average house prices, as measured by the different indices at the end of 2007, is shown below.

LENDER	AVERAGE PRICE (£)
Rightmove	232,396
FTHPI	230,392
CLG	219,591
Halifax	197,039
Land Registry	184,469
Nationwide	182,080
Hometrack	175,200



In this paper, we report our research designed to establish which index provides the truest measure. To do this, we used a portfolio of 405,000 properties sold during 2006, for which the contractual sale prices at two different points in time were available, and compared how well indices predicted the real outcome.

We tested the Halifax, Nationwide and CLG indices, together with the Acadametrics Prices and Transactions (APAT) data, which underpin FTHPI. We found differences, ranging from 7.6% to 0.3%, between the values for the entire portfolio, predicted by the indices or APAT and the real value using the second-sale prices.

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THE OBJECTIVE

The objective of a house price index is to measure the movement in the price of a typical, average, house. Unfortunately, there is no such thing as a typical, average, house.

A simple average of the value of every house in the entire housing stock would represent the average house price. However, taking regular stock measures of the entire population of property would be costly and time consuming. The need is for regularly updated price information and this has meant that indices have generally been built upon the prices of properties for sale, or sold, i.e. upon the transactions, rather than upon the prices of the whole housing stock.

The challenge is that the average price of properties transacted during any period of time does not equate to an average house price. Hence, index builders employ data-weighting methodologies to eliminate the distortions which arise from their use of their particular transaction samples from the stock; within a particular locality; of a particular property type; occurring at a particular time in the year.

The data weighting methodology employed is dictated by the data that are available to the index builder and there are two fundamental and distinct choices of methodology to eliminate bias. One is entitled transaction weighting, where sample data is weighted in accordance with the historic distribution of transactions[1]; the other is entitled stock weighting, which adjusts for the degree to which the sample is representative of the population as a whole[2] - an issue explored in a 2006 CLG paper[3].

THE REALITY

No index provider has a perfect data set. Whilst the Land Registry (LR) is the sole source of final transacted prices in England and Wales, LR does not provide data for Scotland or Northern Ireland. LR does not collect data on property characteristics, meaning that no distinction can be made between, say, three and four bedroom houses. Furthermore, very few sales are reported to LR by the end of the month in which they occurred and several months elapse before LR can provide the bulk of transactions. In order to use LR data for FTHPI, Acadametrics developed a forecasting and updating procedure; with forecasting enabling the provision of timely data and updating providing the final, accurate, results. Likewise national statistics are updated by the Office for National Statistics (ONS).

Perhaps the most obvious difference between indices arises because the underlying house prices employed are not the same. Rightmove and Hometrack report asking prices; Hometrack's prices are those estimated by their panel of estate agents. Halifax and Nationwide report mortgage offer prices; CLG reports the related mortgage completion prices but lacks cash sale data; FTHPI and the LR index use transacted prices and include cash sales. The Royal Institution of Chartered Surveyors (RICS) report does not report prices at all but, instead, reports surveyor expectations concerning how prices will change. Like Hometrack, RICS provides survey results, rather than an index. We do not include RICS results because these provide numbers of surveyors with positive or negative expectations, rather than prices. We do include Hometrack prices because these are reported by newspapers as if they were the result of an index, even though Hometrack are careful to explain that they are derived by survey.

UK house price indices generate valuable PR. In order to be first with the news, some indices report at, or even before, the month end and will necessarily measure prices before all the data for the month are available.

The Communities and Local Government (CLG) index was designed by the Office for National Statistics (ONS) and FTHPI was designed by Acadametrics to provide the "true measure of house price inflation", called for in 1998 by the Bank of England. Neither index is provided for any other purpose.

AN OBJECTIVE COMPARISON OF UK HOUSE PRICE INDICES

The Bank of England's concern about contradictory house price inflation reports from the two lender indices in the first quarter of 1998 was expressed by Mervyn King in his address to the 1998 Building Societies Conference. Whilst no less than five new indices (including the current CLG index) were subsequently

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[1] an index based on transaction weighting represents the price of a house with "typical" characteristics; all the properties in the set have an equal weight in determining what is "typical", irrespective of their price. This method is used when the index is constructed to represent the value of a typical member of the reference set

[2] using expenditure weighting, an index embodies the price of a representative set of properties, and the more expensive houses have a higher weight. This method is used when the price index is constructed to reflect the value of the housing stock

[3] an issue explored in the report "New Horizons Programme Which House Price? Finding the Right Measure of House Price Inflation for Housing Policy", April 2006, Gwilym Price and Phillip Mason, April 2006
http://www.communities.gov.uk/publications/corporate/whichhouseprice

developed, no objective assessment of house price indices against a factual benchmark was ever made. Indeed, no such benchmark was available until 2005.

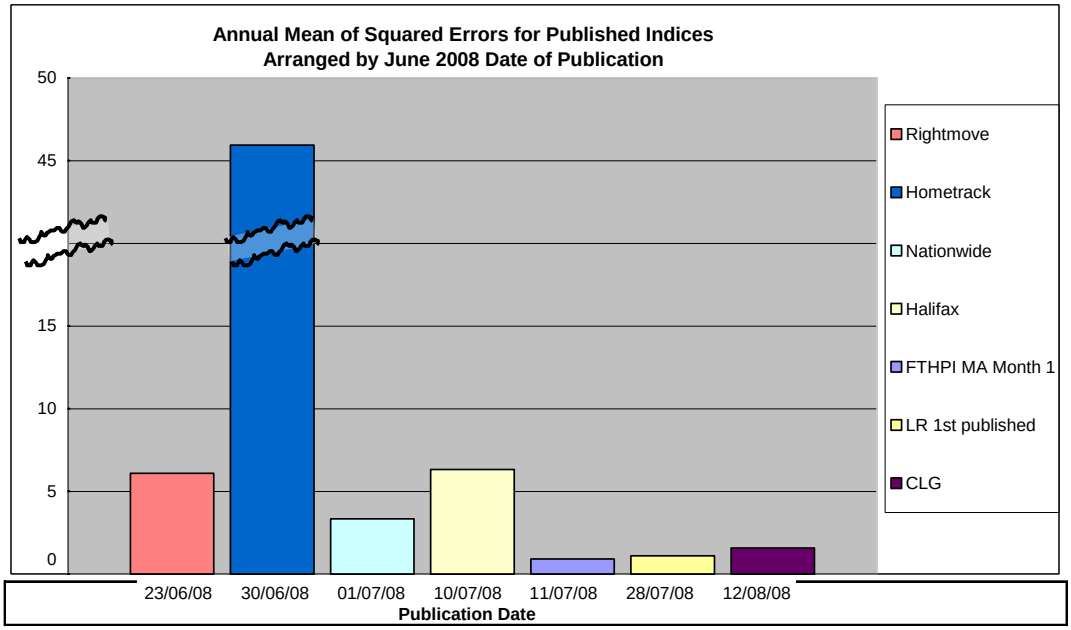
To explain our tests, we need to explain FTHPI. *Every single index*, published immediately or shortly after each month end, *is built upon a sample of data*; but, despite being based upon only sample data, none of the indices, apart from FTHPI, is subject to an on-going monthly update.

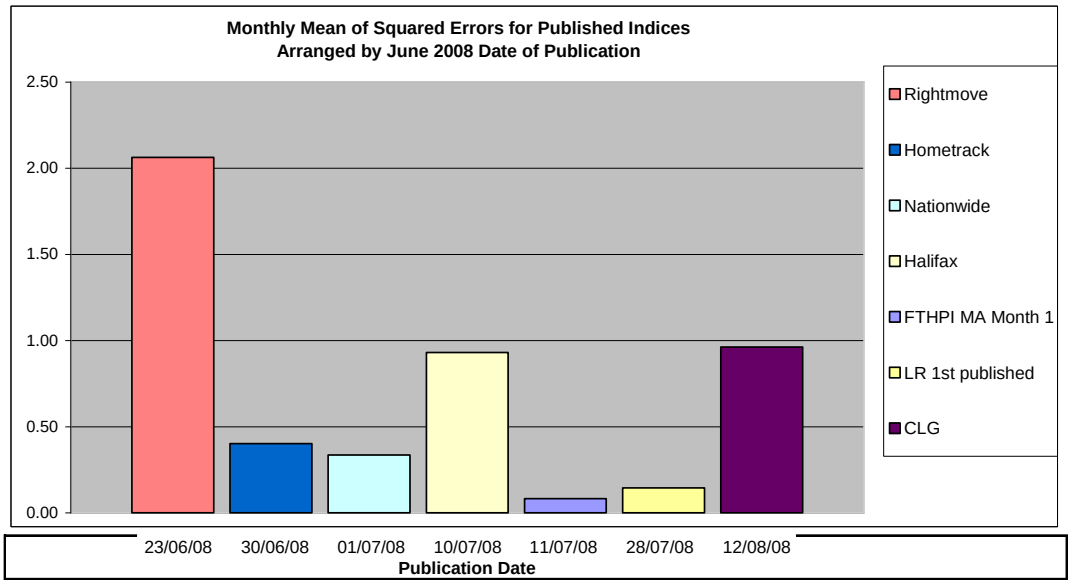
The initial FTHPI for any given month is a forecast figure. The forecast is progressively replaced, in every subsequent month, using real data until every transaction has been recorded at LR. However, four months after the initial month of publication, enough factual LR data have been used to update the original (FTHPI Month 1) forecast such that FTHPI reflects virtually every transaction that has taken place in the month in question. In other words, after four months, FTHPI effectively represents the complete LR data. Note that the average prices reported by FTHPI, after four months, are simply the factual average LR prices, smoothed to minimise volatility, and seasonally and mix adjusted. Seasonal adjustment accounts for price rises which are not due to inflation but are normal in the spring and summer. Mix adjustment accounts for any abnormal swing in the type of houses sold in a particular month.

Since what we entitle FTHPI “final” (being FTHPI updated four months after the initial month of publication) comprises pure LR data, after statistical adjustment, our initial work in developing an objective comparison of the UK house price indices used it as the benchmark. We compared each index, including the earliest FTHPI index forecast (FTHPI Month 1) with FTHPI “final” and calculated the difference between the monthly and annual house price inflation reported by the indices with our factual benchmark.

Our initial purpose was to seek leading indicators, rather than to compare indices. It would be valuable to find a quantitative relationship between asking and final prices. This purpose remains. We acknowledge that we are comparing indices (and our own FTHPI “forecasts”) with FTHPI in the form of FTHPI “final”, rather than with a pure benchmark. We repeat our comparisons monthly and post the results on our website.

We added together the above differences[4]. The results[5] for e.g. June 2008 are reproduced below and place the indices in the normal order of publication to reflect the combination of "speed to market" and accuracy.





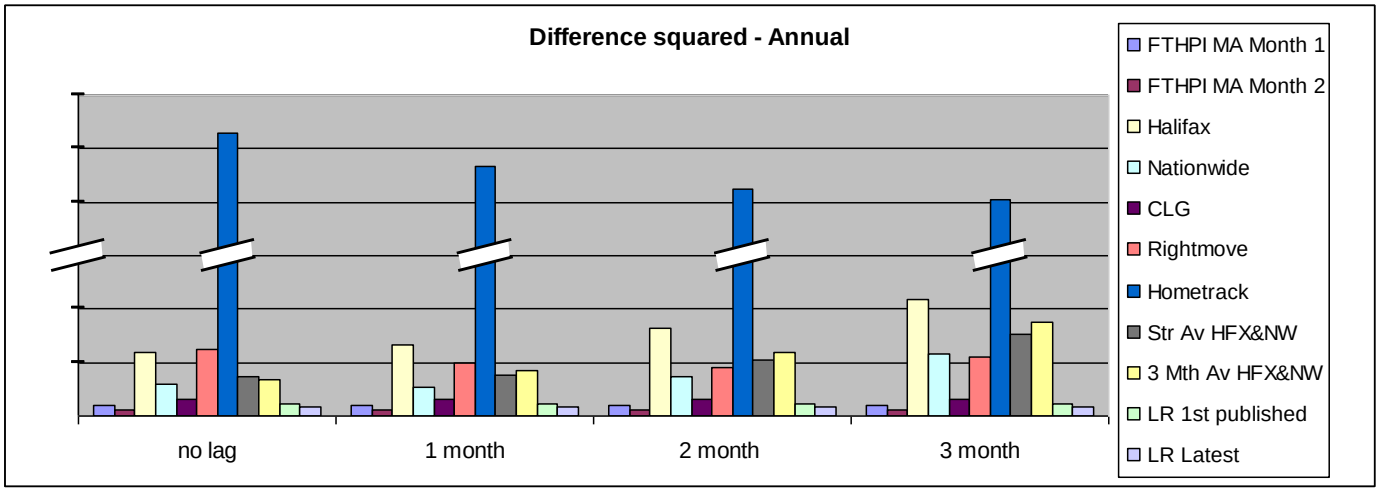
The analysis shows some contradictions between the various indices. We felt that these might be explained by lagging as justified by the expectation that, intuitively, a 1% fall in February *asking* prices might result in a 2% fall in March mortgage *offer* prices and a comparable fall in the prices finally *transacted* in May. Hence, we adjusted our above results for anticipated lags, in order to see whether any such relationship existed. The results are provided in the table below[6].

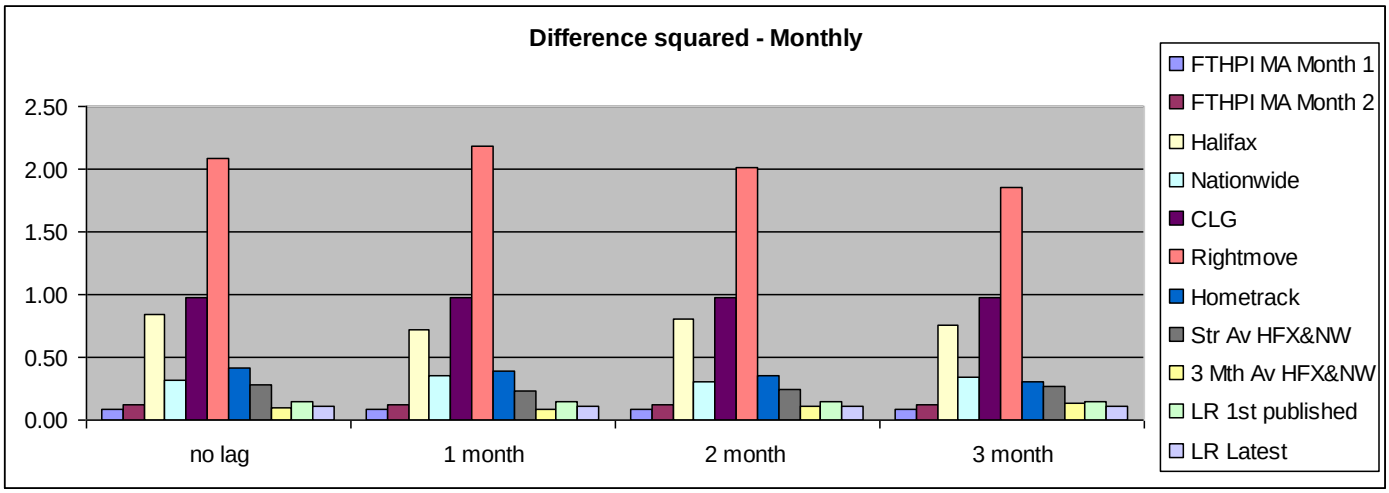
Essentially, we found no evidence of any lagged relationships between the indices, although the analysis did confirm the existence of one leading indicator for monthly (as opposed to annual) inflation, namely the average of the rolling, smoothed, averages of the Halifax and Nationwide indices; our attention was first drawn to this possibility by work from the Bank of England.

[4] to provide a "mean square difference for each of the indices

[5] The detailed Comparison of Indices with interactive charts is available on the Acadametrics website

[6] The Quarterly Comparison of indices tables with lagging tables are available form the Acadametrics website





FACT OR FICTION?

The opportunity to objectively test UK house price indices against a factual benchmark became possible with the launch of the LR "price paid dataset"[7] in 2005. This provided the prices applicable to properties sold more than once since 2000 and, therefore, the opportunity to test index accuracy between two sales dates.

As we have pointed out, no such objective assessment of house price indices has previously been made. This was because no data on factual house price movements, upon which to base such an assessment, had existed when the various current indices were under development.

Because the LR "price paid dataset" is not seasonally adjusted, we took seasonally unadjusted index data from Halifax, Nationwide and CLG. Instead of FTHPI, which is seasonally adjusted, we used our Acadametrics Prices and Transactions data series (APAT), which are the non seasonally adjusted data from which FTHPI is calculated.

For each of the properties within the portfolio of 405,023 extracted from the "price paid dataset" of sales during 2006, we calculated an indexed (or APAT adjusted) price at the second sale date[8], using the previous sale price and compared this with the actual market value. As well as calculating a mean difference for each index at various levels (region and region/property type), we also calculated plus/minus one and two standard deviations around the mean.

Our Test 1 table provides the summary results using regional indices. Within the empirical detail of the analysis, we observed that, for each individual property, the longer the time between the two sales points, the larger the differences which were likely to occur. For the aggregate individual cells (e.g. region) and for the whole portfolio of properties (in this case all 405,023 sales in England and Wales[9]) the mean level of accuracy was much better than for individual properties; and it was interesting to note that the overall differences (plus/minus 1 and 2 standard deviations) were similar or the same for each index.

[7] first published in January 2005
[8] in the LR data
[9] taken from the LR data

Test 1 Valuation Using Regional Data

SUMMARY OF INDEX CONFIDENCE LIMITS					
REGION					
total observations 405023	**less 2 standard deviations**	**less 1 standard deviation**	**mean**	**plus 1 standard deviation**	**plus 2 standard deviations**
Halifax	-34.3%	-18.9%	7.6%	23.3%	52.1%
Nationwide	-33.4%	-18.4%	4.1%	22.5%	50.1%
CLG	-33.4%	-18.4%	7.2%	22.5%	50.1%
APAT	-33.4%	-18.4%	2.6%	22.5%	50.1%

Test 2 Valuation Using Regional and Property Type Data (data not available from CLG) index

Our second test was to establish the extent to which use of more granular data would improve the accuracy of the valuation (aka produce a smaller mean difference). For this, we took the above regional data but further divided by type of property. The results demonstrated that use of more granular data down to region and property type does improve accuracy at the aggregate level.

SUMMARY OF INDEX CONFIDENCE LIMITS					
REGION BY PROPERTY TYPE					
total observations 405023	**less 2 standard deviations**	**less 1 standard deviation**	**mean**	**plus 1 standard deviation**	**plus 2 standard deviations**
Halifax	-32.8%	-18.1%	3.2%	22.0%	48.9%
Nationwide	-32.7%	-18.0%	3.9%	21.9%	48.7%
APAT	-32.5%	-17.9%	0.8%	21.8%	48.2%

Test 3 Valuation Using Regional and Property Type Data (data not published by Halifax, Nationwide or CLG)

We finally considered by how much accuracy can be improved if property type data below regional level are available. Neither the lenders nor CLG publish such data; however Acadametrics Prices and Transactions provide monthly data, by England and Wales County, and by Greater London Borough, as well as by property type. Hence, we tested these data in isolation. For the counties by property type series, we calculated a mean difference of 0.9%; for the London Boroughs by property type series, we calculated a mean difference of 0.3%. Accordingly, using both series together will produce a marginally more accurate outcome than using the Acadametrics Prices and Transactions' region by property type data.

CONCLUSION

Our tests show that all indices are a blend of fact and fiction and thus lack precision; like any statistical measure they are prey to changes in market conditions, affecting sample size, representation and the like.

The tests suggest that our Acadametrics Prices and Transactions provide the most factual measure currently available; but there are insufficient data to say that it provides a true measure. This is simply because we cannot yet provide a benchmark to measure the truth. Even the portfolio of properties from the LR "price paid dataset", which we used, comprised a sample, albeit a large one, of properties sold more than once since 2000.

Our analysis does support the effective use of any of the tested indices for indexed revaluation of loan/property portfolios, since it enables calculation of the haircuts required in risk and capital calculation; these haircuts will differ depending upon the distribution of property (e.g. by region and/or by property type) within any specific portfolio.

Since our APAT provide the data, mix adjusted at property type level, which are then seasonally adjusted to form FTHPI, we draw confidence from our tests that our FTHPI mix adjustment process, one that is simple but relies upon use of the whole population of data, also results in a reliable measure.

We would appreciate any feedback. Please e-mail information@acadametrics.co.uk

FURTHER INFORMATION

For those interested in exploring indices in greater detail, we offer a series of Appendices as follows:

APPENDIX 1 A BRIEF HISTORY OF UK HOUSE PRICE INDICES – a brief history of the key events in the life of UK House Price Indices

APPENDIX 2 THE UK HOUSE PRICE INDICES – summarising each of the UK indices, their methodology, data and uses

APPENDIX 3 COMMENTARY ON UK HOUSE PRICE INDICES – a short examination of the strengths and weaknesses of each index

APPENDIX 4 COMPARING AVERAGE HOUSE PRICES - exploring how and why the average prices quoted by each index may differ

APPENDIX 5 SOME CAVEATS ABOUT INDICES - some issues of which to be aware when using indices

APPENDIX 6 FTHPI - more detail and information

APPENDIX 1 A BRIEF HISTORY OF UK HOUSE PRICE INDICES

Twenty years ago, there were “only” three UK House Price Indices (from Nationwide, Halifax and the DETR), prepared from samples of mortgage lender offer and completion prices. Although prices for all transactions in England and Wales were recorded on the Land Register, the Land Registry was unable to make these available for analysis[10] until 1995. Furthermore, because the data tended to be received by Land Registry from conveyancing solicitors long after the sale transaction date, the data were published only quarterly, as a printed report, some two months after the end of the quarter concerned. Additionally, because publication was not seen as a core requirement for LR, the published information consisted of simple average prices for each region, county and London borough.

A BRIEF HISTORY OF UK HOUSE PRICE INDICES

Year	Event
1952	Nationwide Building Society publish annual house price data based on their own mortgage offer data
1968	DoE (later incarnations being DETR, DTLR, ODPM and CLG) publish a quarterly house price index based on mortgage completion data from the Survey of Mortgage Lenders (SML)
1974	Nationwide publish their first quarterly data series
1978	Royal Institution of Chartered Surveyors (RICS) begin collecting survey data on property prices
1984	Halifax Building Society (later incarnation HBOS) publish a monthly house price index using their own mortgage offer data and employing hedonic regression methodology
1989	Nationwide prepare their own monthly hedonic index
1992	Nationwide upgrade their hedonic methodology to address their smaller sample size
1995	Land Registry publish Residential Property Price Reports - quarterly average prices based upon all registered sales transactions in England and Wales
1996	First OTC trades in residential property derivatives based on the Halifax index.
1998	Mervyn King, then Deputy Governor of Bank of England, highlights a "puzzling and unfortunate divergence in the lender indices"
2000	The House Price Working Group (HPWG) is established by the Office for National Statistics (ONS) to address Bank and Treasury concerns
2000	Hometrack publish a stock weighted index for England and Wales based upon a respondent sample survey of Estate Agents
2002	Rightmove publish a stock weighted index based on sample survey data collected through their Estate Agency web portals
2003	The Financial Times publishes the initial FTHPI based upon an index of indices model. ODPM (now CLG) publish an experimental index using SML data and latest hedonic methods to bridge the gap "until a definitive index, including cash purchases, has been devised"
	The Financial Times publishes the current FTHPI covering England and Wales using every transaction (including cash purchases) from the Land Registry and overcoming a timeliness issue by employing forecasting techniques employing the Land Registry data and the other indices
2006	Land Registry replace their Residential Property Price Reports (from 1995) with a house price index (from 2000) prepared by Calnea using regression upon the sample of repeat sales within their database
2007	Trading volume in OTC derivatives based on UK house price indices reaches £2 billion
2008	Land Registry provide back data for their "price paid dataset" to 1995, reflected in updates to the Land Registry index

[10] until 2004

Focus upon house price indices changed dramatically in 1998, when Mervyn King (then Deputy Governor of the Bank of England) commented[11] upon a *"puzzling and unfortunate divergence of the lender indices"*[12], of the difficulties that this represented for the Monetary Policy Committee (MPC) in making interest rate decisions and of the need for a *"true measure of house price inflation".*

As a direct response to these concerns the Office for National Statistics (ONS) established a "House Price Working Group" (HPWG), in 2000, to develop a reliable, official monthly house price index by making better use of existing data sources.

The final report[13] recommendations, quoted below, outlined the criteria which might apply for a national statistic and resulted in 2003 in the production of what was, initially, the ODPM index and is now the CLG index, produced on an experimental basis. The recommendations were as follows

- "there is a need for a reliable, monthly house price index that covers all housing and all transactions and is capable of providing the outputs and analysis required by users. At present none of the existing indices fully satisfy user needs, but there is scope to build on the current ODPM quarterly index.
- current evidence supports the use of completions data in the construction of the index.
- the index should be mix adjusted to allow for the fact that different houses are sold in different periods.
- a hedonic model should be used to estimate arithmetic estimates of all cell prices.
- weighting across the cells should be based on an arithmetic approach with expenditure weights as used in the current ODPM index and in other price indices published by ONS such as the RPI.
- the mix adjustment should take into account the following variables:
    - region
    - location (within region)
    - type of dwelling
    - size of dwelling
    - the distinction between new and old dwellings
    - the difference between mortgage and cash transactions
    - the difference between first time buyers and former owner occupiers
- the quality of the mix adjustment achieved by allowing for the recommended variables needs to be regularly assessed. Data on mortgage transactions alone may not provide a reliable indication of levels or movements for house prices in general; cash transactions may behave differently and need to be incorporated in any definitive house price index. The weights should be based on a rolling three year period updated annually.
- the index should be chain-linked and reset to 100 at the start of each year.
- the index should be revised as appropriate under clearly defined rules, consistent with other economic series.
- the index should be made available in seasonally adjusted form as soon as possible.
- Buy-to-lets may need to be included in the official house price index for some purposes. This will depend on whether their inclusion results in a significantly different series.
- the Home Conditions Report initiative (part of the proposed Home Information Pack) and the introduction of electronic conveyancing are significant developments which may impact on the source of the house price index in the future. These and other developments (e.g. a National Property Database) should be closely monitored to ensure that the needs of the house price index are met. Work on the Land Registry system should continue – on the need for a proxy measure of house size to improve the mix adjustment; on the timeliness of the data; and on transactions in Scotland and Northern Ireland".

The ODPM experimental index continued to make use of the Survey of Mortgage Lenders data despite the recommendation that cash transaction data, of which the LR was the sole source, were requisite for a reliable indicator. HPWG recommended against use of LR data because of the LR *"timeliness problem"*. Curiously, data and other delays now affect the relevance of the otherwise valuable CLG index which is also subject to a similar timeliness problem. Note that, whilst the HPWG report stated that "given the limited experience of its use and likely shortcomings, the repeat transactions method should not be used to construct the definitive house price index", LR replaced its quarterly Residential Property report with the LR index, using this very method. In fact, the LR index at national level provides monthly change results very similar to those of FTHPI, despite their use of very different data volumes and totally dissimilar methodologies. But house price differences are significant.

Inspired, too, by Mervyn King's comments and in line with its "research first" policy, Acadametrics asked Dr Stephen Satchell, The Reader in Financial Econometrics at the University of Cambridge, in 2001, if he could build a model designed to overcome the LR *"timeliness problem"*.

[11] Bank of England Quarterly Bulletin August 1998

[12] the Halifax and Nationwide indices

[13] These recommendations are taken from the paper prepared to support the launch of the new ODPM index in September 2003

APPENDIX 2 THE UK HOUSE PRICE INDICES

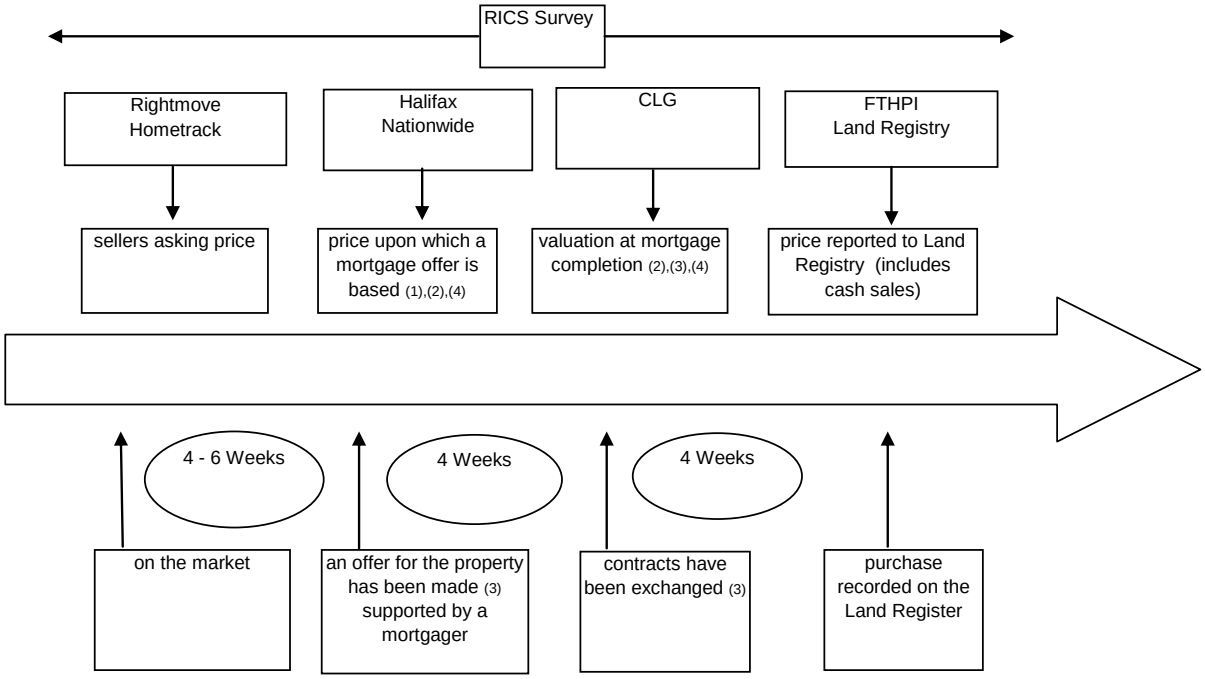
In this section, we describe the different UK indices, their methodologies and their uses. Since each index uses different data and construction methodology, we suggest that each has a different value and different use. A brief summary of the various indices is shown in the table below. The influential Royal Institution of Chartered Surveyors (RICS) survey is included, although it provides a measure of confidence, rather than of house prices or an index. Note that Hometrack also provides survey results, rather than an index. Note that the "Number of Monthly Transactions" shown for 2007, would be greatly reduced if shown for 2008, such that a question arises as to the effect of reduced data volumes upon the accuracy and volatility of indices, especially of those based upon samples. The LR data sample would be beneficially affected by the availability of data from 1995. A further, more detailed, review is provided in Appendix 3.

A SUMMARY OF UK HOUSE PRICE INDICES AND HOUSE PRICE SURVEYS

INDEX/SURVEY / **FEATURE**	FTHPI	CLG	LRHPI	Halifax	Nationwide	Rightmove	Hometrack	RICS
DATA SOURCE	Land Registry Data	SML Data	Land Registry Data	Own Mortgage Offers	Own Mortgage Offers	Website Data	Estate Agents - Respondent Survey	Chartered Surveyors - Respondent Survey
PRICE	Final Registered Transaction	Mortgage Completion	Final Registered Transaction for Repeat Sales	Surveyor Valuation	Surveyor Valuation	Website Asking Price	Estate Agents' estimates	Surveyors' Sales Price expectation
SAMPLE (% of Total Monthly Property Transactions)	100% of total	50% of total	36% of total	15% of total	est 7% of total	est 40% of total	n/a	n/a
NUMBER OF MONTHLY TRANSACTIONS/ RESPONDENTS IN 2007	100,000	50,000	36,000	15,000	n/k	200,000	6000	4000
COVERAGE	England and Wales	UK	England and Wales	UK	UK	England and Wales	England and Wales	England, Wales, Scotland and Northern Ireland
INDEXING METHODOLOGY	Mix Adjusted by Sales	Hedonic Regression	Repeat Sales Regression	Hedonic Regression	Hedonic Regression	None	None	None
OTHER WEIGHTING OR ADJUSTMENT	None	Expenditure weighs (transaction weights* average cell price)	None	Transaction weights	Transaction weights	Stock Weights	Stock Weights	Stock Weights
SEASONAL ADJUSTMENT	Yes	No	Yes	Yes	Yes	No	No	Yes
LOWEST LEVEL OF DETAIL AVAILABLE AS STANDARD	Monthly County & London Borough by Property Type	Monthly Regional by Buyer type	Monthly County and London Borough	Quarterly Regional by Buyer Type	Quarterly regional by Buyer Type and Property Type	Monthly County and London Borough	Monthly National	Monthly Regional by Buyer Type and Property Type

An initial, overarching, observation is that each index takes price data from a different point within the home purchase timeline. To illustrate this we have prepared the following diagram.

UK HOUSE PRICE MEASURES AND THE HOME PURCHASE TIMELINE



Notes

(1) offers may be based upon the asking price but "subject to a survey" or, where the LTV is low, upon an AVM

(2) likely to be either a surveyor or an AVM valuation

(3) where the LTV is low, an AVM price may suffice at both offer and completion stage

(4) excludes cash transactions

APPENDIX 3 COMMENTARY ON UK HOUSE PRICE INDICES

We comment upon each index in turn, as follows:

Nationwide House Price Index

First published annually as a series of simple average prices in 1952, today's index is prepared monthly using the lender's own mortgage offer data which traditionally accounted for approximately 9% of total monthly mortgage transactions in the UK. The index is calculated using an hedonic mix adjustment methodology[14] with the weights used recalculated annually. The strengths of the index are its long data series and the regularity and timeliness of its reporting which makes it a widely watched measure of house price trends; its weaknesses are a relatively small sample size, now unspecified by the lender, which may be the primary cause of some volatility and which reduces accuracy. Additionally, the fact that the index is always published at the month end means that the data used include an element of data from the prior month and exclude some data from the month reported.

CLG Index

First published as the DoE index in 1968, what is the primary governmental index was launched in its current form by **t**he Office of the Deputy Prime Minister (ODPM) on 12th September 2003. The index is prepared by the Office for National Statistics and uses, as its data source, mortgage completion prices from the Survey of Mortgage Lenders (SML) data, compiled by the Council of Mortgage lenders (CML). Like Nationwide, the CLG index uses hedonic mix adjustment methods[15]; the mix adjustment weights are compiled as a three year rolling assessment. The index uses expenditure weights and is not yet seasonally adjusted. The strength of the index lies in the statistical methodology employed which is fully consistent, in statistical terms, with its aim of providing the "definitive" UK house price index; the delays in receiving the SML data and the fact that no cash purchases and only 50% of mortgage transactions are employed, contribute to a weakness in terms of timeliness and volatility.

Halifax House Price Index

The Halifax index, first published in 1984, was the first UK index to provide national figures every month. Like the Nationwide index, the data to produce the index are sourced from the lender's own mortgage book, which accounts for some 20% of the UK mortgage market by stock. Like Nationwide and CLG, Halifax employs an hedonic mix adjustment methodology[16], using the characteristics of properties upon which the lender based its approval of mortgages in 1983, estimating the prices of those characteristics separately each month and weighting the transactions by volume. Because of its prime mover advantage as the first source of monthly house prices, the Halifax index is widely applied for a variety of purposes, including property portfolio revaluation, for which it was not specifically designed. The strength of the index lies in its provenance from the UK's largest lender; it uses a complete month of data and, whilst always published a few days following Nationwide, is always timely; its weaknesses are that it is open to sample errors from the use of Halifax-only data.

Land Registry

The Land Registry first published average house price data in 1995. Publication was suspended in November 2006, when the LR launched its own index. To distinguish their methodology from others, Land Registry opted to use a "repeat sales" methodology[17] (RSR) developed in the USA using the sample of repeat sales taken from the LR data available since 2000. The LR index results are seasonally adjusted and use of RSR obviates the need for mix adjustment. The advantage of the LR index is that the methodology is designed to use relatively low data volumes and calculates national results without the need for forecasting. The disadvantages are a potential, as yet un-quantified, bias towards properties that are traded more regularly, a lack of timeliness and a need to manage lack of a data by varying the methodology at county/London borough level. The data sample comprising properties sold twice is vulnerable to a fall in overall transactions; hence, at regional and especially at county/London borough levels, data samples may be very small when the housing market slows. A partial counter balance is provided by the 2008 availability of data from 1995.

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[14] Nationwide Methodology - http://www.nationwide.co.uk/hpi/methodology.htm

[15] ODPM Methodology http://www.communities.gov.uk

[16] Halifax Methodology http://www.hbosplc.com/economy/housingresearch.asp

[17] Land Registry Methodology http://www.calnea.com/LandRegistryIndex.pdf

Hometrack

The Hometrack survey was first published in 2000 and uses data taken from a monthly respondent survey of estate agents, with at least two responses from every postcode district in England and Wales. It provides average price data based upon each respondent's opinion concerning the achievable selling price for each of four standard property types in every postcode district. The price is for a given date each month and assumes a willing seller and a reasonable marketing period, whilst taking into account current market conditions and recent transactions. The methodology[18] employs both mix adjustment and stock weighting. The index may best be taken as indicating market confidence and it is published early. The source and validity of the underlying data is not clear to us and users requiring precision may well wish to seek clarification from Hometrack.

Rightmove

The Rightmove index has been published since 2002. Rightmove is the UK's largest property advertising website, and compiles its index from the average asking prices of newly listed properties on its website. This sample will include up to 200,000 homes each month but any changes in price after the property has been listed are not reported. The underlying prices used are, of necessity, speculative and will include prices for properties which may not be sold. The methodology[19] involves a standardised mix adjustment process and stock weighting; the data are not seasonally adjusted and the coverage is for England and Wales. The strength of such an index is that it should be the first to track changes in the property market; hence, it has primary value as a trend indicator. The disadvantage of using a sample of asking prices is a tendency to volatility and a bias towards higher prices in South East England; this taken with the lack of seasonal adjustment, which prevents meaningful month on month comparison, limits use of the index as an accurate measure of house prices - a task best performed by other indices.

FTHPI

FTHPI was first published on 6th September 2003, only a few days before ODPM aka CLG also published their new, experimental, index reported above. The index was developed by Acadametrics as a research exercise to address concerns over the data, timeliness and accuracy of UK house price indices. Initially launched only as an "index of indices", FTHPI now employs two unique elements. Firstly, through its updating process, it is the only index to ultimately use every item of (transaction) data as opposed to a sample, Secondly, the continued use of the "index of indices" forecasting model enables the index to overcome the Land Registry *"timeliness problem"* by weighting the Halifax, Nationwide and CLG index results, according to how well these foreshadow the house price changes subsequently reported by Land Registry. The methodology[20] involves mix adjustment and seasonal adjustment. Further detail and results are provided in Appendix 6. The advantage of the index lies in using all the data so that it does not suffer from sample bias once enough time has elapsed. Its disadvantage lies in reliance upon forecasting for initial results and a lack of detail concerning property and buyer type which constrain any detailed mix adjustment process; mix adjustment is, however, applied to the whole transaction set rather than to a sample.

[18] a copy of the Hometrack methodology can be obtained by contacting Hometrack directly

[19] a copy of the Rightmove methodology can be obtained by contacting Rightmove directly

[20] FTHPI Methodology http://www.acadametrics.co.uk/ftHousePrices.php

APPENDIX 4 COMPARING AVERAGE HOUSE PRICES

Different timeline stages at which indices/surveys draw data can, in theory, make a very large difference to the results. Whilst some indices compare as to timing, the data and methodologies employed may not do so. Halifax and Nationwide timing and methodologies are comparable, although far from identical; but their data are different and may reflect their different mortgage populations. In the short analysis that follows, we suggest that the difference in the average price at December 2007 between Hometrack and Rightmove is largely due to data; whilst the difference between FTHPI and LR is due to data and methodology.

HOMETRACK AND RIGHTMOVE the £57,196 difference must be substantially explained by the data differences. Rightmove's December price is an average of the *prices advertised* by those with properties on the market in the four weeks ending 10th December. Hometrack's price is built from the *estimates of current value* of a panel of agents, who may or may not have themselves placed any significant number of properties on the market in November/December.

FTHPI AND LR the £45,923 difference involves both data and methodology. Data differences occur because LR applies RSR to the circa 5,400 repeat sales in December 2007, taken from the circa 15,000 sales available, whilst the FTHPI "forecast" does not use LR December data at all. Methodology differences occur because LR calculates "standardised average house prices … by taking the geometric mean price in April 2000 and moving this in accordance with index changes". Hence, the LR first calculates house price change and uses change to update a past price whilst the FTHPI first calculates the current month price and uses it and a prior price to calculate change.

APPENDIX 5 SOME CAVEATS ABOUT INDICES

INDICES AT NATIONAL LEVEL

At national level, most indices perform similarly over a sufficiently long timescale, especially when house price trends are steady. Thus, the Bank of England charted the LR index, immediately following its launch alongside the traditional lender indices, over an extended timescale, to show a "similar" pattern of results[21]. CLG compared indices in their Housing Market Reports[22] to show "National house price inflation steady". But divergence can be sharp over short periods. The FTHPI Chart "Monthly Change in House Prices - Comparison of Indices" available from the Appendix 6 link shows such divergence. Any monthly volatility is accentuated by the use of small data samples, and volatility in a series from which prices for two months are taken to calculate % Annual change would affect the result.

INDICES AT REGIONAL LEVEL

Regional definitions vary between indices. LR and FTHPI indices do not use Government Office Regions (GOR). Halifax has its own definitions.

Indices using samples of data at national level are likely to be using quite small data samples at regional level.

FTHPI, with the entire circa 100,000 universe of normal monthly transactions, will have an average of only 10,000 monthly transactions for each of the 10 regions. These data volumes have fallen recently in line with the fall in national transactions. Indices using samples will have proportionately less data for regions and aggregate the regional data and report quarterly. FTHPI and CLG provide regional data on a monthly basis but both do so one month in arrear whilst LR provides monthly regional data without arrear.

COUNTY/LONDON BOROUGH DATA

Data volumes at county and London borough level are lower still. Thus, CLG, for example, do not report down to these levels. FTHPI does so but, as for regions, always one month in arrears. LR publishes current month results, but averages the data over four months to negate the impact of lower data volumes. However this means that the LR index county/London borough prices are calculated differently from LR national and regional prices, both as to the concept, and the underlying timing, of a house price[23].

[21] November 2006 Inflation Report (Chart 1.5)

[22] December 2006

[23] LR commented "We do not view the differences in methodology used for national/regional and county price levels as a 'disconnect'. As there is much more data available nationally and regionally than on a county level because of the difference in sizes of the areas, there should be a difference in the methodology. With regard to Rutland, an obvious extreme case, the monthly index is calculated as a moving weighted average of quarterly transactions (163 last month). We feel the approach used in the comparisons of the indices doesn't present a balanced view as it omits the benefits and focuses only on what you see as the disadvantages of an RSR approach. We have never claimed that any one method of calculating an index is the 'only' or 'best' way. All methodologies have, we believe, pros and cons. With repeat sales regression, the key advantage is the ability to utilise the most informative element of the Land Registry dataset, which is the exact address information."

APPENDIX 6 FTHPI

Use of national data almost inevitably leads to the need for an updating procedure unless publication of an index is delayed until all data are available. ONS data are updated for this reason. FTHPI introduced this procedure for house price indices.

FTHPI is published on the second Saturday of every month in the FT Weekend newspaper, and on www.ft.com and www.acadametrics.co.uk on the previous day.

FTHPI UPDATING

For explanation purposes, it is convenient to refer the pre-recession volume of LR data, traditionally comprising some 100,000 transactions monthly. These do not represent conveyances for a single month. Rather, they represent conveyances over the prior six months. Of these conveyances, only some 15% took place in the particular month. We found this sample to be unrepresentative of the eventual outcome and rely upon our academic model in providing an FTHPI "forecast" index. LR data for any initial month (month 1) rise from 15% (month 1) to circa 70% (in month 2), to 90% (in month 3) and 95% (in month 4) of all the transactions ultimately reported. Thus, the FTHPI "forecast" result is progressively updated, using the new LR data, until the FTHPI for the month concerned is published, based upon the factual LR data, after smoothing, seasonal and mix adjustment. For the comparison and testing which we describe in the main text, we use the FTHPI, updated in the fourth month; whilst these data can be affected by yet further transactions reported to LR, the difference between FTHPI in month four and FTHPI "ultimate" index is normally minimal.

We entitle the FTHPI for any given month progressively as the FTHPI "forecast" index (month 1), FTHPI "updated" index (month 2), FTHPI "updated" index (month 3) and FTHPI "final" index (month 4) thereafter, until the index is designated FTHPI "ultimate".

HISTORY OF FTHPI

The following table illustrates FTHPI development from 2000.

FTHPI Development	
2000 – August 2003	the "index of indices" academic forecasting model is developed at the University of Cambridge and the Sir John Cass Business School
September 2003	the Financial Times launches the seasonally adjusted "index of indices" FTHPI - solely an FTHPI "forecast" index
December 2003	the FTHPI "updated" index and FTHPI "final" index data are launched, employing 100,000 LR monthly transactions (more factual data than used by any other) to replace, progressively, the FTHPI "forecast" index, with the smoothed and seasonally adjusted "final" LR data
January 2004 – June 2005	Financial Times readers are shown the seasonally adjusted FTHPI "forecast" index track record in successfully foreshadowing the LR quarterly results and the FTHPI "final" index
July 2005	the mix and seasonally adjusted FTHPI is launched: whilst this cannot be related to non mix adjusted LR results, it provides a "true measure of house price inflation"
February 2007	addition of London boroughs: note that their inclusion in the mix adjustment process affects London regional and, marginally, national historic series data

www.acadametrics.co.uk/FTHPI

ABOUT ACADAMETRICS

Acadametrics is a consultancy focussed upon mortgage risk. We: assess capital requirements; conduct research (led by Dr Stephen Satchell, The Reader in Financial Econometrics at the University of Cambridge and Fellow of Trinity College); develop products at our own expense designed to assist lenders; are expert in the measurement of house prices, preparing our own house price index FTHPI chosen by the Chicago Mercantile Exchange for their proposed 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 hazard rate stress testing methodologies, developed by Dr Satchell.

During 2009, we have worked closely with MIAC Analytics from New York in a joint **MIAC ACADAMETRICS** venture, enabling lenders to download our data and models from the MIAC platform, placed on an EC country server, for desktop work. Using MIAC expertise, our models will additionally assist those involved in securitisations and the sale and purchase of loan portfolios. We offer:

- **Collateral Valuation** comprising our Acadametrics Prices and Transactions (APAT) data and Confidence Interval tables for use by clients or as in our Property Portfolio Revaluation service.

- **Loan Level Stress and Scenario Testing** comprising our:
  - UK Arrears and Possessions Forecasting (UKAPF) which employs Bayesian techniques to model the UK mortgage book and is under an update to account for forbearance
  - Stress and Scenario Testing (SST) with optional APAT or AVM revaluation to provide forecasts of loan by loan mortgage possessions and losses under alternative scenarios
  - Predictive Mortgage Analytics (PMA) which forecasts arrears and cash flow at LTV or risk bucket level with limited past data and can be provided within an interactive desktop model

- **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 our House Price Calculator, which uses our APAT data to update a property value, providing a full explanation of the procedures and the standard deviations of the results from those of our benchmark data.

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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