IPD Pan-European Quarterly Transaction Linked Indicators

Overview

IPD aims to bring transparency to commercial real estate investment markets by providing performance analysis of real estate investments across the globe. This is only possible through the participation of commercial real estate investors who contribute their performance data and allow IPD to aggregate this to give a record of market performance. To date, the vast majority of IPD's work has been based on valuation data. This allows for robust, comparable analysis, but it also means the frequency of publication is constrained by the valuation frequency in the local market, which in many cases is predominantly annual.

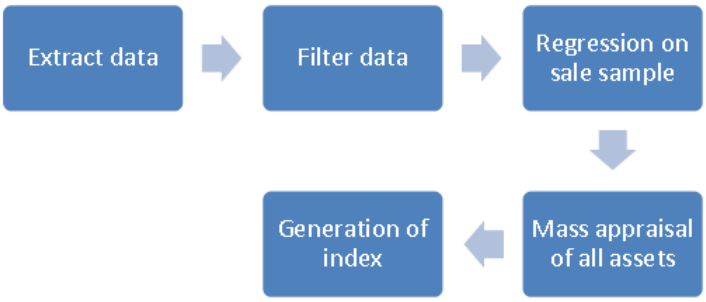
Over recent years, there has been increasing pressure from various index users for more frequent publication of indexes across national markets and of Euro zone & Pan-European composite series. Although more investors are now starting to report valuations on a quarterly basis, there is still not sufficient data for IPD to publish quarterly indexes in the majority of European markets. Of the sixteen European countries where IPD produces an index, only three can be produced quarterly (Ireland, Netherlands and UK) and two biannually (France and Italy), with the remainder reported annually. In order to produce quarterly data in other markets, and for European aggregates, it is necessary to pursue alternative methodologies.

Over the last couple of years, IPD has been working with the University of Aberdeen in researching the viability of Transaction Linked Indicators. The basis of this approach is to compare prices from transactions completed in the market place with previous valuations for those same assets to give an indication of market movements between those time points. Sale prices for properties that have sold in each period are regressed on to preceding valuations and a set of dummy variables that indicate the location of the property concerned and sector of the market to which it belongs. The results of these regressions capture the way in which prices typically differ from valuations in that period.

Once regressions have been estimated for each quarter, the coefficients from these regressions are used to conduct a mass appraisal of all unsold assets in the IPD database each period. Two predictions of price are generated for each property; one that uses the preceding quarter's coefficients and one that uses the current quarter's coefficients. These sets of predictions can then be summed to give aggregate price estimates for all properties in a sector, in a country or across Europe as a whole. The change between the first and second estimate then provides a transaction linked and value weighted estimate of capital growth, which can be chain linked with those for other quarters to produce longer run Transaction Linked Indicators.

Index Construction

The different stages involved in producing Transaction Linked Indicators are summarised in the following diagram and discussed in more detail in the sub-sections that follow:



Stages 1 and 2 – Extracting and filtering the dataset

The dataset currently used to create Transaction Linked Indicators is the same as that used to create IPD's standard Valuation Based Indexes (VBIs). However, to enable regular quarterly updating for those markets without a quarterly valuation regime, a small amount of data on transactions will need to be collected from contributing funds each quarter rather than following the year end, when all data is normally delivered to IPD.

The IPD databases hold individual asset level information on property characteristics and performance measures. The Transaction Linked Indicators utilise gross sale prices, capital valuations and indicators of the asset type and location in order to generate capital growth figures.[1] However, some other fields from the databases are used to generate rules and filters for properties entering the model and mass appraisal stages. This is to ensure that estimations are not distorted by extreme cases and that an adequate prior valuation history is available. These rules and filters are as follows:

To ensure relevant and sufficient data

- Removal of any properties that do not have a predominant usage of retail, office, industrial or residential[2]
- Removal of any cash flow or valuation data for periods prior to 2001
- Ensure that all assets remaining in the sample are standing investments for at least two quarters prior to the period being analysed
- Ensure that each asset in the sale sample has been sold as a standing investment and not as a development

To exclude extreme cases

- Removal of any properties that have a total return of greater than 100% or less than -50% in the two quarters prior to the period being analysed
- Removal of assets where the capital value is greater than €1billion or less than €12,500 in the quarters preceding the period being analysed.
- Removal of properties where the difference between the sale price and the valuation two quarters prior is greater than 50% or less than -50%

[1] Gross sale price is the sale price paid to the vendor prior to the deduction of any sale costs. Meanwhile, capital valuations in the IPD database are recorded net of purchaser costs and gross of any seller costs.
[2] Predominant usage is defined by there being >50% of estimated rental value in one usage.

European countries are modelled together using data specified in Euros. This is with the exception of the UK for which an independent model, using a similar approach, existed prior to the development of the European Transaction Linked Indicators.

Austria, Belgium, Czech Republic, Hungary and Poland are also currently excluded owing to the short historical time series for these nations, whilst Italy and Switzerland are included in the dataset, but do not contribute to the first year in the case of Switzerland and the first two years in the case of Italy owing to their limited histories.

Stage 3 – Performing the regressions

To run the regressions, the sale samples must first be defined. For each quarter's model, sales from the preceding six months are identified. Thus, the model for Q4 2010 draws on sales completed during Q3 and Q4 of 2010. This reflects the fact that, owing to the low liquidity of property investments, there are insufficient sales in just one quarter for stable models to be estimated and usable indicators to be produced.

A reference set of valuations for each sale sample must also be defined. In each case, the chosen valuation is two quarters prior to the quarter in which the asset in the sample was sold. This procedure is adopted to ensure that the valuations in the model are independent of the sale prices, as a valuation conducted during sale negotiations may be influenced by information from those negotiations.[3] In the case of biannually & annually valued countries the valuations used may be interpolations between actual valuations.

Once the relevant sales and their reference valuations are defined, the natural log of the sale price and the capital value in each case are computed. Meanwhile, dummy variables are created to identify the main property type and the country of each asset in the dataset. Although finer distinctions with respect to property type and location would be desirable, the dummy variables are defined to strike a balance between disaggregation and representation, such that sales for each category were observed in the majority of periods.

With these steps complete, an Ordinary Least Squares (OLS) regression is run for each and every quarter in the time period. The regression model has the following form:

$$\widetilde{\text{Ln } P_{i,t}} = \beta_0 + \widetilde{\beta_1} \widetilde{\ln V_{i,\,t-n}} + \widetilde{\beta_{2,i,j}} \widetilde{D_{i,j}} + \widetilde{\beta_{3,i,k}} \widetilde{D_{i,k}} + \widetilde{\varepsilon_i}$$

Where i identifies a property,
t identifies a particular quarter,
n represents the time gap between sale and reference valuation
j identifies a country and Di j is a vector of country dummies,
k identifies a sector and Di k is a vector of sector dummies,
P equals the gross sale price and
V equals the capital valuation

[3] For further discussion and relevant references, see Devaney & Martinez Diaz (2011).

Stages 4 and 5 – Mass appraisal and indicator generation

The coefficients from the regressions can be used to predict sale prices for assets that were not traded. In particular, two such predictions are made for properties held in each quarter. First, a start price is predicted using coefficients from the regression on the sale sample for the preceding period. Second, an end price is predicted from output for the regression on the sale sample for the current period. So, for Q4 2010, predicted start prices are derived from the regression on Q2-Q3 sales and predicted end prices are derived using the regression on Q3-Q4 sales.

These predicted prices are in log form rather than cash terms and it is the latter that is required for generating indexes. Whilst a simple exponential transformation would yield estimates of prices in levels, such estimates would be biased (see Fisher et al., 2007: 14). Thus, following Miller (1984), the predicted log prices are transformed in the following manner to correct for this bias:

$$\hat{P} = \exp(\ln \hat{P}) \times \exp(\frac{\widehat{\sigma^2}}{2})$$

Where σ^2 is the Mean Squared Error of the regression generating the predicted price.

The transformed start and end prices can then each be summed for all assets within a particular country or sector. The change between these two totals (in % terms) will represent a value-weighted capital return figure derived from transaction evidence. These rates of change can be chain-linked with those from the surrounding quarters in order to form a time-series for that country or sector.

Meanwhile, Pan-European and Eurozone composite indexes are capital weighted using IPD's market size estimates. These estimate the aggregate value of all professionally managed direct real estate holdings in each country. The estimates are revised on an annual basis and IPD capital growth is used to create an historical series. When new estimates are available each year, historical market sizes change since we assume that each estimate is more robust than the previous one. These estimates are all done as at the end of December each year and converted from local currency to Euros using the exchange rate reported at the end of trading on the last trading day of the year.

Composition of the Composite Indexes

Countries/sectors	Eurozone					Pan-European				
	Retail	Office	Industrial	Residential	All property[1]	Retail	Office	Industrial	Residential	All property[2]
Ireland	Y	Y	Y		Y	Y	Y	Y		Y
Netherlands	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sweden						Y	Y	Y	Y	Y
Norway						Y	Y	Y	Y	Y
Denmark						Y	Y	Y	Y	Y
Germany	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Switzerland						Y	Y	Y	Y	Y
Southern Europe (Italy, Spain, Portugal)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
France	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UK						Y	Y	Y		Y

[1] The Eurozone All Property Index includes France, Germany, Netherlands & Southern Europe (Italy, Portugal, Spain) for all four sectors and Ireland for retail, office and industrial only.
[2] The Pan-European All Property Index includes France, Germany, Netherlands & Southern Europe (Italy, Portugal, Spain), Denmark, Norway, Sweden, Switzerland, for all for sectors but Ireland and UK for retail, office and industrial only.

Currency reporting

All countries apart from the UK are incorporated into one model that is estimated and reported in Euros. The separate UK model is estimated and reported in Pounds Sterling. In order to include the UK in the Pan-European Transaction Linked Indicator, the capital growth figures for the UK are converted from Pounds Sterling to Euros using the following formula:

$$CG_{euro} = \left(1+CG_{pound}\right) \times (1+\Delta e) - 1$$

Where CG_{euro} is the quarterly capital growth in Euros,
CG_{pound} is the quarterly capital growth in pounds sterling that is generated from the UK model and
Δe is the quarterly exchange rate movement

Meanwhile, national Indexes for non-Eurozone nations, such as Switzerland or Denmark, can be reported in local currency using the same methodology as above. In fact, using the same logic, any Transaction Linked Indicator can be reported in terms of any currency, if required.

Differences from the UK model

The UK Transaction Linked Indicator differs from those estimated using the European dataset in some key respects. First, the greater liquidity of the UK property investment market enables the regressions for each quarter to be based solely on sales occurring within that quarter. Second, the UK model includes only retail, office and industrial real estate investments. Third, there are some minor differences in the filters used; for instance, the value filters must be specified in terms of Pounds Sterling rather than Euros.[4]

The UK Transaction Linked Indicator can also be run using both standard OLS and a more complex procedure that attempts to correct for any sample selection bias that may be present in the sale samples each period. However, the latter approach has only been used in academic work (see Devaney & Martinez Diaz, 2011) and does not provide a stable solution for ongoing indicator production. It is highly sensitive to small samples of sales and thus is unreliable in periods when liquidity is poor. As this approach has not proved stable with the UK data, it has not been tested on the European dataset.

Summary and ongoing work

The Transaction Linked Indicators described above represent the most robust indicators that IPD can currently produce utilising the transaction evidence present in the IPD databases. However, the models and procedures will continue to be refined over time as more data is added and the time series continues to grow. The next stage of this work involves the development of a quarterly updating regime so that quarterly updates are available throughout 2012. Whilst it was hoped the quarterly update regime could be introduced during 2011, the continuing development of the model and the time needed to set up a quarterly data collection regime has prevented this. As all annual reporting across Europe giving the fullest record of transactions and valuations for the year, is completed during the first quarter of the year IPD have updated all Transaction Linked Indicators to Q4 2011 in April 2012. A quarterly update regime will then be implemented from that point.

[4] The value filters for the UK are set at £10,000 (lower filter) and £1bn (upper filter), respectively.

References

Devaney S. and Martinez Diaz R. 2 11 'Transaction based Indexes for the UK commercial real estate market: an exploration using IPD transaction data' *Journal of Property Research*, 28 (4): 269-289.

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Miller D. M. 1984 'Reducing Transformation Bias in Curve Fitting' *The American Statistician*, 38 (2): 124-126.