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# FTSE PRIVATE EQUITY BUYOUT RESEARCH INDEX

METHODOLOGY


FTSE RUSSELL
An LSEG Business

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# Introduction

The **FTSE Private Equity Buyout Research Index** ("FTSE PE Buyout Research Index") tracks the GROSS performance of the US private equity industry through a comprehensive aggregation of company values. The focus of the index is on acquisitions and leveraged buyouts. Each firm's return in the FTSE PE Buyout Research Index is weighted by the value of the firm itself and the index is published quarterly.

The final methodology for the index was developed through a partnership of LSEG, DSC Quantitative Group and academic advisors.

LSEG publishes the index data on a quarterly basis based on Private Equity Investment Database analyzing over 8,000 US private equity companies.

Interested readers will find the LSEG Private Equity Data Feed details to be useful in understanding the primary source of private equity data available for the project. No effort is made to replicate these documents here, or incorporate their content.

# Data Sources

The LSEG Private Equity Data Feed defines the universe of companies and round events. Valuation data for exits (e.g., IPOs or sales) from LSEG Deals content is also used and merged with the data set.

Market and Sector Indices Data are used in both regressions, as well as in the interpolation/extrapolation. The ten FR equity index broad sectors are aggregated to build a sector structure that is a good representation of the private equity market. The resulting seven sectors are:

- Cyclical Consumer Goods and Services
- Noncyclical Consumer Goods and Services
- Energy/ Utilities
- Technology Equipment
- Industrials
- Healthcare Services
- Financials

## Universe Identification

The starting universe of the firms of interest in the private equity universe is defined by the coverage of the LSEG Private Equity Datafeed:
Data is retrieved, duplicates are removed and invalid entries are eliminated.

The data is then complemented with the computed columns derived from these existing data points.
An Entry event happens when a private equity fund is taking a position in a firm and they are classified as acquisitions (less than 50% ownership) and a leveraged buyout (greater than 50% ownership):

a. If the firm value is revealed, we use that.

b. If the firm value is missing, we estimate it using either Entry Model 1 or Entry Model 2 (defined below) depending on what information is available.

Exit events are taken from the LSEG Workspace exit database and they are: IPO, Trade Sale and Secondary Sale:

a. If the firm value is revealed, we use that.

b. If the firm value is missing, we estimate it using the Exit Model (defined below).

Intermediate events (between entry and exit) are treated as valuation points:

a. If firm value is revealed, we use that.

b. If the firm value is missing, we estimate it using Entry Model 1 (defined below).

It is possible for a firm to be taken public, return to private status and then exit from private status a second time. However, events following the first exit are not considered in the index.

For IPO exits, we use a Post Offer Value that adds the Proceeds Amount and the Over-allotment Sold All Markets as the valuation.

## Computing Missing Valuations

Regressions are done across the entire back-test period to evaluate Entry or Exit values, where they are missing. This means that the body of data used in the regressions is increasing with each rebalance rather than using a rolling data window of fixed width. It also means that monthly index values may shift as new data gets incorporated into the regressions.

## Generating Monthly History for Each Firm

If we have received no data about any events associated with the firm for more than seven years, the firm is removed from the index.

The round and exit data, with missing valuations filled, are then used to create a regular monthly data series for each firm.

## Portfolio Creation

The last step of the process is the computation of the monthly index values. For each rebalance period we:

1. Determine the potential candidates for the previous and current months.
2. Determine the index return, which is the ratio of the sum of the valuations for the candidate set in the current month over the sum of the valuations for the candidate set for the previous month.
3. Determine the sector weights for the month.

## Index Rebalance and History

Index Inception Date: Base value of 100 as of December 31, 1996. Prices are computed quarterly, as of the last business day of the month, beginning on March 31, 1997.

Rebalance Date: The FTSE PE Buyout Research Index is rebalanced and recomputed on a quarterly basis. The Index is published on the last Friday of the month following each quarter end (April, July, October and January).

Every quarter, after the underlying firms' data has become available, the index is recalculated and a new quarter of monthly data is published. In order to take advantage of all available information, index returns within a window of 8 quarters are restated at each quarterly publication date, incorporating all updates made to historical data.[1]

## Estimation of Missing Firm Values

Firm Valuations at the time of an Entry or Exit event are not always disclosed or present in the Database. These are the possible cases:

- Entry Valuation and Exit Valuations are observed -> we use the observed values.
- Entry Valuation is observed but Exit Valuation is missing -> we use the Exit Model.
- Exit Valuation is observed but Entry Valuation is missing -> we use the Entry Model 1.
- Both Entry and Exit Valuations are missing -> we use Entry Model 2 and then the Exit Model.

## The Entry Model 1 (for filling Entry Values where Exit Valuation is observed)

We use a linear model with log transformation of gross annualized return to estimate entry valuations for firms with known exit valuation.

If the entry event is LBO and its DISCLOSED_VALUATION_AMOUNT is unavailable, we use DEAL_VALUE to fill in.

$$\mathrm{Log}\left(\left(\frac{\mathrm{ExitValuation}}{\mathrm{PreMoneyValuation}}\right)^{\frac{365.25}{\mathrm{ExitDate}-\mathrm{EntryDate}}}\right) = X\beta$$

where PreMoneyValuation = DISCLOSED_VALUATION_AMOUNT; if DISCLOSED_VALUATION_AMOUNT=0 or NA, DEAL_VALUE is used.

X contains:

- Constant.
- LogTSM, the log of annualized returns of FR equity index between entry and exit month.
- MonthsToEnd, the months between firm entry date and index end date.
- log (ROUND_TOTAL), the log of round total (set to zero if ROUND_TOTAL is missing).
- ROUND_TOTAL_NOT_AVAILABLE, the dummy variable if ROUND_TOTAL is NA 1.
- SECTORHC, SECTOROther, SECTORRetail, the dummy variables of sectors.

After we get the predicted value, we transform the valuation back.

$$\mathrm{PreMoneyValuation} = \mathrm{ExitValuation} \,/\, (\exp(\mathrm{Predition})^{\frac{\mathrm{ExitDate}-\mathrm{EntryDate}}{365.25}})$$

[1] Significant data errors or omissions may require additional quarters to be restated with index committee approval.

## The Entry Model 2 (for filling Entry Values where Exit Valuation is not available)

We use a linear model with log transformation to estimate entry values for entry events without an exit valuation.

If the entry event is LBO and its DISCLOSED_VALUATION_AMOUNT is unavailable, we use DEAL_VALUE to fill in.

$$\log(\text{PreMoneyValuation}) = X\beta$$

where PreMoneyValuation = DISCLOSED_VALUATION_AMOUNT; if DISCLOSED_VALUATION_AMOUNT=0 or NA, DEAL_VALUE is used.

X contains:

- Constant.
- LogTSM, the log of FR Equity Index on each entry month.
- MonthsToEnd, the months between firm entry date and index end date.
- log (ROUND_TOTAL), the log of round total.
- ROUND_TOTAL_NOT_AVAILABLE, the dummy variable if ROUND_TOTAL is NA 1.
- SECTORHC, SECTOROther, SECTORRetail, the dummy variables of sectors.
- A dummy variable for each quarter of the index.

After we get the predicted value, we transform the valuation back.

$$\text{PreMoneyValuation} = \exp(\text{Predition})$$

## The Exit Model (for filling missing values)

Similar to the second entry model, we use a linear model with log transformation on gross annualized return.

$$\text{Log}\left(\left(\frac{\text{ExitValuation}}{\text{PreMoneyValuation}}\right)^{\frac{365.25}{\text{ExitDate}-\text{EntryDate}}}\right) = X\beta$$

where X contains:

- Constant.
- LogTSM, the log of annualized returns of FR Equity Index between entry and exit month.
- LogRtd, the log of round total.
- ElapLast, the years between firm exit date and the last firm entry date.
- LogMonth, the log of the months between firm exit date and index start date.
- TradeSale, the dummy variable if EXIT_TYPE=TradeSale.
- SECTORHC, SECTORTechnology, SECTORRetail, the dummy variables of sectors.

After we get the predicted value, we transform the valuation back.

$$\text{ExitValuation} = \text{PreMoneyValuation} \,/\, (\exp(\text{Predition})^{\frac{\text{ExitDate}-\text{EntryDate}}{365.25}})$$

## Monthly Interpolation between Entry and Exit Events

After we have filled the missing values and have a dataset of valuation events we will use, we interpolate firm values between valuation events using the following method.

We perform interpolation to fill in monthly valuations for months between known valuations (either entry or exit). The interpolation equation for round is:

$$\text{Valuation}_{\text{event,s}} = \text{Valuation}_{\text{t}} * \left(\frac{\text{SectorIndex}_{\text{s}}}{\text{SectorIndex}_{\text{T}}}\right) * \left(\frac{\text{Valuation}_{\text{t+1}}/\text{Valuation}_{\text{t}}}{\text{SectorIndex}_{\text{s}}/\text{SectorIndex}_{\text{T}}}\right)^{\frac{\text{s-t}}{\text{T-t}}}$$

Where:

t is the time of the previous revealed or estimated valuation.

s is the time of the current interpolation.

T is the time of the last valuation.

Sector Index is the index value of FR equity index at the particular sector of that firm. Valuation is the previous revealed or estimated valuation.

$\text{Valuation}_{\text{t+1}}$ is the next revealed or estimated valuation.

## Extrapolation

We only apply extrapolation function on firms with entry events within the last 7 years. For months after the last valuation event for each firm, the monthly return is computed using the following method.

If there is no exit event for the firm, we perform extrapolation between the last known round date and the index end date or seven years from the last date, whichever is earlier. If the extrapolation yields a negative value, a zero is used as the valuation. The logic for the extrapolation relies on two co nstants (alpha and gamma). The extrapolation equation is:

$$\text{Valuation}_{\text{t}} = \text{Valuation}_{\text{t-1}} * \exp\left(\text{kExtapolationAlpha} + \log\left(\frac{\text{SectorIndex}_{\text{t}}}{\text{SectorIndex}_{\text{t-1}}}\right) + \text{kExtapolationGamma} * (\text{t-t}_0)\right)$$

Where:

$t_0$ is the time of the last revealed or estimated valuation.

t is the time of the current interpolation.

SectorIndex is the index value of FR equity index at the particular sector of that firm .

$\mathrm{Valuation}_t$ is the next extrapolation valuation.

The extrapolation coefficients are currently:

kExtrapolationAlpha = 0.009704867

kExtrapolationGamma = -9.220062e-05

## Aggregation

Starting with an index level of 100 at the index inception date of December 31, 1996, we compute each subsequent level using the following:

$$L_{t+1}=L_t(1+\ \sum_i (w_{i,t}\ .\ \ r_{i,t}))$$

Where L denotes the index level, r is a firm return based on its monthly change in value and w is the value of the firm at the beginning of the month divided by the value of all firms summed at the beginning of the month. There is a limiting factor that controls the maximum weight of a particular firm to be at most 0.05.

# Governance

## Index Action Committee (IAC)

The Index Action Committees (IAC) for the FTSE Venture Capital Index is composed of representation from the FR equity Indices and independent outside members of the financial community (TBD).

The main activity of this Index Action Committee is to ensure that the attributes the FTSE Venture Capital Index claims to possess are indeed present. These reviews take place a week before the quarterly rebalance results are published (3rd Friday in April, July, October and January). The Index Action Committee deals with making sure algorithm that calculates the index is accurate. The committee will also review the results of the quarterly rebalance and reserves the right to make any necessary changes.

# About FR Equity Indices

LSEG is the world's leading source of intelligent information for businesses and professionals. We combine industry expertise with innovative technology to deliver critical information to leading decision makers in the financial, legal, tax and accounting, scientific, healthcare and media markets, powered by the world's most trusted news organization.

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- **Custom Index Services**
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For over 35 years we have been at the forefront of driving change for the investor, always innovating to shape the next generation of benchmarks and investment solutions that open up new opportunities for the global investment community.

## CONTACT US

To Learn more, visit ftse-russell/indices; email Index_Queries@lseg.com

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