# Transaction-based vs. Holdings-based Performance

A Framework for Evaluating Measurement and Attribution Methodologies

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# Transaction-based vs. Holdings-based Returns: Which Is Better?

- Define some terms
- Set some achievable goals
- Develop some criteria
- Compare methodologies using criteria
- Apply benefits to client priorities

This presentation reproduces and expounds upon material contained in an upcoming article from the *Journal of Performance Measurement.*

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# “vs.” Is an Oversimplification: A Continuum of Performance Methodologies

- Spaulding* outlines a full range of choices:
  - Monthly holdings-based
  - Daily holdings-based
  - Monthly, beginning holdings plus weighted flows (Modified Dietz)
  - Daily, beginning holdings plus weighted flows
  - Calculate security returns using actual transaction prices
  - Capture 100% of transaction activity

**Spaulding, David, “Holdings vs. Transaction-based Attribution, an Overview,” The Journal of Performance Measurement, Fall 2003, Vol. 8 No. 1, pp. 52-56*

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# How Do We Choose? What Are We Trying to Achieve?

- Insight
  - into the effectiveness of the investment process
  - were good decisions made?
  - were decisions executed well?
- Confidence
  - that the story told by the numbers reflects reality
- Feasibility
  - within external and internal enterprise constraints

# Criteria for Comparison and Evaluation

- Return, weight and contribution
- Granularity
- Simplicity
- Intuitiveness
- Accuracy
- Periodicity
- Attribution
- Time-period linking

# Return, Weight and Contribution

- *Should explicitly specify the calculations for return, weight and contribution.*
- At every level of granularity
- For single and multiple periods
- Contribution is key to effective transaction-based methodologies

# An Effective Transaction-based Example

$$R_{i,t} = \frac{M_{i,e(t)} + O_{i,t}}{M_{i,b(t)} + I_{i,t}} - 1$$

$$W_{i,t} = \frac{M_{i,b(t)} + I_{i,t}}{M_{P,b(t)}} = \frac{M_{i,b(t)} + I_{i,t}}{\sum_i M_{i,b(t)}}$$

$$C_{i,t} = R_{i,t} * W_{i,t}$$

- Fully-weights inflows, zero-weights outflows

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# Granularity – How Low Can You Go?

- *Should calculate performance at the lowest, most granular level possible.*
  - Portfolio
  - Asset Class
  - Region/Country
  - Currency
  - Sector/Industry
  - Strategy
  - Factor
  - Position – recommended for transaction-based
  - Leg
  - Tax Lot

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# Simplicity

- *Should be as simply constructed as possible, and free of special-case logic or exceptions.*
- Specify the fewest number of calculations to cover the widest range of circumstances
- Special cases reduce simplicity. Consider:
  - Opened positions
  - Flipped positions
  - Long/short crossover

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# Intuitiveness

- *Should produce results which, in all transactional circumstances, match our intuitive expectations of performance.*
- Work through examples to demonstrate that the methodology calculations produce intuitive results (or not)
- Narrowly interpreted:

$$R_{i,t} = (M_{u(i),b(t)} * R_{u(i),t}) + \sum_{x(i)} (M_{x(i)} * R_{x(i),t}) = R_{P,t}$$

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# Accuracy

- *The sum of the most granular contributions should equal the portfolio return, for every period*
- When they don't:
  - an explanation will be asked for,
  - this explanation, and the time it takes to make it will distract from the actual point that the performance analysis is intended to make,
  - the explanation, each time it is proffered, will generate dissatisfaction,
  - and the dissatisfaction so generated will cumulate over time.

# Periodicity

- *The periodicity of the methodology should match the availability of holdings valuations*
- I.e., for most organizations today, daily
- Arguments against:
  - Input noise
  - Auto-correlation
  - Heteroskedacity
  - Thus cannot infer anything about manager performance from daily returns
- Arguments for:
  - Not trying to compare 1-day returns to each other
  - Are trying to get a to-date read on how our strategies are working
  - Easier to tie out to accounting returns

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# Attribution

- *Should be consistent with the measurement methodology, and attribute relative performance as accurately as possible.*
- Clearly separate -
  - Performance Measurement: segmentation of a portfolio’s return into position- and/or segment-level returns and contributions
  - Performance Attribution: comparison of segment-level performance to that of a benchmark, together with a quantitative and causative explanation of the differences

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# "The Missing Ruler"* – Why Transaction-based Attribution Is Rarely Feasible

- Must have a complete valuation of every portfolio ***and benchmark*** position at each transaction time
- Use of transaction-based returns & weights otherwise introduces spurious attribution effects
- Worse, transacting is not the only way a manager expresses a decision – ***not transacting*** is equally significant
- Solution: difference between transaction-based contribution and holdings-based attribution effects is measured but not attributed
  - "Un-attributable", not "Transaction/Trading" Effect
  - Not because "apples-to-apples" comparison to un-transacted benchmark

*Bonafede, Julia K., and Mary Cait McCarthy, "Transaction-based vs. Holdings-based Attribution: the Devil is in the Definitions," *The Journal of Performance Measurement*, Fall 2003, Vol. 8 No. 1, pp. 42-51

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# Time-period Linking

- *Returns should be geometrically linked*
- Attribution effects – a whole other topic
  - See Cariño, Menchero, Frongello, Laker, Mirabelli, Valtonnen, David, et al.
- Contribution – adjust to cumulative portfolio return index
- Weight – beginning, end, average, implied adjusted
  - Whichever you use, label it clearly

# Transaction-based Performance: Where Does It Improve over Holdings-Based?

| | Return, Weight, & Contrib. | Granular | Simple | Intuitive | Accurate | Daily | Attrib. | Time-period linking |
|---|---|---|---|---|---|---|---|---|
| Insight | + | + | | | | + | | + |
| Confidence | | + | + | + | ++ | + | | |
| Feasibility | | | + | | | ? | - | |

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# Applying the Criteria – What's Right For Us?

- Who is the client?
- Are the inputs available?
- How complex is the segmentation/aggregation structure?
- How flexible are the performance reports?
- How early/quickly must they be produced?

# Who's the Client? What is the Consumer Looking For?

- Portfolio manager, Investment officer
  - Most demanding
  - Accuracy, granularity, timeliness, intuitiveness
  - Match to investment process
- Client
  - Confidence = Accuracy
  - Match to performance story
- Marketing
  - Granularity + Accuracy = Flexibility
- Operations, Data quality
  - Accuracy, granularity, periodicity, intuitiveness

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# Are the Inputs Available? What Is the Cost of Filling the Data Gap?

- Daily position valuations
  - !!! corrected for as-of transactions? !!!
  - all securities (private placements, STIFs)?
  - separate long from short?
  - separate cash from short-term?
  - accruals (coupon, dividend)?
  - FX rates?
  - segment classifications?
- Complete transaction data
  - !!! corrected for as-of transactions? !!!
  - reflexive cash transactions?
  - outflow/inflow by transaction type?
  - separate long from short (no crossover)?
  - FX rates?
  - Commissions and fees detail?

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# Are the Inputs Available? (cont.)

- Daily benchmark constituents
  - valuations?
  - valuations same or different source than portfolio?
  - weights, if not market-value weighted?
  - segment classifications?
  - segment classifications same or different than portfolio?
- The good news – if your methodology inputs position and transaction values, and these are already correct, you won't need to deal with:
  - corporate actions
  - complex security master, security-type specific rules

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# How complex is the segmentation/aggregation structure?

- Number of dimensions, segments, hierarchies, aggregates
- Flexibility of drill-down dimension order
- Multiple structures in same dimension from different data sources (e.g., sector/industry)
- Changes to structures over time

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# How flexible are the performance reports?

- Start, end dates
- Segment, aggregation hierarchy
- Flexibility of drill-down dimension order
- Net/gross at various levels
- Reporting currency
- Benchmark selection
- Methodology options

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# How early/quickly must they be produced?

- Standard reports delivery
- Input data availability
- Ad-hoc reporting performance
- Pre-calculate and store vs. on-the-fly
- Depth, periodicity of history
- Restatement/splicing of existing history
- Historical corrections, accounting period closing cycles

# Conclusions

- All-out transaction-based performance provides superior insight and confidence.
- Transaction-based performance measurement (but not attribution) is quite feasible now, and technology and markets conspire to make it more so.
- But - depending on your data gap - it can be expensive to implement.
- Make sure you know who you're doing it for and why they need it.

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# For more information:

- *The Journal of Performance Measurement*
  - Upcoming article
  - Reprint Fall 2003, Vol. 8 No. 1
- www.essexriver.com
  - TransactionBasedPerformance.xls
  - Worked-through examples of methodology
- mark.david@essexriver.com

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