# Improving Operating Performance Measurement:

# Linking to Discounted Cash Flow Value & Isolating

# Management's Contribution to Value

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# Introduction

- Operating performance measurement has two key objectives:
  - Increasing shareholder value, which means that operating performance measures need to tie to discounted cash flow value.
  - Isolating and rewarding management contribution to value, which means that operating performance measures need to be decomposed into the component due to management and the component due to industry factors.
- In this presentation, we will show that:
  - The "EVA math" is the key to understanding how operating performance links to discounted cash flow value: it shows how operating performance is tied to discounted flow value, expected return and excess return.
    - The EVA math does not say that EVA is the only performance measure that matters.
    - The EVA math highlights the importance of future growth value ("FGV") and shows why non-EVA measures can be important: they are better proxies for $\Delta$FGV than $\Delta$EVA. *This allows other measures to be used in a way that is consistent with discounted cash flow value*.
  - Combining EVA with empirical models of $\Delta$FGV significantly improves operating performance measurement, i.e., makes the operating performance measure a better proxy for excess return. This can be done in two ways: excess $\Delta$EVA with "dynamic expected improvement" and "operating return".
  - Better operating performance measures don't eliminate the need to isolate management's contribution to value because industry affects operating performance, not just market performance.
- The two operating performance measures can be used to monitor strategy implementation and to communicate with analysts and governance advisors.

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# THE EVA MATH

## Economic Value Added (EVA) - or economic profit (EP) - is profit after the cost of debt *AND* equity capital

| | | |
|---|---|---|
| Sales | | 100 |
| Cost of goods sold | | (80) |
| Gross profit | | 20 |
| SG&A | | (6) |
| Pre-tax operating profit | | 14 |
| Taxes | | (5) |
| Net operating profit after-tax (NOPAT) | | 9 |
| | | |
| Total assets | 60 | |
| Current liabilities (non-interest bearing) | (20) | |
| Capital | 40 | |
| x Cost of capital | 10% | |
| Capital charge | | (4) |
| | | |
| EVA | | 5 |

# EVA is an important financial concept because it's the only earnings measure that ties to discounted cash flow value

| Value | Operating Expression |
|---|---|
| Market value of debt | ■ Present value of future interest and principal payments discounted at the cost of debt |
| Market value of equity | ■ Present value of future dividends discounted at the cost of equity |
| Market value of debt + equity | ■ Present value of future free cash flow discounted at the weighted average cost of capital (WACC) |
| Market value of debt + equity | ■ Capital plus the present value of future EVA discounted at the cost of capital<br>■ EVA = NOPAT – WACC x beginning capital<br>■ NOPAT = Net Operating Profit After Tax |
| Market value of debt + equity | ■ Current operations value + future growth value<br>■ Current operations value = [Capital + EVA/WACC]<br>■ Future growth value (FGV) = PV of future ΔEVA<br>■ FGV = (1 + WACC)/WACC x PV of future annual ΔEVA |

# Future growth value – *an extremely important concept* - is the value attributable to *future* improvements in EVA

| | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|
| ROIC | 15% | | | | | | |
| Cost of capital | 10% | | | | | | |
| Capital growth | 3% | | | | | | |
| Beginning capital | | 100,000 | 103,000 | 106,090 | 109,273 | 112,551 | 115,927 |
| NOPAT | | 15,000 | 15,450 | 15,914 | 16,391 | 16,883 | |
| Capital charge | | (10,000) | (10,300) | (10,609) | (10,927) | (11,255) | |
| EVA | | 5,000 | 5,150 | 5,305 | 5,464 | 5,628 | |
| ΔEVA | | | 150 | 155 | 159 | 164 | |
| Growth rate in ΔEVA | | | | 3% | 3% | 3% | |

**EVA VALUATION**

| | | | | |
|---|---|---|---|---|
| Present value of future ΔEVA | | 2,143 | | |
| = year 2 ΔEVA/(WACC - growth rate) | | | | |
| Capitalized present value of future ΔEVA | A | 23,571 | = Future growth value | |
| = (1 + WACC)/WACC x PV | | | | |
| Present value of current (i.e., year 1) EVA | | | | |
| = Year 1 EVA/WACC | B | 50,000 | = Perpetuity value of current EVA | = Current operations value |
| Ending capital | C | 103,000 | = Ending capital | |
| Market value (= A + B + C) | | 176,571 | = A + B + C | |

**FREE CASH FLOW VALUATION**

| | | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|
| NOPAT | | 15,450 | 15,914 | 16,391 | 16,883 |
| Change in ending capital | | 3,090 | 3,183 | 3,278 | 3,377 |
| Free cash flow | | 12,360 | 12,731 | 13,113 | 13,506 |
| Growth in free cash flow | | | 3% | 3% | 3% |
| Present value of future free cash flow | 176,571 | | | | |
| = year 2 FCF/(WACC - growth rate) | | | | | |

# EVA also ties to expected and excess investor returns

| Value | Operating Expression |
|---|---|
| Expected investor return | ■ WACC x market enterprise value<br>■ WACC x current operations value + WACC x FGV<br>    ■ NOPAT [with WACC return on new capital]<br>    ■ (1+WACC)/WACC x EI + expected ΔFGV<br>■ EI = expected ΔEVA =<br>    ■ (WACC x FGV – expected ΔFGV)/((1 + WACC)/WACC)<br>    ■ If expected ΔFGV = 0, EI = WACC x FGV/((1+WACC)/WACC) |
| Excess investor return | ■ Actual investor return – expected investor return<br>    ■ Actual investor return = (ending market enterprise value – beginning market enterprise value) + future value of free cash flow.<br>    ■ Expected investor return = beginning market enterprise value x [((1 + WACC)^years) – 1]<br>■ Capitalized value of excess ΔEVA + unexpected ΔFGV<br>    ■ Excess ΔEVA = ΔEVA – expected improvement (“EI”)<br>    ■ EI = ΔEVA required to provide a WACC return on FGV |

# Return on market value = WACC if and only if capitalized ΔEVA + ΔFGV = WACC x beginning FGV

| | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|
| ROIC | 15% | | | | | | |
| Cost of capital | 10% | | | | | | |
| Capital growth | 3% | | | | | | |
| Beginning capital | | 100,000 | 103,000 | 106,090 | 109,273 | 112,551 | 115,927 |
| NOPAT | | 15,000 | 15,450 | 15,914 | 16,391 | 16,883 | |
| Capital charge | | (10,000) | (10,300) | (10,609) | (10,927) | (11,255) | |
| EVA | | 5,000 | 5,150 | 5,305 | 5,464 | 5,628 | |
| ΔEVA | | | 150 | 155 | 159 | 164 | |
| Growth rate in ΔEVA | | | | 3% | 3% | 3% | |

**CALCULATION OF TOTAL RETURN FROM ΔMARKET VALUE AND FCF SHOWING ACTUAL RETURN = EXPECTED RETURN**

| | Year 1 | Year 2 | |
|---|---|---|---|
| Present value of future ΔEVA | 2,143 | 2,207 | |
| = next year's ΔEVA/(WACC - growth rate) | | | |
| Capitalized present value of future ΔEVA (= FGV) | 23,571 | 24,279 | |
| = (1 + WACC)/WACC x PV of future ΔEVA | | | |
| Present value of current EVA (= EVA/WACC) | 50,000 | 51,500 | |
| Ending capital | 103,000 | 106,090 | |
| Market value | 176,571 | 181,869 | |
| Increase in market value | | 5,297 | A |
| NOPAT | | 15,450 | |
| Change in ending capital | | 3,090 | |
| Free cash flow | | 12,360 | B |
| Actual return = Δmarket value + free cash flow (= A + B) | | 17,657 | = A + B |
| Expected return (= WACC x market value) | 17,657 | | |

**CALCULATION SHOWING ΔEVA AND ΔFGV PROVIDE EXPECTED RETURN ON FGV**

| | Year 1 | Year 2 | | |
|---|---|---|---|---|
| Expected return on FGV (= WACC x FGV) | 2,357 | | | |
| Capitalized value of ΔEVA | | 1,650 | C | = [(1 + WACC)/WACC] x ΔEVA |
| Change in FGV | | 707 | D | |
| Actual return on FGV (= C + D) | | 2,357 | = C + D | |

# Excess return is the sum of capitalized excess ΔEVA plus the unexpected change in future growth value

| | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|---|
| ROIC | 15% | | 18% | | | | |
| Cost of capital | 10% | | | | | | |
| Capital growth | 3% | | 4% | | | | |
| | | | | | | | |
| Beginning capital | | 100,000 | 103,000 | 107,120 | 111,405 | 115,861 | 120,495 |
| NOPAT | | 15,000 | 18,540 | 19,282 | 20,053 | 20,855 | |
| Capital charge | | (10,000) | (10,300) | (10,712) | (11,140) | (11,586) | |
| EVA | | 5,000 | 8,240 | 8,570 | 8,912 | 9,269 | |
| ΔEVA | | | 3,240 | 330 | 343 | 356 | |
| Growth rate in ΔEVA | | | | | 4% | 4% | |

**CALCULATION OF DOLLAR EXCESS RETURN FROM ΔMARKET VALUE AND FCF**

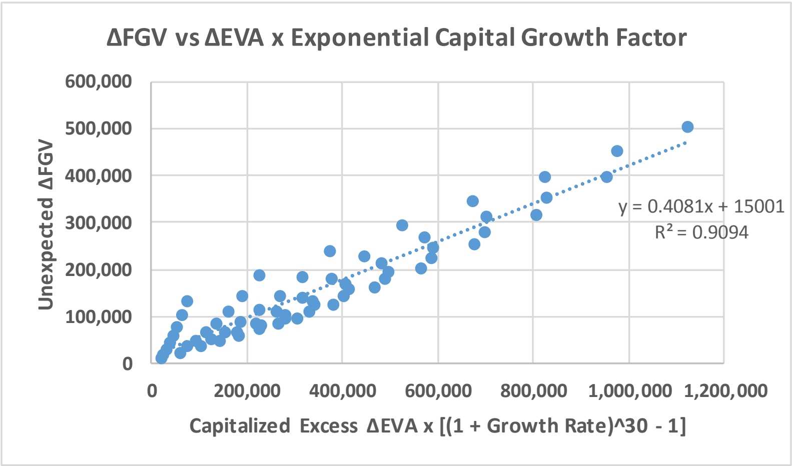
| | Year 1 | Year 2 | |
|---|---|---|---|
| Present value of future ΔEVA | 2,143 | 5,493 | |
| = next year's ΔEVA/(WACC - growth rate) | | | |
| Capitalized present value of future ΔEVA (= FGV) | 23,571 | 60,427 | |
| = (1 + WACC)/WACC x PV of future ΔEVA | | | |
| Present value of current EVA (= EVA/WACC) | 50,000 | 82,400 | |
| Ending capital | 103,000 | 107,120 | |
| Market value (= A + B + C) | 176,571 | 249,947 | |
| Increase in market value | | 73,375 | A |
| | | | |
| NOPAT | | 18,540 | |
| Change in ending capital | | 4,120 | |
| Free cash flow | | 14,420 | B |
| | | | |
| Actual return = Δmarket value + free cash flow = A + B | | 87,795 | = A + B |
| Expected return (= WACC x market value) | 17,657 | | |
| Excess return (= actual return - expected return) | | 70,138 | C |

**CALCULATION SHOWING DOLLAR EXCESS RETURN = CAPITALIZED EXCESS ΔEVA + UNEXPECTED ΔFGV**

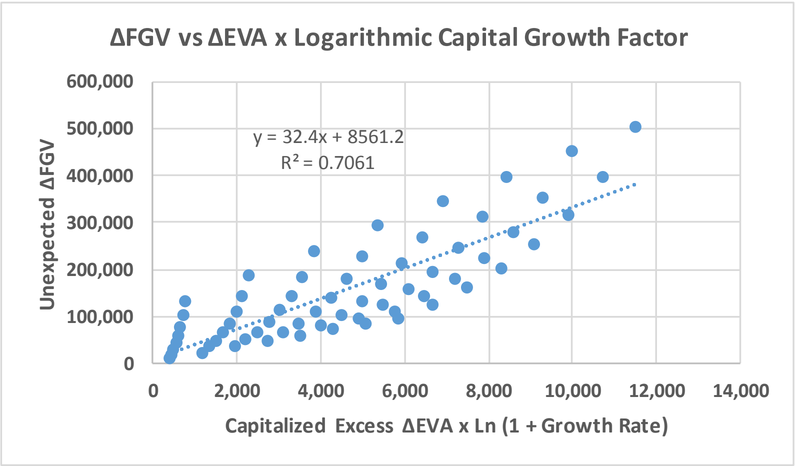
| | Year 2 | |
|---|---|---|
| Actual ΔEVA | 3,240 | |
| Expected ΔEVA (= EI) | (150) | |
| Excess ΔEVA (actual ΔEVA = EI) | 3,090 | |
| Capitalized excess ΔEVA (= excess ΔEVA x (1 + WACC)/WACC) | 33,990 | D |
| | | |
| Actual ΔFGV | 36,855 | |
| Expected ΔFGV | (707) | |
| Unexpected ΔFGV | 36,148 | E |
| | | |
| Excess return (= capitalized excess ΔEVA + unexpected ΔFGV) | 70,138 | = D + E = C |

# OPERATING DRIVERS OF ΔFGV

# In our example, ΔFGV is well explained by two *current* period measures: ΔEVA and Δcapital




Note: plot points use ROIC of 16% to 30% and capital growth rates of 3.5% to 7.0%




Note: plot points use ROIC of 16% to 30% and capital growth rates of 3.5% to 7.0%

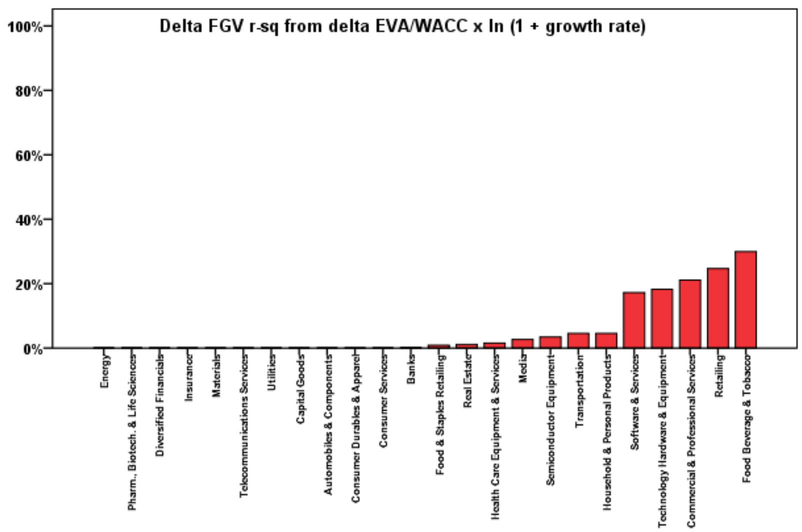
**The plot points in the two graphs above are derived from the example on the second previous page. The example starts with a basic case valuation - assuming 15% ROIC, 3% capital growth and 10% cost of capital – and then calculates the change in FGV associated with an increase in ROIC and capital growth. The graph plots capitalized excess ΔEVA and unexpected ΔFGV for 64 scenarios with new ROIC ranging from 16% to 30% and new capital growth rate ranging from 3.5% to 7.0%.**

**The left panel shows that capitalized excess ΔEVA x [(1 + capital growth rate)^30 – 1] explains 91% of the variation in excess ΔFGV. We can get the r-squared closer and closer to 100% by extending the projection horizon for the capital growth rate beyond 30 years.**

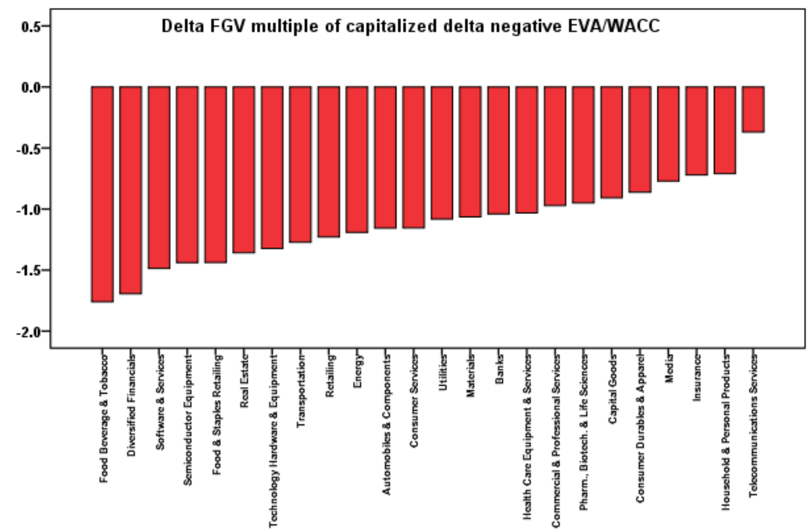
**When we use historical capital growth rates as a proxies for expected capital growth rates, we find that logarithmic transformations have more explanatory power than exponential transformations because log functions dampen the noise in the historical growth rate while exponential functions compound it. The right panel uses a logarithmic growth rate to provide a comparison to the better fitting models using historical growth rates (shown on the following page). The right panel shows that capitalized excess ΔEVA x ln(1 + capital growth rate) explains 71% of the variation in excess ΔFGV.**

# In practice, ∆EVA x ln(1 + growth) has limited explanatory power and ∆FGV is negative when EVA increases from a negative base

## Delta FGV From Delta EVA and Growth




## Delta FGV From Delta Negative EVA




**The left panel shows the variance in five year ∆FGV explained by ∆EVA+/WACC x ln(1 + growth rate) across the 24 GICS industry groups. The variance explained is zero in half the industry groups and only 30% in the best industry group, Food Beverage & Tobacco. The sample is five year periods ending in 1996-2015 for S&P 1500 companies. EVA+ is EVA if positive and zero otherwise.**

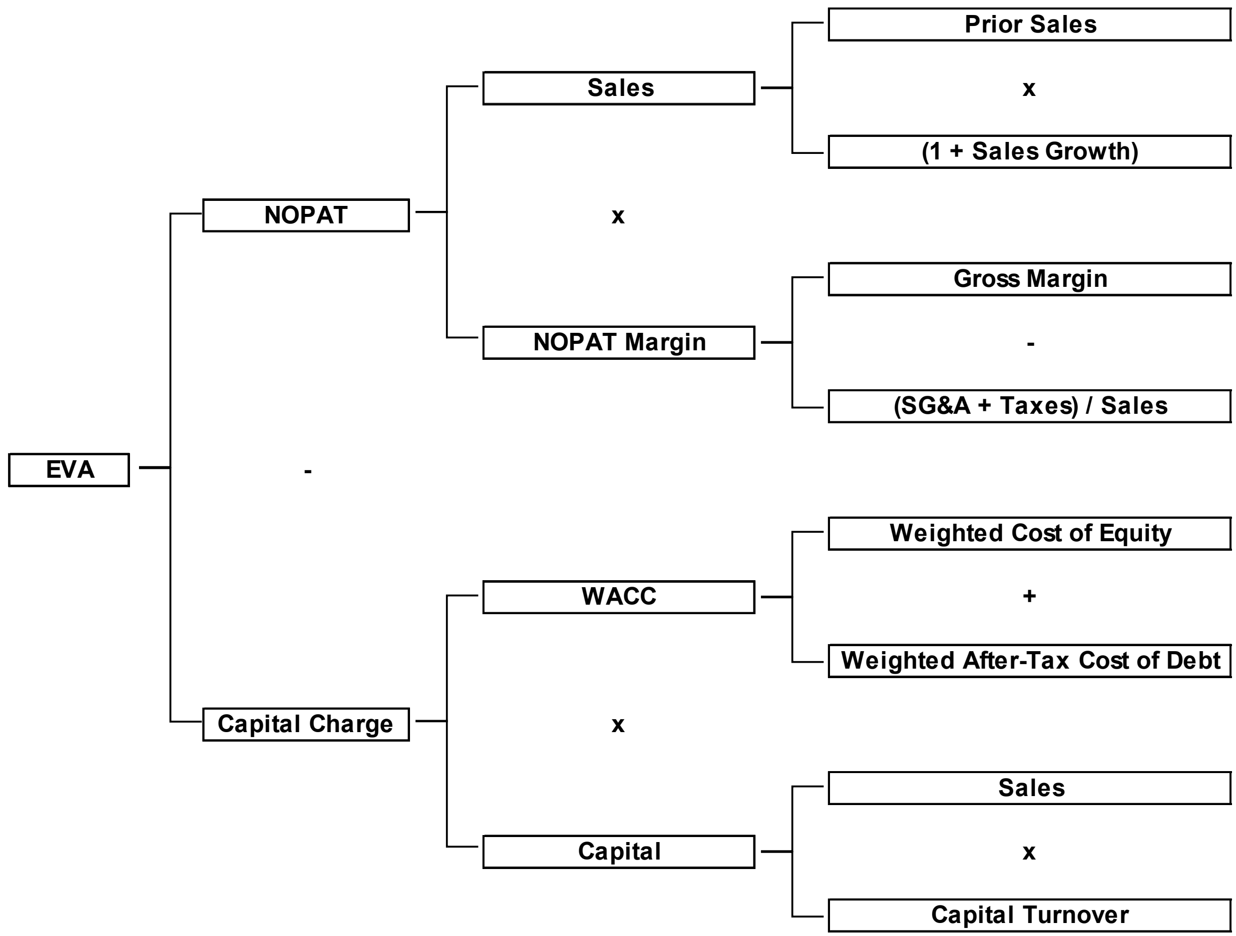
**The right panel shows that improvements in EVA- [= EVA if negative, zero otherwise] *reduce* FGV in every industry group. This, of course, makes ∆EVA- a poor proxy for ∆FGV.**

**For the median GICS industry group, ∆EVA only explains 19% of the variation in five year excess returns vs. 31% for ∆EBITDA.**

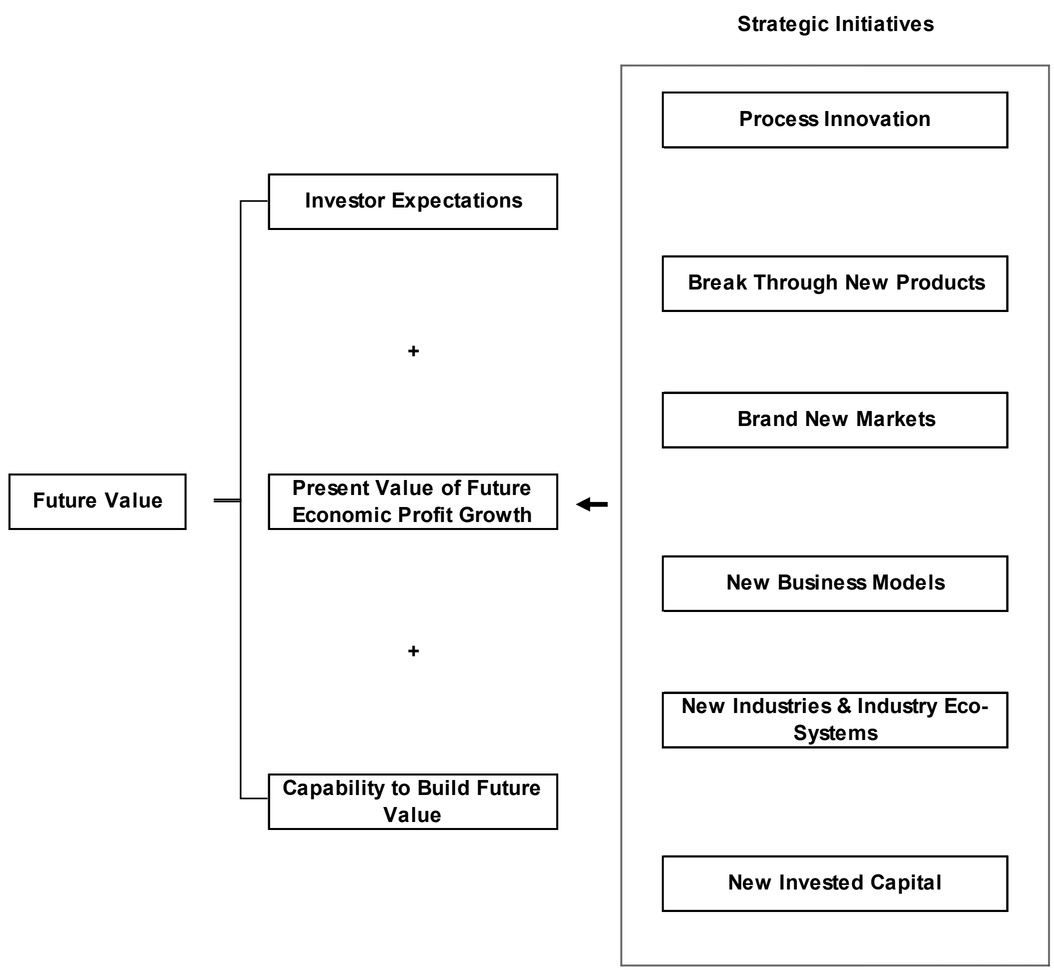
# What are the current period drivers of ∆FGV?

- EVA value driver trees are common, but they typically show the current period drivers of *current* period EVA, not current period ∆FGV.
- Several sources, including the IRRCi report on the Alignment Gap, Kaplan & Norton's Balanced Scorecard and the McKinsey valuation book, have helpful discussions of future value drivers.
- The big challenge in using future value drivers is measurement and valuation impact. The McKinsey Valuation authors note:
  - "If managers know the relative impact of their company's value drivers on long-term value creation, they can make explicit trade-offs between pursuing a critical driver and allowing performance against a less critical driver to deteriorate. This is particularly helpful for choosing between activities that deliver short-term performance and those that build the long-term health of the business." Koller, Goedhart & Wessels, Valuation, 5th edition, p. 420.
- Our approach is to develop a statistical model of ∆FGV using, for the analysis in this report, five variables available in/from Compustat: EVA, R&D, advertising, sales and EBITDA.
- For a specific industry, the model of ∆FGV can be improved by incorporating additional measures, e.g., in the airline industry, customer satisfaction measured by Net Promoter Score.

# Conventional value driver trees highlight the current period drivers of *current* EVA



# The IRRCi report on “The Alignment Gap” presents a future value driver tree




Source: Mark Van Clieaf, Karel Leefland & Stephen O'Byrne, "The Alignment Gap Between Value Creation, Performance Measurement and Long-Term Incentive Design", IRRCi Report, November 2014, p. 25, available at www.irrci.org

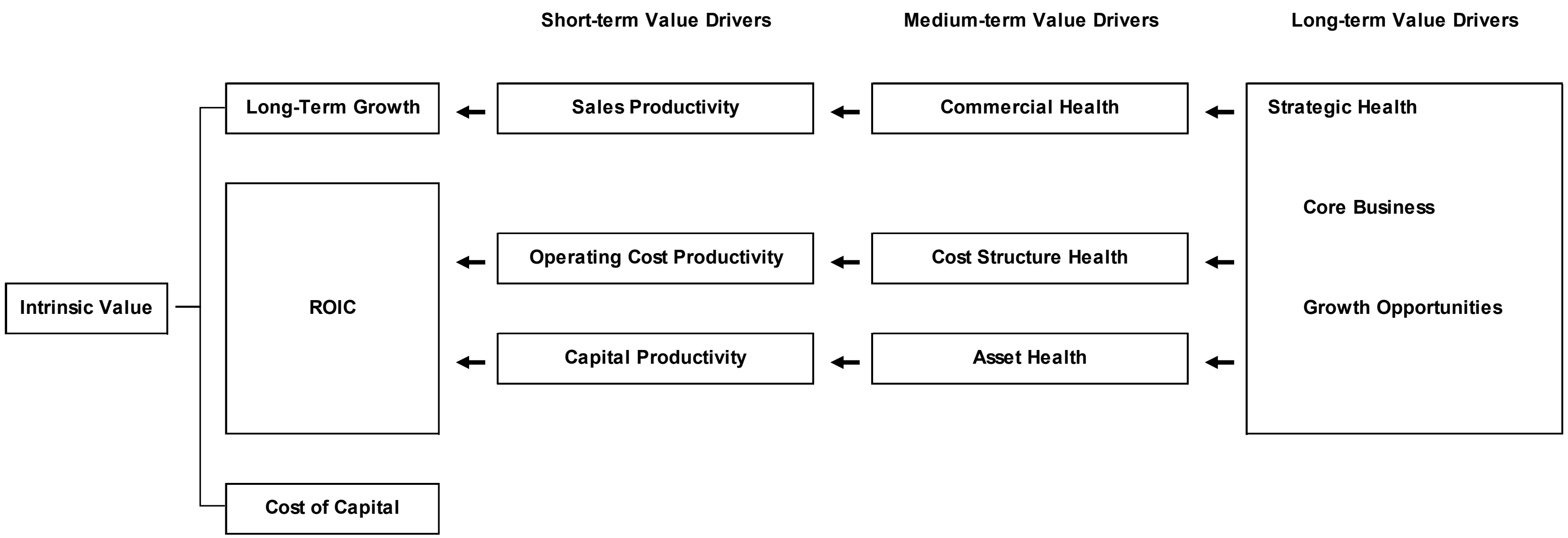
# Kaplan & Norton identify many drivers of future value in their books on the Balanced Scorecard

**Balanced Scorecard for Mobil North American Marketing and Refining**

| | Strategic Themes | Strategic Objectives | Strategic Measures |
|---|---|---|---|
| **Financial** | Financial Growth | Return on Capital Employed | ROCE |
| | | Existing Asset Utilization | Cash Flow |
| | | Profitability | Net Margin Rank (vs. Competition) |
| | | Industry Cost Leader | Full Cost per Gallon Delivered (vs. Competition) |
| | | Profitable Growth | Volume Growth Rate vs. Industry |
| | | | Premium Ratio |
| | | | Nongasoline Revenue and Margin |
| **Customer** | Delight the Customer | Continually Delight the Targeted Customer | Share of Segment in Selected Key Markets |
| | | | Mystery Shopper Rating |
| | Win-Win Dealer Relations | Build Win-Win Relations with Dealer | Dealer Gross Profit Growth |
| | | | Dealer Survey |
| **Internal** | Build the Franchise | Innovative Products and Services | New Product ROI |
| | | | New Product Acceptance Rate |
| | | Best-in-Class Franchise Teams | Dealer Quality Score |
| | Safe and Reliable | Refinery Performance | Yield Gap |
| | | | Unplanned Downtime |
| | Competitive Supplier | Inventory Management | Inventory Levels |
| | | | Run-out Rate |
| | | Industry Cost Leader | Activity Cost vs. Competition |
| | Quality | On Spec, on Time | Perfect Orders |
| | Good Neighbor | Improve EHS | Number of Environmental Incidents |
| | | | Days Away from Work Rate |
| **Learning and Growth** | Motivated and Prepared Workforc | Climate for Action | Employee Survey |
| | | Core Competencies and Skills | Personal Balanced Scorecard (%) |
| | | Access to Strategic Information | Strategic Competency Availability |
| | | | Strategic Information Availability |

Source: Robert S. Kaplan and David P. Norton, The Strategy Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment, p. 41.

# McKinsey presents a "Value Creation Tree" that includes long-term value drivers




Source: Tim Koller, Marc Goedhart & David Wessels, Valuation: Measuring and Managing the Value of Companies, 5th Edition, p. 417

## The McKinsey discussion of performance management lists many more specific drivers of future value

Advertising spending
Brand strength
Customer satisfaction
Employee retention
Market share
Product pipeline
Product price premium
R&D spending
Sales force productivity
Same store sales growth

Source: Tim Koller, Marc Goedhart, David Wessels, Valuation: Measuring and Managing the Value of Companies, 5th edition, chapter 20

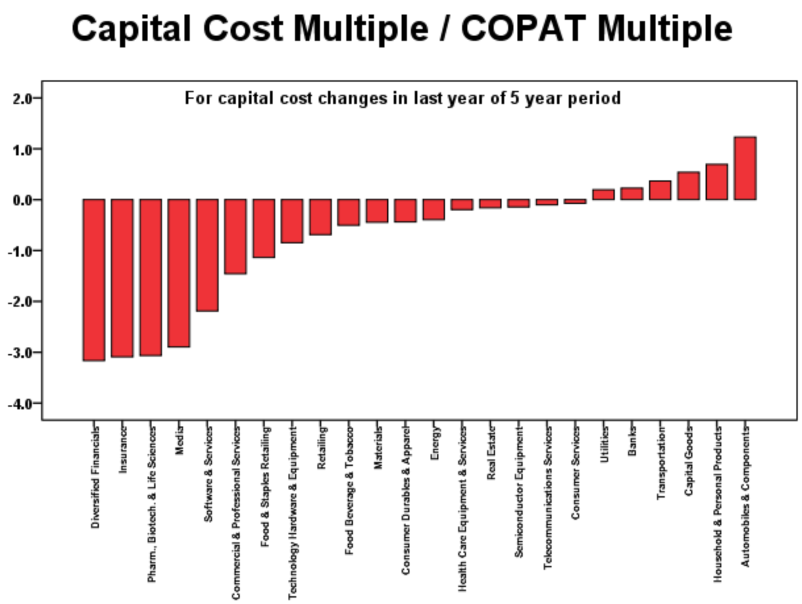
# We develop industry models of FGV using variables than can be calculated from Compustat data

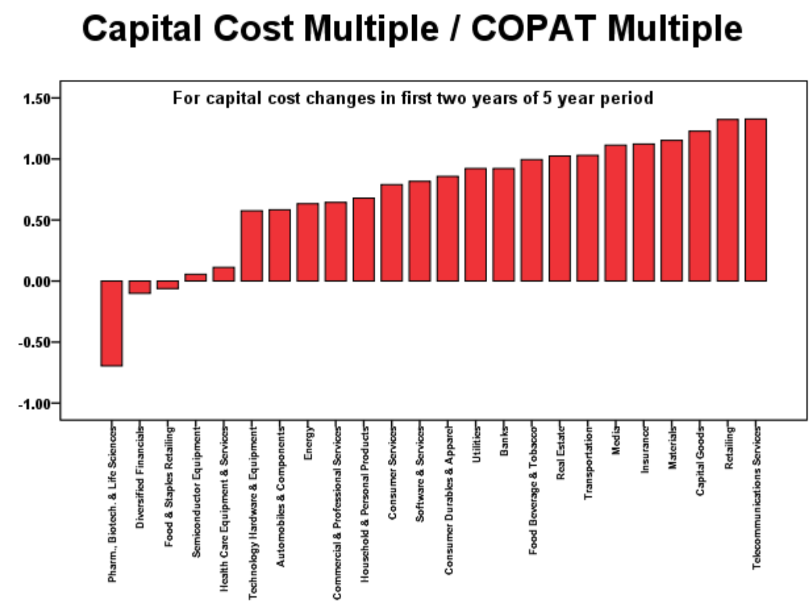
- Our models are multiple regression models using FGV/capital and ΔFGV/capital as the dependent variables.
- The independent variables include five drivers of FGV: EVA, EBITDA, sales, R&D and advertising:
  - ΔEVA+ x ln (1 + sales growth)
  - ΔEVA+
  - ΔEVA-
  - ΔEBITDA x (1 – tax rate) / WACC
  - Δsales x average EVA+ return on capital
  - Δsales
  - ΔR&D x (1 – tax rate) / WACC
  - Δadvertising x (1 – tax rate) / WACC
  - Beginning future growth value
  - Beginning capital

# Why should EBITDA be a driver of future ΔEVA?

- When positive NPV investments have “delayed productivity of capital”, EVA falls while market value, and FGV, is increasing.
- Delayed productivity of capital has economic and accounting causes:
  - Economic causes are increasing capacity utilization and other economies of scale and experience that develop over time.
  - An accounting cause is straight line depreciation which makes the total capital cost of an asset, i.e., after-tax depreciation plus capital charge, decline over the life of the asset.
- Empirical models show that investors expect capital to have delayed productivity:
  - Investor perceptions of delayed productivity are evident when we develop a model of five year excess returns using five independent variables: the five year change in COPAT [Cash Operating Profit After Tax], the changes in total capital cost (i.e., after-tax depreciation + capital charge) in the first two years, in the second two years and in the final year, and expected improvement.
  - The multiples on the recent changes in capital cost are frequently *positive*, and even when negative, are much lower, in absolute value, than the multiple on ΔCOPAT. The following page shows the ratio of capital cost multiple to COPAT multiple for early and late investments by industry group.
- When ΔEBITDA is positive, but ΔEVA is zero (because tax-adjusted ΔEBITDA is offset by Δcapital cost), EVA is likely to increase in the future for economic and/or accounting reasons. This is why ΔEBITDA is a driver of ΔFGV.

# Lower multiples on recent ∆capital cost show that investors expect capital to have increasing productivity



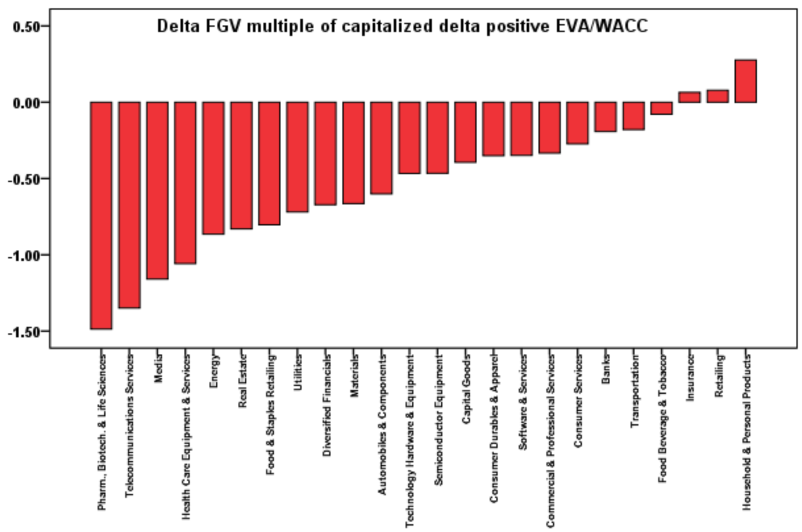




**The left panel shows, for each of the 24 GICS industry groups, the ratio of capital cost multiple to COPAT multiple for capital cost changes in the last year of each five year period. The multiples are coefficients in a multiple regression where excess return is the dependent variable and the independent variables, i.e., capital cost changes and expected improvement, are expressed as capitalized future values, i.e., carried forward to the ending year to take account of the time value of money and capitalized to better approximate the impact of earnings on market value. To show more costly capital as higher positive multiples, the ratio is calculated as [-capital cost multiple/COPAT multiple] since capital cost multiples should be negative.**

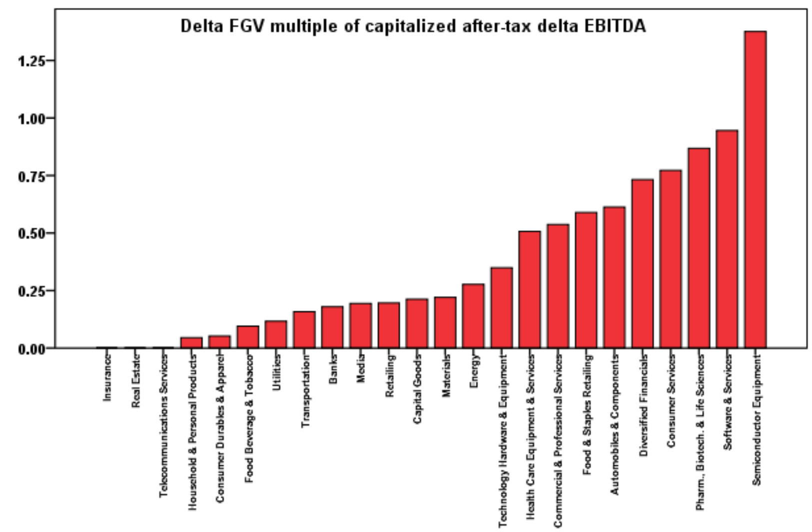
**The right panel shows, for each of the 24 CIGS industry groups, the ratio of capital cost multiple to COPAT multiple for capital cost changes in the first two years of each five year period. If investors believe that the increased capital was fully productive, the ratio should be close to 1. The low multiples on capital cost changes in the most recent year show that investors anticipate additional COPAT from more recent investments, i.e., anticipate delayed productivity of capital.**

# *Insights from the ΔFGV models:* in most industries, ΔEVA+ without growth destroys FGV, while EBITDA growth increases FGV

## Delta FGV From Delta Positive EVA




## Delta FGV From Delta EBITDA

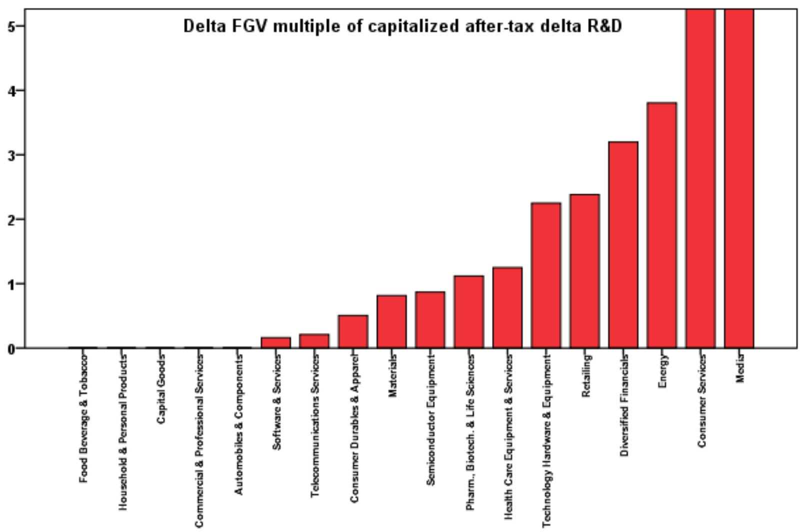



**The left panel shows the change in FGV per $1 of capitalized ΔEVA+ for each of the 24 GICS industry groups. The change in FGV is the coefficient of ΔEVA+/WACC in a regression that controls for ΔEVA+/WACC x ln(1 + sales growth), so it represents the impact of ΔEVA+ when there is no business growth. In all but three groups, ΔEVA+ without business growth has a negative effect on FGV.**

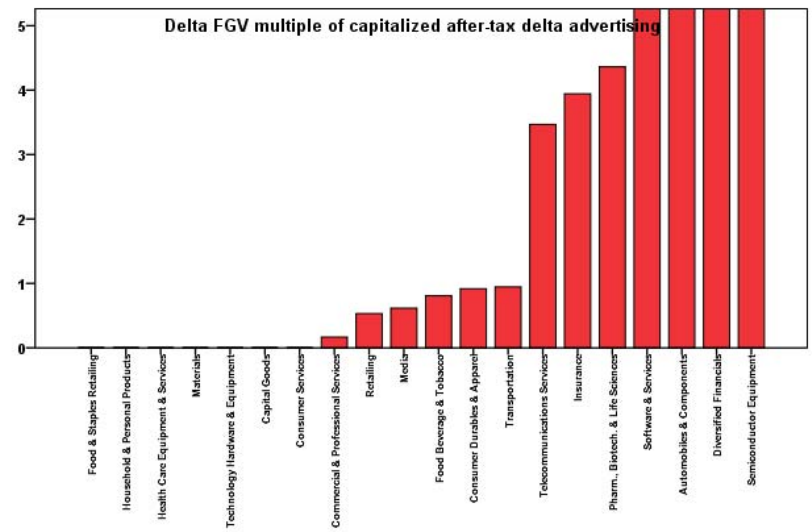
**The right panel shows the change in FGV per $1 of capitalized after-tax ΔEBITDA. If after-tax ΔEBITDA is offset by increases in after-tax depreciation and capital charge, why should FGV increase? Our research shows that the value multiple (from investor return) on after-tax ΔEBITDA is significantly higher, in absolute value, than the value multiples on after-tax Δdepreciation and Δcapital charge. One explanation for this result is that investors believe that capital has "delayed productivity" due to economics (e.g., companies become more profitable over time as they increase capacity utilization) or accounting (e.g., the total capital recovery charge for an investment declines over time because companies use straight line, not sinking fund, depreciation).**

# *Insights from the ∆FGV models:* Increases in R&D and advertising increase FGV in many industries, but don't add value in all of them

### Delta FGV From Delta R&D




### Delta FGV From Delta Advertising

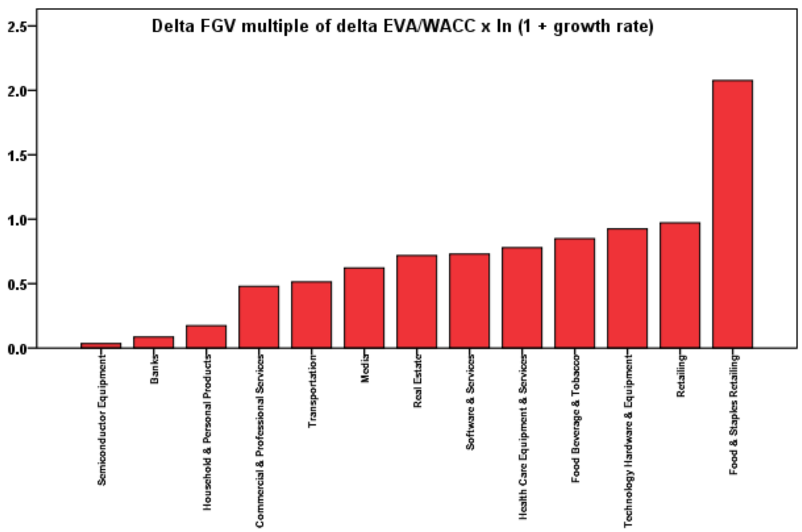



**The left panel shows five year ∆FGV as multiple of capitalized after-tax ∆R&D. If the multiple is greater than 1.0, the increase in FGV is greater than the negative effect on capitalized EVA, so R&D is adding value, not just FGV.**

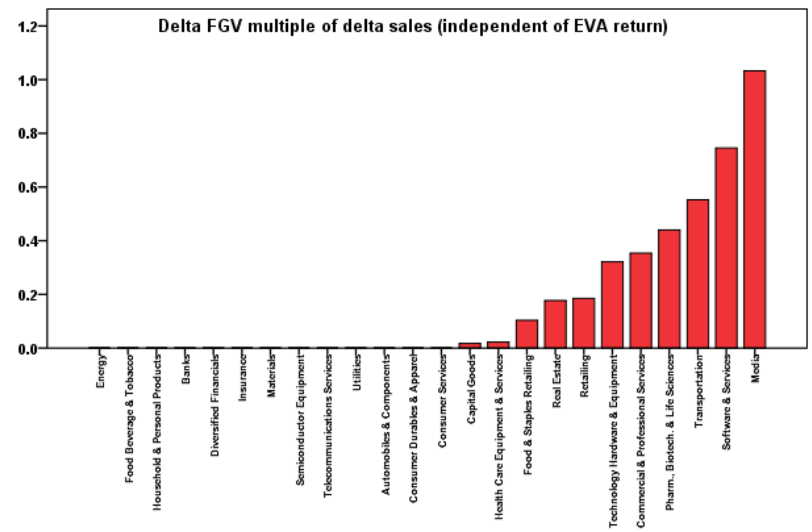
**The right panel shows five year ∆FGV as a multiple of capitalized after-tax ∆advertising.**

# *Insights from the ∆FGV models:* Sales growth without positive EVA adds value in some industries but not all

**Delta FGV From Delta EVA and Growth**



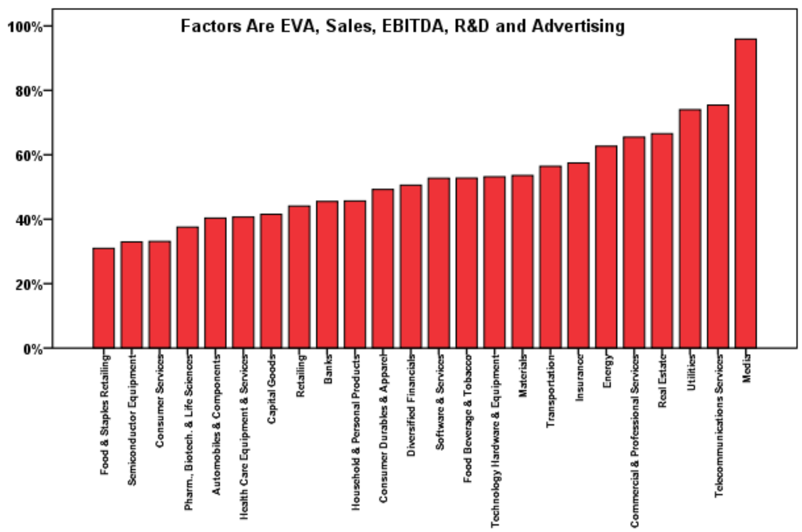

**Delta FGV From Delta Sales**



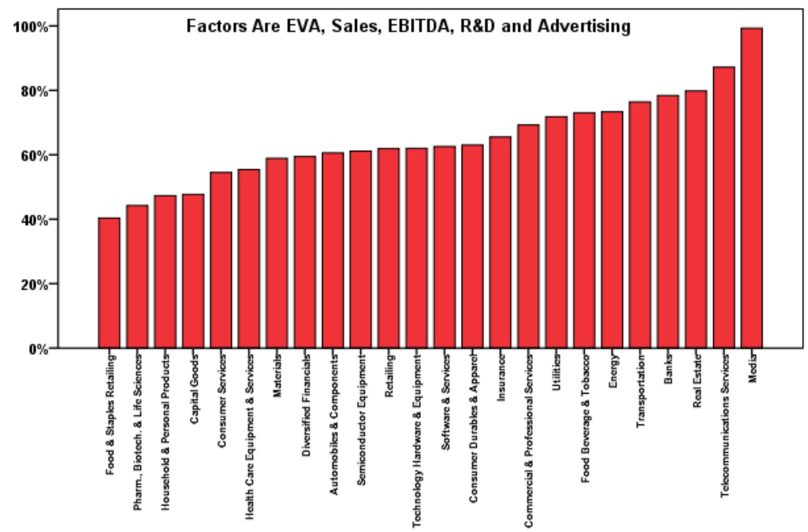

**The left panel shows the industry groups where capitalized ∆EVA x ln(1 + sales growth) increases FGV. The right panel shows the industry groups where sales, independent of ∆EVA, increases ∆FGV.**

# A five factor model explains 52% of the variation in five year ΔFGV for the median industry group

### 5 Yr Delta FGV Explained by All Factors

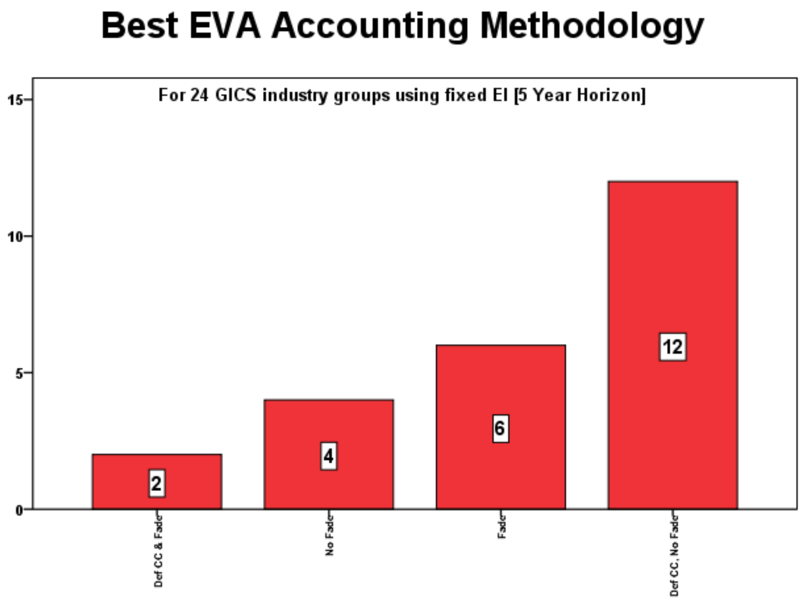


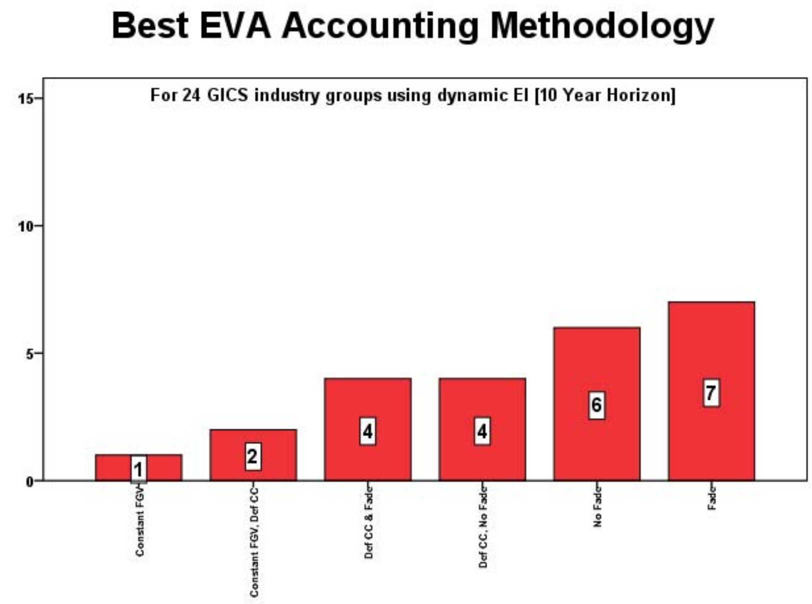

### 10 Yr Delta FGV Explained by All Factors




**A five factor model explains 62% of the variation in ten year ΔFGV for the median industry group.**

# Using a deferred capital charge and/or taking account of fade improves EVA explanatory power in some industry groups




**The left panel shows, for the 24 GICS industry groups, the EVA accounting methodologies that provide the highest r-squared with 5 year excess returns for excess ∆EVA using a fixed EI. The "fade" methodology calculates current operations value (and hence, FGV) taking account of the predictable fade in EVA return on capital. The "deferred cc" [deferred capital charge]" methodology defers the capital charge on all new investment for two years and then adds back the deferred capital charge (with interest at the cost of capital) over the next two years. The exhibit shows that a deferred capital charge with no fade provides the highest explanatory power for 12 of the 24 industry groups.**

**The right panel shows, for the 24 GICS industry groups, the EVA accounting methodologies that provide the highest r-squared with 10 year excess returns for excess ∆EVA using a dynamic EI. In the 3 of the 24 GICS industry groups, a fixed EI assuming constant FGV works better than a dynamic EI.**

# EXCESS ΔEVA WITH DYNAMIC EI & OPERATING RETURN

# There are two ways to incorporate a model of ΔFGV into an operating measure that's consistent with DCF valuation

- Excess ΔEVA with "dynamic EI"
  - EI must satisfy WACC x FGV = EI + EI/WACC + ΔFGV
  - Dynamic EI = [WACC / (1 + WACC)] x [WACC x FGV – predicted ΔFGV]
  - Predicted ΔFGV takes account of actual ΔR&D, Δadvertising, Δsales and ΔEBITDA over the measurement period.
- Operating return:
  - Operating value = capital + EVA/WACC + predicted FGV
  - Operating return = Δoperating value + future value of free cash flow.
  - Δoperating value = Δcapital + ΔEVA/WACC + Δpredicted FGV
  - Excess operating return =
    - operating return – (beginning operating value x [(1 + WACC)$^n$ – 1])

# Example calculation of excess ΔEVA with dynamic EI

| HOME DEPOT INC | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| **OPERATING PERFORMANCE** | | | | | | | |
| Revenue | | 71,656 | 72,639 | 73,022 | 76,337 | 79,214 | 83,743 |
| R&D | | 0 | 0 | 0 | 0 | 0 | 0 |
| Advertising | | 975 | 923 | 878 | 849 | 869 | 890 |
| EBITDA | | 6,960 | 7,929 | 8,558 | 9,624 | 10,862 | 12,544 |
| Tax rate | | 39% | 39% | 39% | 39% | 39% | 39% |
| NOPAT | | 3,528 | 3,891 | 4,352 | 4,958 | 5,719 | 6,739 |
| Capital charge | | 2,914 | 2,788 | 2,688 | 2,617 | 2,540 | 2,405 |
| EVA | | 614 | 1,103 | 1,664 | 2,341 | 3,179 | 4,334 |
| ΔEVA | | | 489 | 561 | 678 | 838 | 1,155 |
| Dynamic EI | | | 171 | 171 | 171 | 171 | 171 |
| Excess ΔEVA with dynamic EI | | | 318 | 390 | 507 | 667 | 983 |
| Future value of excess ΔEVA with dynamic EI | | | 318 | 733 | 1,300 | 2,072 | 3,224 |
| Capitalized future value of excess ΔEVA with dynamic EI | | | 4,225 | 9,754 | 17,283 | 27,561 | 42,882 |
| EVA return on capital | | 1.7% | 3.2% | 5.0% | 7.3% | 10.2% | 14.7% |
| Free cash flow (= NOPAT - Δcapital) | | | 5,123 | 5,230 | 5,905 | 7,382 | 7,334 |

**DYNAMIC EXPECTED IMPROVEMENT CALCULATIONS**

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| Market enterprise value | | 77,254 | 78,098 | 97,331 | 125,399 | 130,732 | 163,286 |
| Cost of capital | | 8.1% | 8.1% | 8.1% | 8.1% | 8.1% | 8.1% |
| Present value of current EVA | | 7,552 | 13,563 | 20,462 | 28,796 | 39,105 | 53,306 |
| Ending capital | 35,846 | 34,296 | 33,064 | 32,186 | 31,239 | 29,576 | 28,980 |
| Future growth value | | 35,407 | | | | | 81,000 |
| Required five year return on FGV | | 16,932 | | | | | 163,286 |
| Predicted five year change in FGV | | 1,083 | | | | | 35,837 |
| Required return on FGV from ΔEVA | | 15,849 | | | | | 199,122 |
| EVA- value multiple ([1 + (1/WACC)] x FV factor + ΔFGV) | | 16.73 | | | | | |
| EVA+ value multiple ([1 + (1/WACC)] x FV factor + ΔFGV) | | 92.66 | | | | | |
| Five year future value factor | | 5.88 | | | | | |
| Dynamic EI | | | 171 | 171 | 171 | 171 | 171 |

**CALCULATION OF EXPECTED ΔFUTURE GROWTH VALUE FROM NON-EVA FACTORS**

| DRIVERS OF FUTURE GROWTH VALUE CHANGE | Value | Capitalized After-Tax Value | Delta FGV Multiple | Contri-bution to Delta FGV |
|---|---|---|---|---|
| 5 year sales growth | 12,087 | | 0.11 | 1,277 |
| 5 year sales growth x avg EVA rtr | 975 | | 1.77 | 1,727 |
| 5 year R&D growth | 0 | 0 | 0.00 | 0 |
| 5 year advertising growth | -85 | -634 | 0.84 | -534 |
| 5 year EBITDA growth | 5,584 | 41,897 | 0.17 | 7,138 |
| Year[-5] FGV | 35,407 | | -0.49 | -17,296 |
| Year[-5] capital | 34,296 | | 0.26 | 8,772 |
| **Change in FGV** | | | | 1,083 |

| | |
|---|---|
| 5 year delta EVA-/WACC | -1.00 |
| 5 year delta EVA+/WACC | 0.15 |
| 5 year delta [EVA+/WACC] x ln(1 + sales growth) | 0.57 |

**EXCESS RETURN ANALYSIS**

| | |
|---|---|
| Ending market enterprise value | 163,286 |
| Future value of FCF | 35,837 |
| Expected investor wealth | -114,199 |
| Excess return | 84,923 |
| | |
| Change in FGV | 45,593 |
| Expected change in FGV (from non-EVA factors) | 1,083 |
| Expected change in FGV (from ΔEVA) | 2,468 |
| Unexpected change in FGV | 42,041 |
| Capitalized FV of excess ΔEVA | 42,882 |
| Excess return | 84,923 |

# Example calculation of five year operating return

| HOME DEPOT INC | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | |
|---|---|---|---|---|---|---|---|---|
| **OPERATING PERFORMANCE** | | | | | | | | |
| Revenue | | 71,656 | 72,639 | 73,022 | 76,337 | 79,214 | 83,743 | |
| R&D | | 0 | 0 | 0 | 0 | 0 | 0 | |
| Advertising | | 975 | 923 | 878 | 849 | 869 | 890 | |
| EBITDA | | 6,960 | 7,929 | 8,558 | 9,624 | 10,862 | 12,544 | |
| Tax rate | | 39% | 39% | 39% | 39% | 39% | 39% | |
| NOPAT | | 3,528 | 3,891 | 4,352 | 4,958 | 5,719 | 6,739 | |
| Capital charge | | 2,914 | 2,788 | 2,688 | 2,617 | 2,540 | 2,405 | |
| EVA | | 614 | 1,103 | 1,664 | 2,341 | 3,179 | 4,334 | |
| **OPERATING RETURN CALCULATIONS** | | | | | | | | |
| EVA return on beginning capital | | 1.7% | 3.2% | 5.0% | 7.3% | 10.2% | 14.7% | |
| Cost of capital | | | 8.1% | 8.1% | 8.1% | 8.1% | 8.1% | |
| EVA multiple (no fade) | | 12.3 | 12.3 | 12.3 | 12.3 | 12.3 | 12.3 | |
| Present value of current EVA | | 7,552 | 13,563 | 20,462 | 28,796 | 39,105 | 53,306 | A |
| Ending capital | 35,846 | 34,296 | 33,064 | 32,186 | 31,239 | 29,576 | 28,980 | B |
| Estimated FGV | | 17,556 | | | | | 33,103 | C |
| Operating value | | 59,404 | | | | | 115,389 | D = A + B + C |
| Cumulative future value of FCF | | | | | | | 35,837 | E |
| Operating wealth | | 59,404 | | | | | 151,226 | F = D + E |
| | | G | | | | | | = F/G - 1 |
| Free cash flow (= NOPAT - Δcapital) | | | 5,123 | 5,230 | 5,905 | 7,382 | 7,334 | |

**CALCULATION OF ESTIMATED CHANGE IN FUTURE GROWTH VALUE**

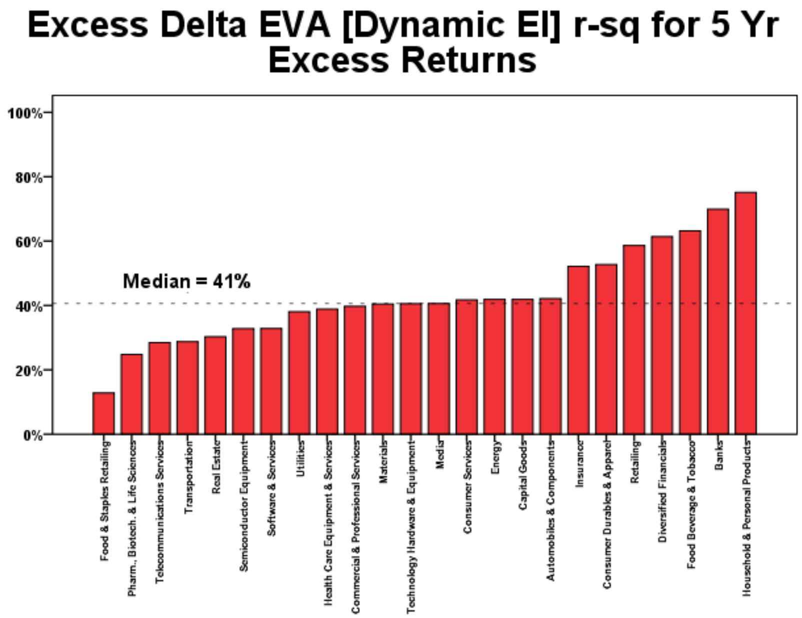
| DRIVERS OF FUTURE GROWTH VALUE CHANGE | Value | Capitalized After-Tax Value | Delta FGV Multiple | Contri-bution to Delta FGV |
|---|---|---|---|---|
| 5 year sales growth | 12,087 | | 0.10 | 1,155 |
| 5 year sales growth x avg EVA rtr | 975 | | 0.66 | 644 |
| 5 year R&D growth | 0 | 0 | 0.00 | 0 |
| 5 year advertising growth | -85 | -634 | 0.85 | -539 |
| 5 year EBITDA growth | 5,584 | 41,897 | 0.16 | 6,577 |
| 5 year EVA- change | 0 | 0 | -1.00 | 0 |
| 5 year EVA+ change | 3,720 | 45,754 | 0.18 | 8,298 |
| 5 year EVA+ chg x ln(1 + sls growth) | 580 | 7,132 | 0.62 | 4,398 |
| Year[-5] capital | 34,296 | | -0.15 | -4,987 |
| **Change in FGV** | | | | 15,547 |

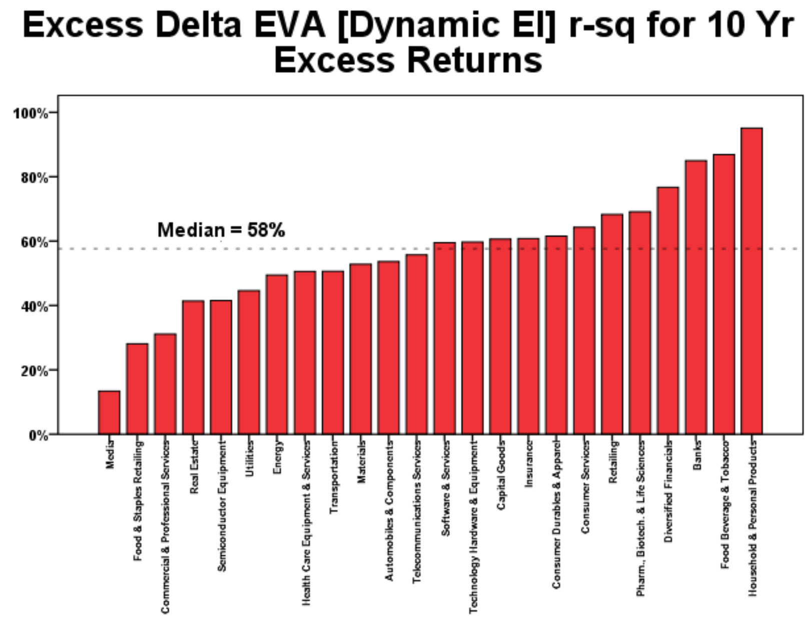
**OPERATING RETURN**

| | |
|---|---|
| Dollar operating return [= F - G] | 91,822 |
| Percentage operating return [= F/G - 1] | 154.6% |

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | | |
|---|---|---|---|---|---|---|---|---|---|
| Cost of capital | 8.13% | 8.13% | 8.13% | 8.13% | 8.13% | 8.13% | 8.13% | | **EXCESS OPERATING RETURN** |
| Expected operating wealth | | 59,404 | 64,234 | 69,456 | 75,103 | 81,210 | 87,812 | 63,414 | Dollar excess operating return [I = F - H] |
| | | | | | | | H | 72.2% | Percentage excess operating return [= I/H - 1] |

# Excess ΔEVA with dynamic EI explains 58% of 10 year excess return variance for the median industry group



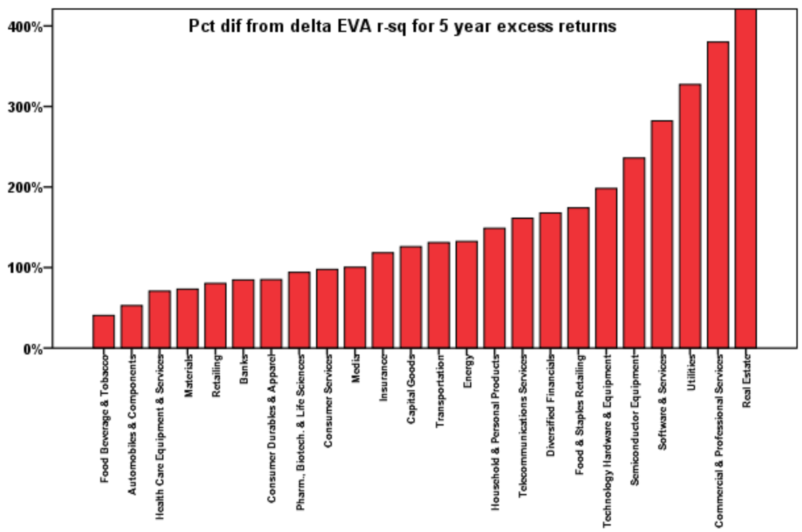

**The left panel shows, for S&P 1500 companies in each of the 24 GICS industry groups, the explanatory power of excess ΔEVA for five year excess returns ending in 1996-2015.**

**The right panel shows, for each of the 24 GICS industry groups, the explanatory power of excess ΔEVA for ten year excess returns.**

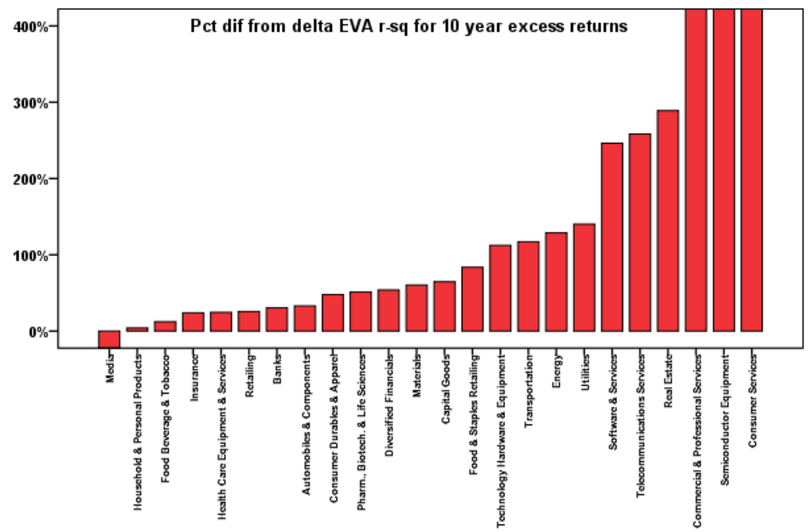
**For the median GICS industry group, ΔEVA alone explains 19% of the variation in 5 year excess returns and 31% of the variation in ten years excess return vs. 31% and 50% for ΔEBITDA.**

# ΔEVA with dynamic EI has much greater explanatory power than simple ΔEVA

R-sq of 5 Yr Excess Delta EVA [Dynamic EI] vs Delta EVA



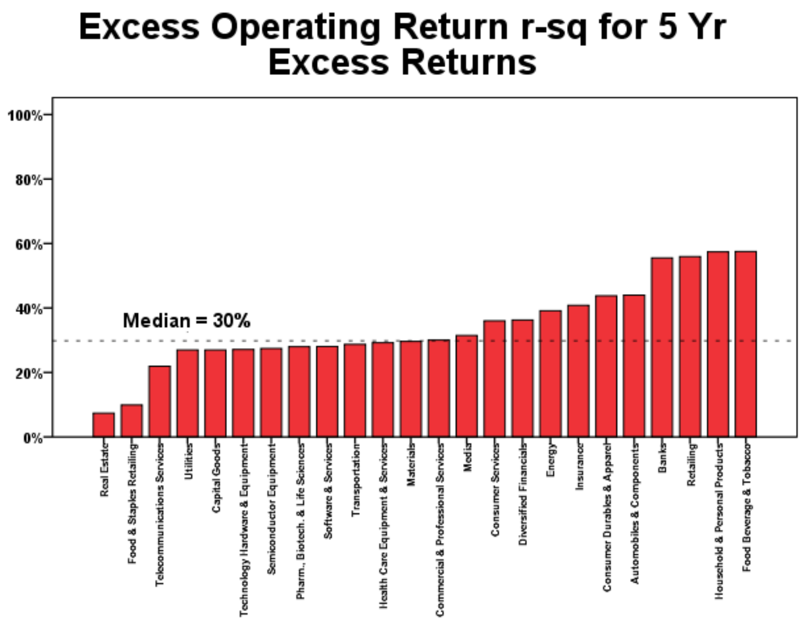

R-sq of 10 Yr Excess Delta EVA [Dynamic EI] vs Delta EVA

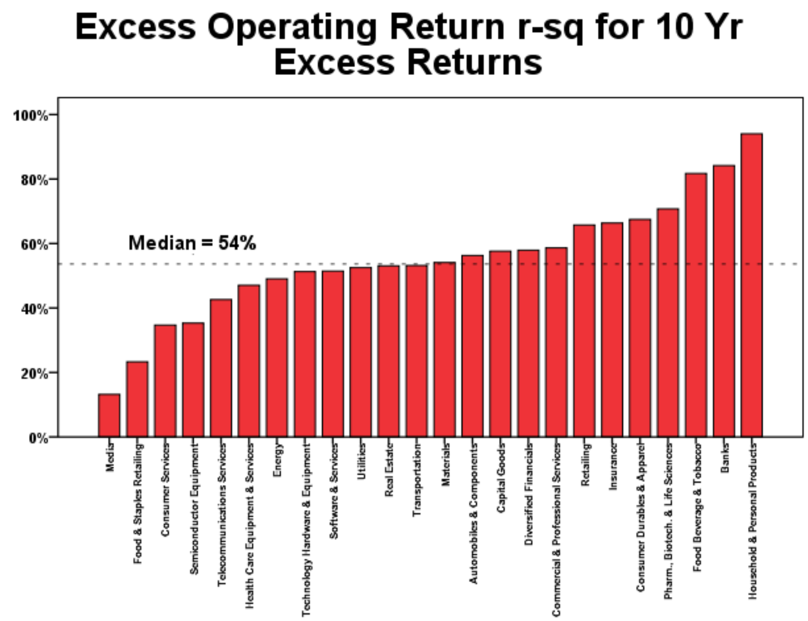



**The left panel shows, for S&P 1500 companies in each of the 24 GICS industry groups, the percent difference between the 5 year excess return variance explained by excess ΔEVA with dynamic EI and the variance explained by ΔEVA. The sample is five year periods ending in 1996-2015. The median value is +128%.**

**The right panel shows the same analysis using ten year returns. The median value is +63%.**

# Operating return explains 54% of 10 year excess return variance for the median industry group




**The left panel shows, for S&P 1500 companies in each of the 24 GICS industry groups, the explanatory power of excess operating return for five year excess returns ending in 1996-2015.**

**The right panel shows the same analysis using ten year returns.**

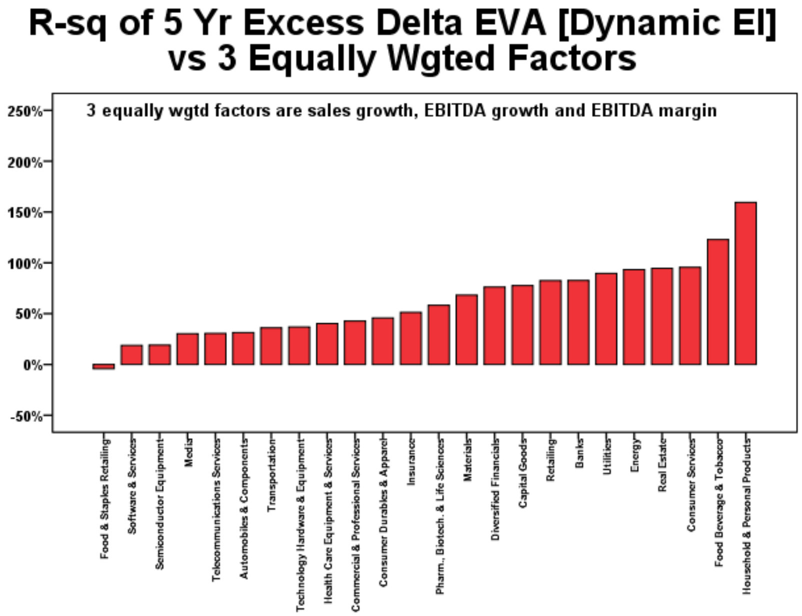
# EXCESS ΔEVA WITH DYNAMIC EI & OPERATING RETURN VS

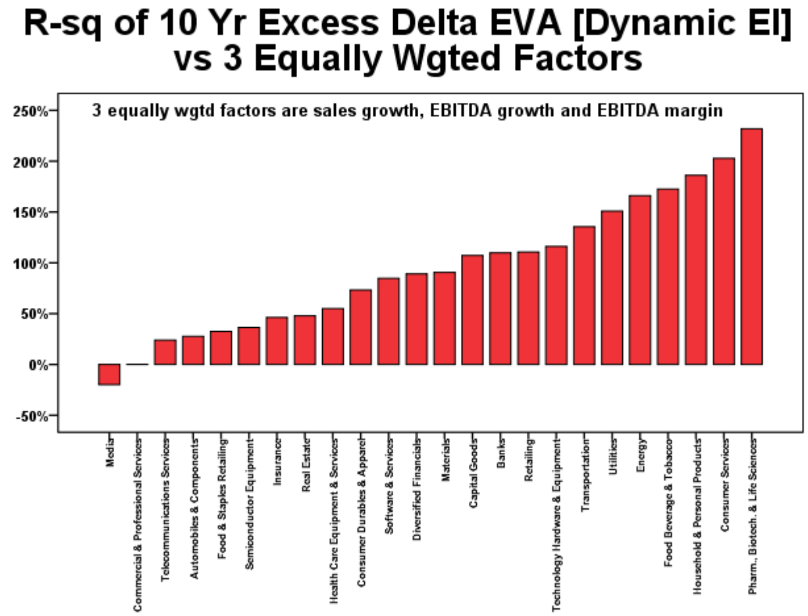
# EQUALLY WEIGHTED MEASURES & ΔEBITDA

# There are two common approaches to period measurement that don't try to isolate FGV

- EBITDA growth is widely used by equity analysts and others as a measure of period performance.
  - For comparison with EVA with dynamic EI and operating return, we will use ∆EBITDA per dollar of expected market enterprise value.
  - ∆EBITDA per dollar of beginning or expected market enterprise value is much more predictive of investor returns than the percentage growth rate in EBITDA.
- Equally weighted multiple measures are widely promoted by institutional investors and governance advisors and frequently used in corporate incentive plans.
  - Measures of sales growth, profit growth and capital or operating efficiency are commonly used.
  - For comparison with excess ∆EVA with dynamic EI and operating return, we will use an equally weighted average of sales growth percentile, EBITDA growth percentile and EBITDA margin percentile, all measured with respect to the GICS industry group.
- To assess the usefulness of the four measures, we will analyze each measure's ability to explain excess return variance across S&P 1500 companies.
  - Excess return = [ending market enterprise value + future value of free cash flow – expected market enterprise value]/expected market enterprise value.
  - Expected market enterprise value = beginning market enterprise value x $(1 + WACC)^n$.

# Excess ∆EVA has much more explanatory power than three equally weighted measures



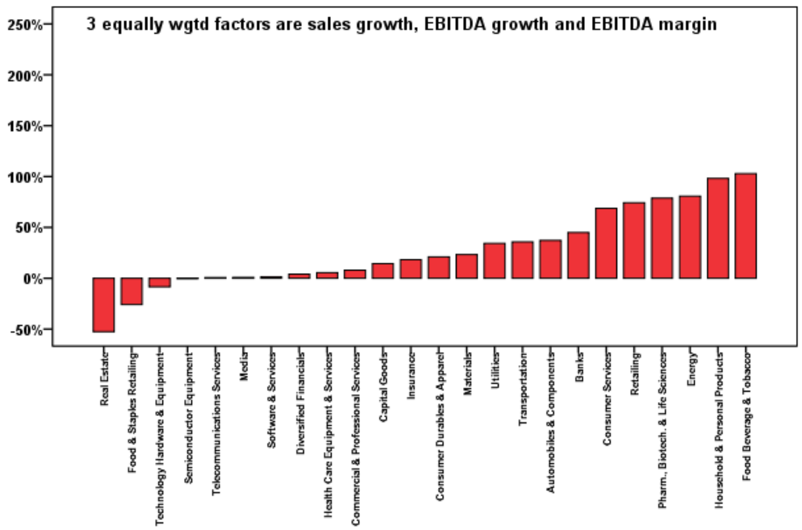

**The left panel shows, for S&P 1500 companies in each of the 24 GICS industry groups, the percent difference between the 5 year excess return variance explained by excess ∆EVA with dynamic EI and the variance explained by three equally weighted factors (i.e., ∆EBITDA, ∆sales and EBITDA margin on sales). The sample is five year periods ending in 1996-2015. The median percent difference is +55%.**

**The right panel shows the same analysis using ten year returns. The median percent difference is +90%.**

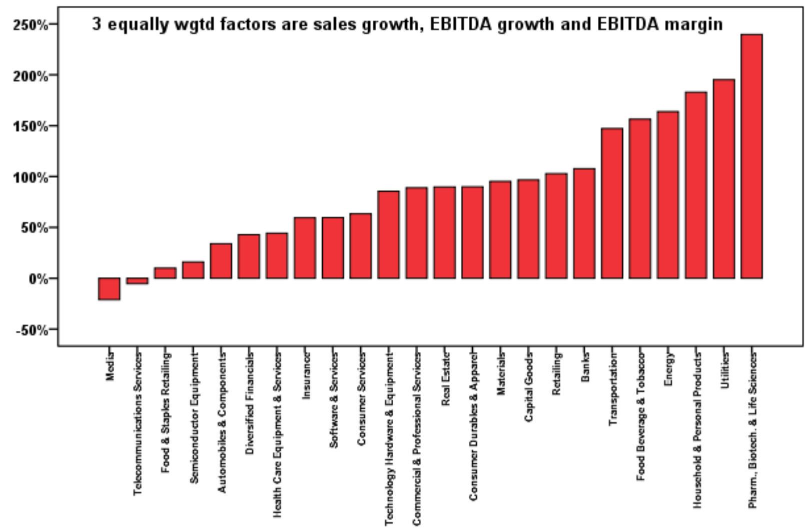
**The equally weighted measure is constructed by calculating percentile ranks for the three variables and then taking the average of the three percentile ranks. ∆EBITDA and ∆sales are standardized by expected market enterprise value (i.e., market enterprise value x (1 + WACC)^years) before calculating percentile ranks.**

# Excess operating return has more explanatory power than three equally weighted measures, particularly over longer time horizons

## R-sq of 5 Yr Excess Operating Return vs 3 Equally Wgted Factors




## R-sq of 10 Yr Excess Operating Return vs 3 Equally Wgted Factors



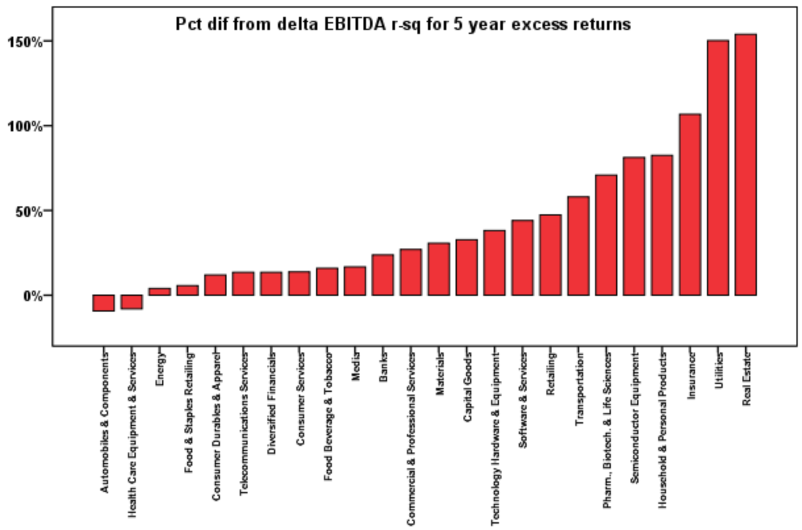

**The left panel shows, for S&P 1500 companies in each of the 24 GICS industry groups, the percent difference between the 5 year excess return variance explained by excess operating return and the variance explained by three equally weighted factors (i.e., ∆EBITDA, ∆sales and EBITDA margin on sales). The sample is five year periods ending in 1996-2015. The median percent difference is +20%.**

**The right panel shows the same analysis using ten year returns. The median percent difference is +90%.**

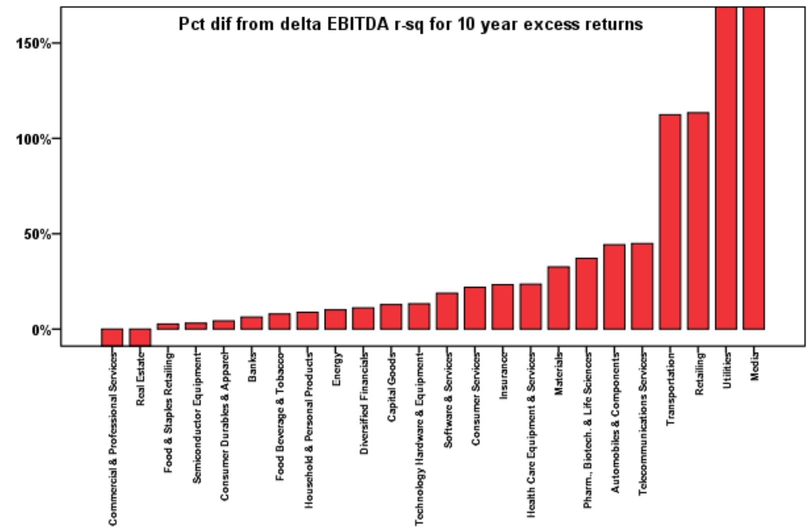
**The equally weighted measure is constructed by calculating percentile ranks for the three variables and then taking the average of the three percentile ranks. ∆EBITDA and ∆sales are standardized by expected market enterprise value (i.e., market enterprise value x (1 + WACC)^years) before calculating percentile ranks.**

# Excess ∆EVA with dynamic EI has much greater explanatory power than ∆EBITDA

## R-sq of 5 Yr Excess Delta EVA [Dynamic EI] vs Delta EBITDA




## R-sq of 10 Yr Excess Delta EVA [Dynamic EI] vs Delta EBITDA

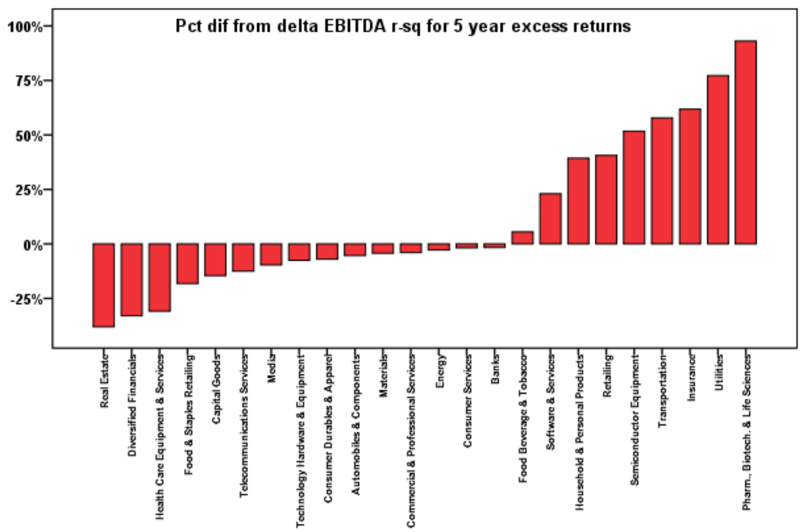



**The left panel shows, for S&P 1500 companies in each of the 24 GICS industry groups, the percent difference between the 5 year excess return variance explained by excess ∆EVA with dynamic EI and the variance explained by ∆EBITDA. The sample is five year periods ending in 1996-2015. The median value is +29%.**

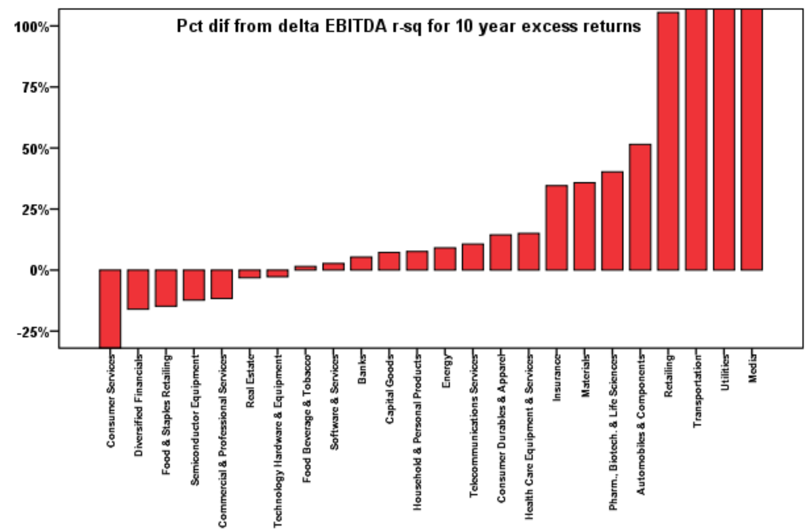
**The right panel shows the same analysis using ten year returns. The median value is +16%.**

# Operating return has greater explanatory power than ∆EBITDA in 9 of 24 industry groups over 5 years and in 17 of 24 over ten years

## R-sq of 5 Yr Excess Operating Return vs Delta EBITDA




## R-sq of 10 Yr Excess Operating Return vs Delta EBITDA




**The left panel shows, for S&P 1500 companies in each of the 24 GICS industry groups, the percent difference between the 5 year excess return variance explained by excess ∆EVA with dynamic EI and the variance explained by ∆EBITDA. The sample is five year periods ending in 1996-2015. The median value is -3%.**

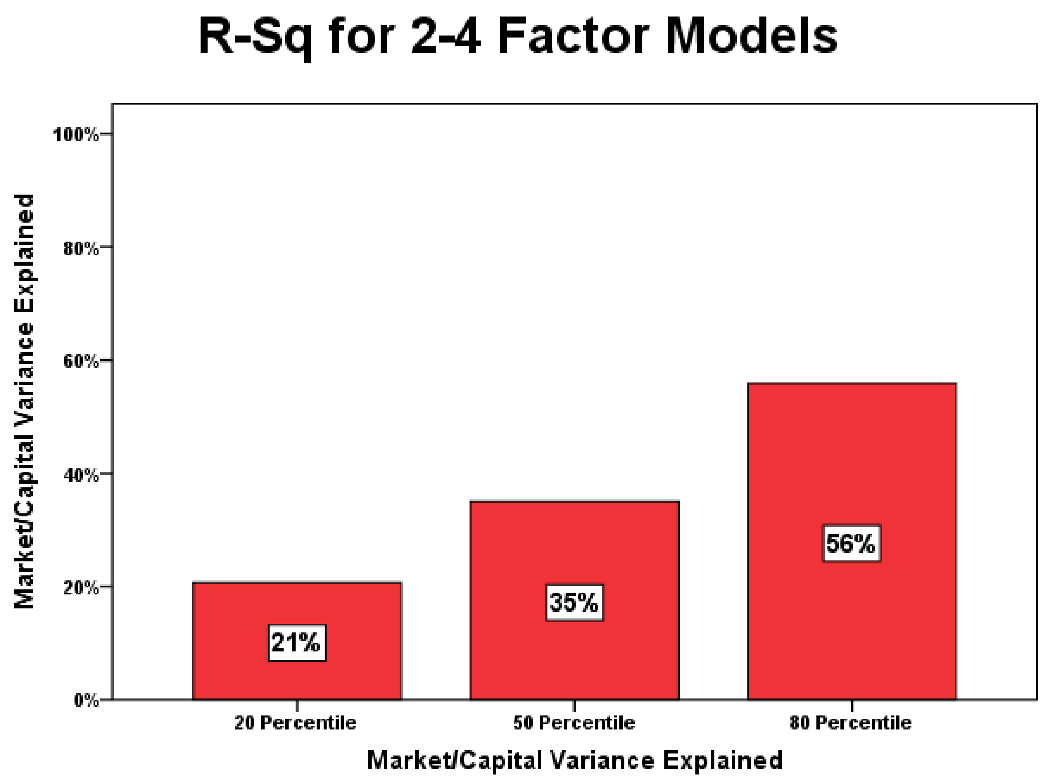
**The right panel shows the same analysis using ten year returns. The median value is +8%.**

# OPERATING RETURN USING A SIMPLER MODEL OF OPERATING ENTERPRISE VALUE

# This section explains a simpler, but less accurate, approach to measuring operating return

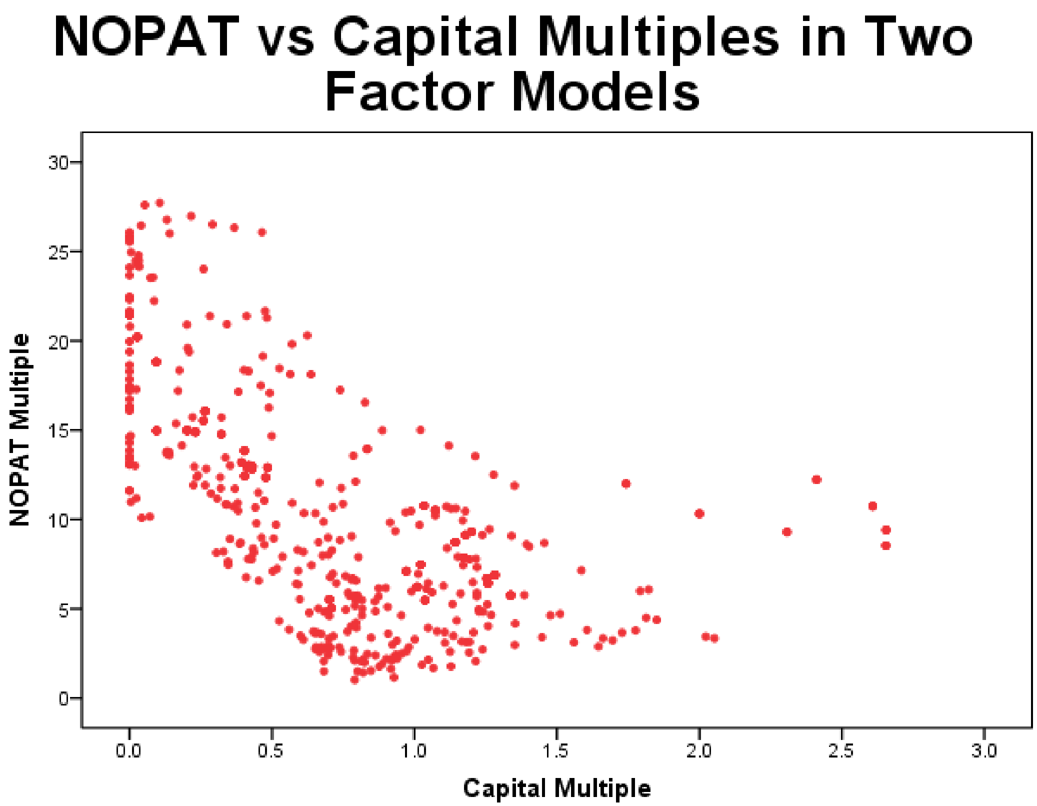
- Develop a formula for operating enterprise value using four variables: capital, NOPAT, EVA and sales growth.  Operating enterprise value =
  - Capital multiple x capital
  - NOPAT multiple x NOPAT
  - [EVA+ x sales growth] multiple x EVA+ x sales growth (EVA+ = EVA if positive, 0 otherwise)
  - Sales growth multiple x capital x sales growth
- $ operating return = Δoperating enterprise value + future value of free cash flow.
  - Operating enterprise value is calculated at the beginning and end of the measurement period using the same valuation multiples.
  - Percent operating return = dollar operating return/beginning operating value.
  - Percent excess operating return = (dollar operating return – expected dollar operating return)/expected investor wealth.
- Multiples are developed using ten years of historical data for the industry.
  - NOPAT, EVA x sales growth and capital x sales growth are only used if their multiples are positive and statistically significant at conventional 5% levels.
  - We use an industry model if there are statistically significant variables at the industry level (34% of all models) and a sector model if there are no statistically significant variables at the industry level (57% of all models).
  - In 7% of the 1,234 models (there is a separate model for each company/year in the Frydman Saks database), no variable is statistically significant at the industry or sector level, so we use the mean market/capital ratio.

# The median 1-4 factor model explains 35% of the variance in market/capital models



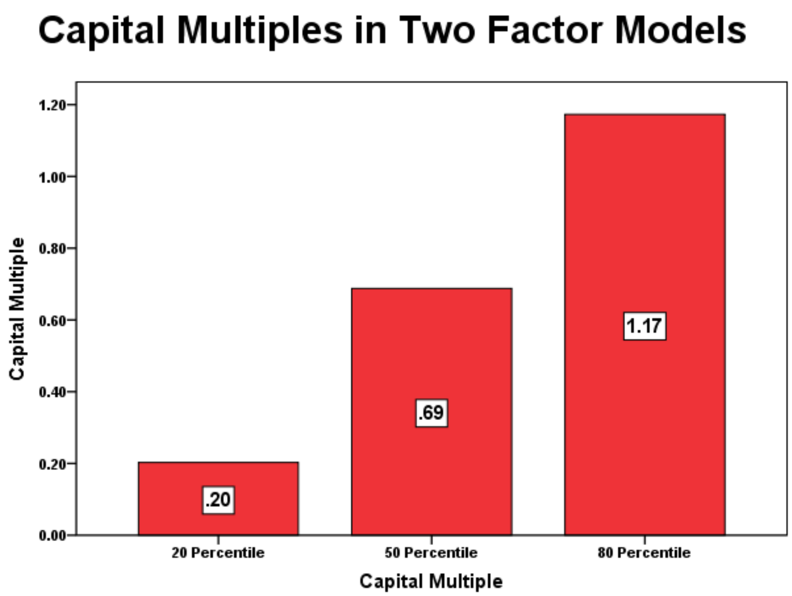

**The statistics reported above are for industry/sector models developed for the 101 companies in the Frydman/Saks database using data for the years 1950-2013. The Frydman/Saks database provides top management compensation data for the years 1936-1991 (which we supplement with data from Execucomp for the years 1992-2013). It was developed by Professor Carola Frydman of Boston University and Raven Saks of the Federal Reserve.**

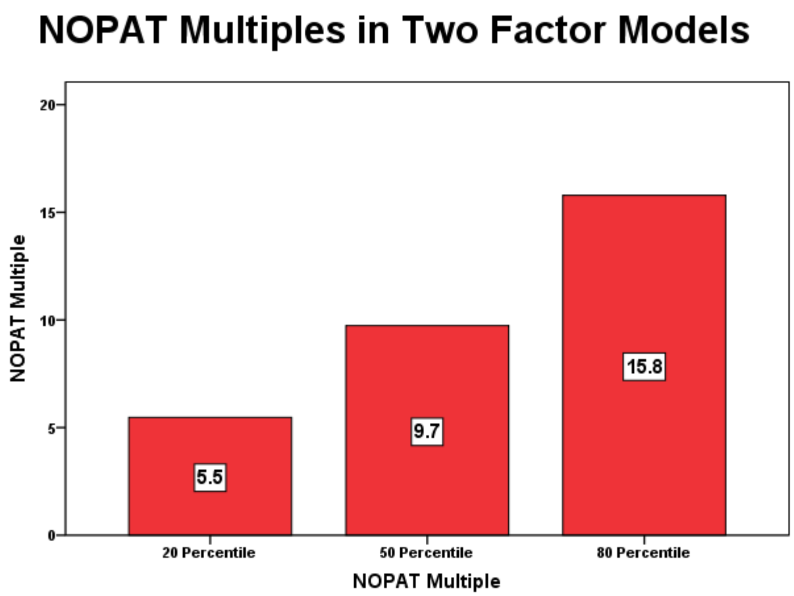
# NOPAT vs capital multiples in the two factor models




**This scatterplot shows that the difference from the average NOPAT multiple tends to offset the difference from the average capital multiple. In other words, when the NOPAT multiple is above average, the capital multiple tends to be below average and vice versa.**

# Capital and NOPAT multiples in two factor models



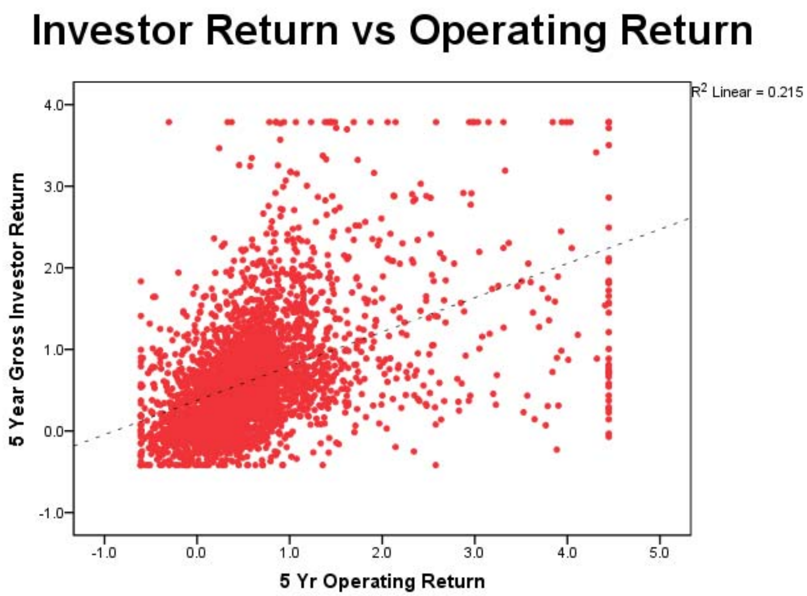



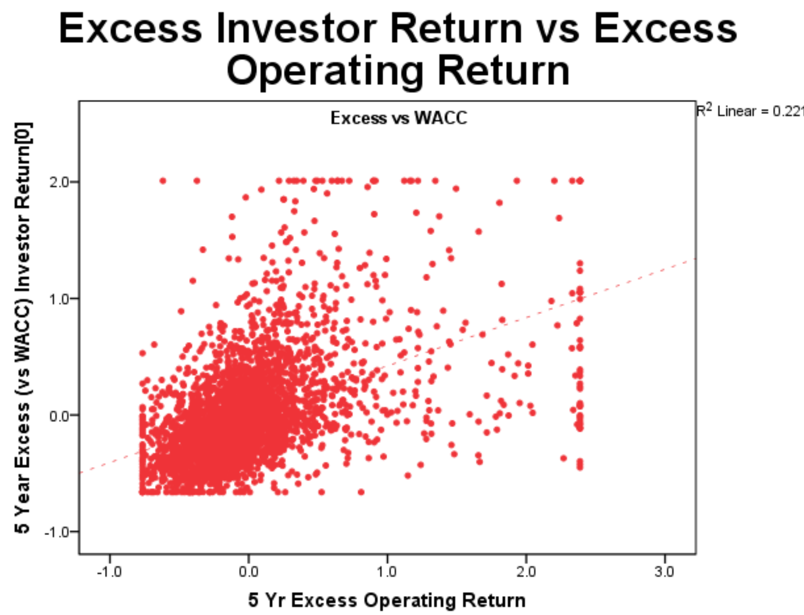

**The sample is the companies in the augmented Frydman Saks database using five year periods ending in 1954-2013.**

# Companies in the Frydman Saks database

3M CO
AETNA INC
ALTRIA GROUP INC
AMERICAN EXPRESS CO
AMERICAN FINANCIAL GROUP INC
AMERICAN INTERNATIONAL GROUP
AMERICAN MOTORS CORP
AMERICAN STORES CO
AMOCO CORP
ANACONDA CO
ARMCO INC
AT&T CORP
ATLANTIC RICHFIELD CO
BEAM INC
BELLSOUTH CORP
BESTFOODS
BETHLEHEM STEEL CORP
BOEING CO
CBS CORP -OLD
CHASE MANHATTAN CORP -OLD
CHESSIE SYSTEM INC
CHEVRON CORP
CHIQUITA BRANDS INTL INC
CHRYSLER CORP
CIGNA CORP
CITICORP
CITIES SERVICE CO
CITIGROUP GLOBAL MKTS HLDGS
CITIGROUP INC
COCA-COLA CO
COMMONWEALTH EDISON CO
CONAGRA FOODS INC
CONOCOPHILLIPS
CONSOLIDATED EDISON INC
CONTINENTAL GROUP INC
CSX CORP
DIGITAL EQUIPMENT
DOW CHEMICAL
DTE ENERGY CO
DU PONT (E I) DE NEMOURS
EASTMAN KODAK CO
ENRON CORP
EXXON MOBIL CORP
FIRESTONE TIRE & RUBBER CO
FOOT LOCKER INC
FORD MOTOR CO
GENERAL DYNAMICS CORP
GENERAL ELECTRIC CO
GENERAL FOODS CORP
GENERAL MOTORS CO
GEORGIA-PACIFIC CORP
GOODYEAR TIRE & RUBBER CO
GTE CORP
GULF CORP
HEWLETT-PACKARD CO
HONEYWELL INTERNATIONAL INC
INTL BUSINESS MACHINES CORP
INTL PAPER CO
ITT CORP
KENNECOTT CORP
KRAFT GENERAL FOODS
KRAFT INC -OLD
KROGER CO
LOCKHEED MARTIN CORP
LTV CORP
MARATHON OIL CORP
MARCOR INC
MCDONNELL DOUGLAS CORP
MOBIL CORP
MOMENTIVE SPCLTY CHEMICALS
NABISCO GROUP HOLDINGS CORP
NAVISTAR INTERNATIONAL CORP
NORFOLK SOUTHERN CORP
OCCIDENTAL PETROLEUM CORP
OWENS-ILLINOIS INC
PARKE DAVIS & CO
PENNEY (J C) CO
PEPSICO INC
PG&E CORP
PHELPS DODGE CORP
PRIMERICA INC
PROCTER & GAMBLE CO
RCA CORP
REPUBLIC STEEL CORP
ROCKWELL AUTOMATION
RYERSON HOLDING CORP
SAFEWAY INC
SEARS HOLDINGS CORP
SEARS ROEBUCK & CO
SHELL OIL CO
SPERRY CORP
TARGET CORP
TENNECO INC
TEXACO INC
UNION CARBIDE CORP
UNIROYAL INC
UNISYS CORP
UNITED TECHNOLOGIES CORP
VECTOR GROUP LTD
WAL-MART STORES INC
WARNER-LAMBERT CO
WRIGLEY (WM) JR CO

# Operating return explains 22% of the variation in five year investor returns



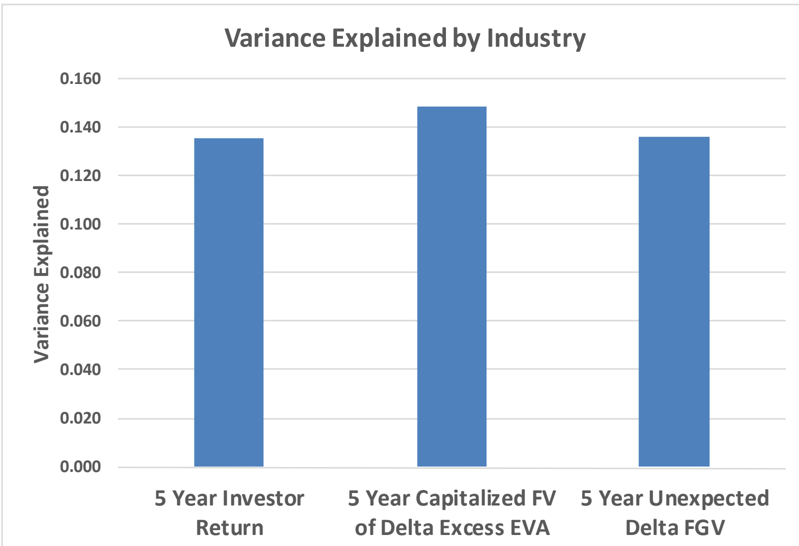

**The sample is the companies in the augmented Frydman Saks database using five year periods ending in 1954-2013.**

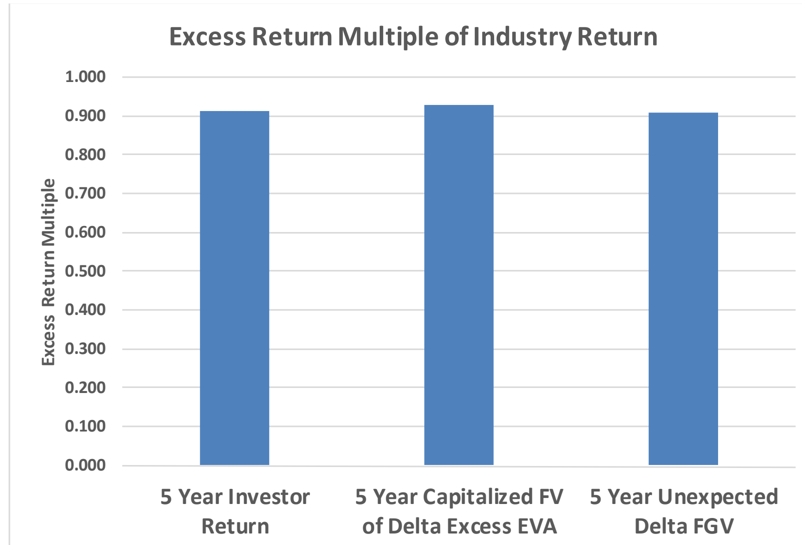
# ISOLATING MANAGEMENT’S CONTRIBUTION TO OPERATING PERFORMANCE

# There is a common belief that operating performance is controllable, but market performance is not

- There is a common belief that management controls operating performance, but stock market performance is beyond management control.
  - The National Association of Corporate Directors says that compensation "committees should link pay to desired outcomes that the CEO and senior management team can affect, rather than to stock price alone." (Report of the Blue Ribbon Commission on the Compensation Committee, 2015, p. 6).
  - A partner of a leading compensation consulting firm recently wrote that "executives cannot control TSR directly, and it generally makes more sense to link pay to the strategic priorities of the business that executives can control, like revenue growth, innovation, margin management and returns on investment". Semler Brossy managing director John Borneman, "Executive Pay: Creating Real Alignment with Shareholders", *Workspan*, January 2016, p. 10.
- The graphs on the following page show that industry affects excess ∆EVA as much and as strongly as it affects ∆FGV and investor return.
- The second following page shows that industry explains less investor return variance over longer time horizons, but that industry betas do not decline with longer time horizons.

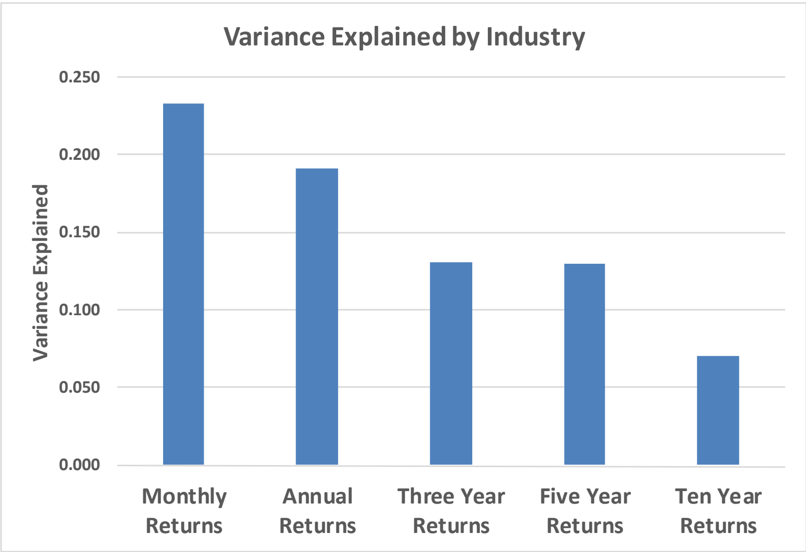
# Industry affects excess ΔEVA as much and as strongly as ΔFGV

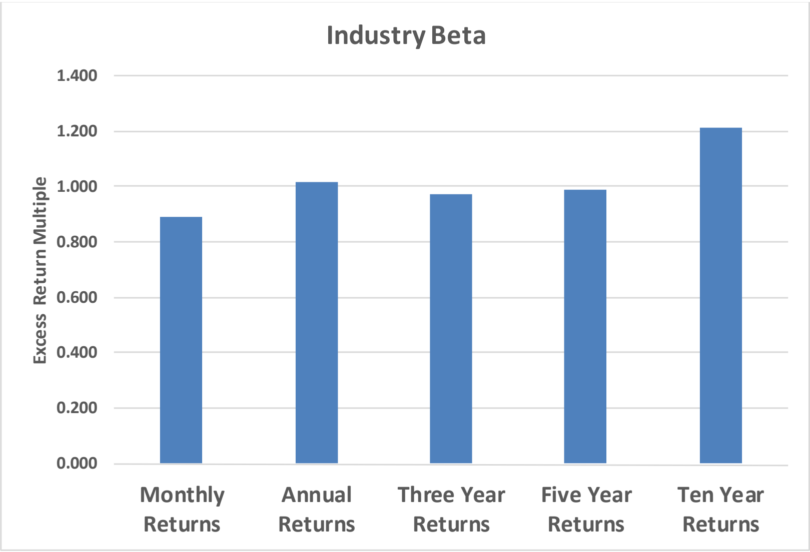



Notes: based on 22,787 five periods ending in 1996-2015 for S&P 1500 companies. Industry performance for a company is the average performance of the company's GICS industry group, excluding the company, for the same five year period.

# Industry explains less return variance over longer horizons, but industry betas do not decline




Notes: based on periods ending in 1996-2015 for S&P 1500 companies. Industry is GICS industry group. Returns are shareholder returns, not investor returns.

# Summary

- Operating performance measurement has two key objectives:
  - Increasing shareholder value, which means that performance measures need to tie to discounted cash flow value.
  - Isolating and rewarding management contribution to value, which means that performance measures need to be decomposed into the component due to management and the component due to industry factors.
- The "EVA math" is the key to understanding how operating performance links to discounted cash flow value.
  - The EVA math highlights the importance of future growth value ("FGV") and shows why non-EVA measures can be important: they are better proxies for $\Delta$FGV than $\Delta$EVA.
  - Combining EVA with empirical models of $\Delta$FGV significantly improves operating performance measurement, i.e., makes the operating performance measure a better proxy for excess return. This can be done in two ways: excess $\Delta$EVA with dynamic EI and operating return".
- Better operating performance measures don't eliminate the need to isolate management's contribution to value because industry affects operating performance, not just market performance.
- The two operating performance measures can be used to monitor strategy implementation, communicate with analysts and governance advisors and improve executive pay.