Preview of Advancing Preconstruction & Estimating Presentation on Construction Inflation & Forecasting 5-22-19

Causes of Construction Inflation

Common Causes of Inflation include

Labor Availability – Wage Rate - Productivity

Material Availability – Demand - Cost

Amount of Work has as much or more impact on inflation than labor & material

Work in Backlog generates Spending

Bid Activity impacts Margins

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The level of construction activity in a metropolitan area has a significant impact on labor availability and bid activity. Margins tend to increase when work is plentiful.

Input Cost Indices

LABOR AND MATERIAL INPUTS
- ENR BCI, ENR CCI
- RS Means

MATERIAL ONLY
- Producer Price Index (PPI)

OTHER non-construction indices
- Consumer Price Index (CPI)
- S&P / Case Shiller Home Price Index

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No Input cost index accounts for changes in margins. Some don't account for changes in labor. Input indices should not be used to forecast inflated final cost of a building.

PPI Input Costs

2018 Producer Price Index 12 month change
- Inputs to all construction +6% (at producer level)

- Ready mix conc +3.2%, Concrete contractors +6%
- Asphalt roofing products +10%, Roofing contractors +1%

- Steel Pipe and Tube +22%, Fab Structural Metal +12%,
- Fab Structural Metal for Bridges +18%
- Aluminum shapes +8%, Ornamental metal +10%
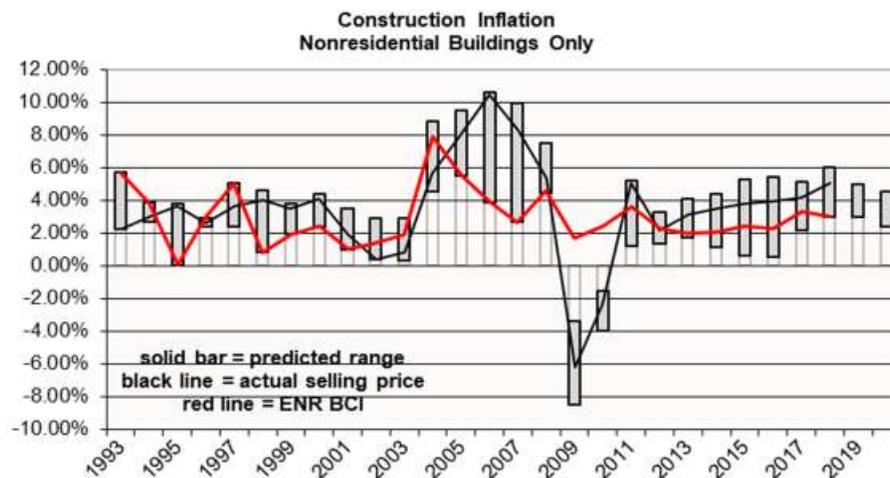- Sheet metal products +8%

PPI contractors and buildings indices attempt to account for all final cost. All other PPI indices are input costs at various levels of input. Some of them represent pre-wholesale cost changes.

Construction Inflation Indices

This compares nonresidential final cost indices to an input index. Since 2011, if you inflated cost using ENR-BCI (red line) you would have undercut real cost by 12% compared to final cost index (black line).

Final Cost Indices

NONRESIDENTIAL BUILDINGS
- Construction Analytics Building Cost Index
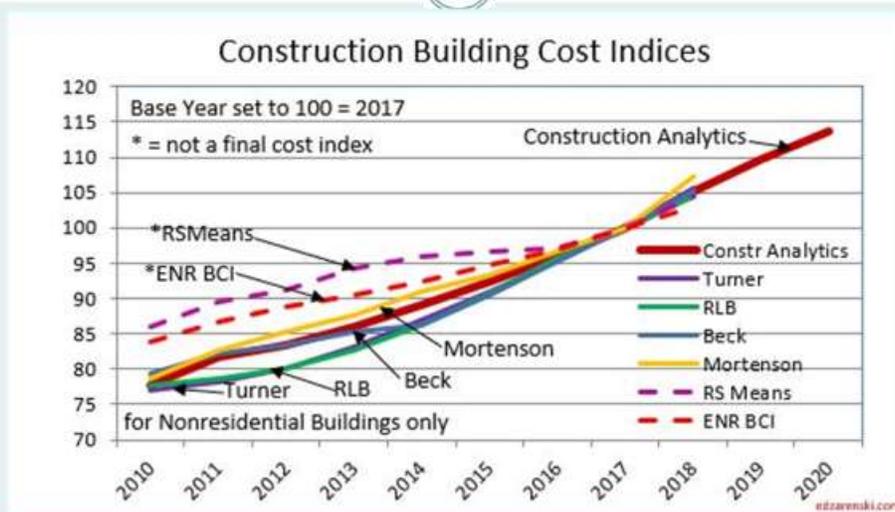- Turner, Rider Levett Bucknall, Beck, Mortenson

INFRASTRUCTURE
- I H S Power Plant, Pipeline, Refinery Costs
- National Highway Construction Cost Index

RESIDENTIAL
- U S Census Constant Quality Single Family House

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Final Cost Indices vs Input Indices

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Notice in this plot Input indices ENR and RSMeans for 2010 to 2017 increased only from 85 to 100, 17% growth. Final cost indices increased from 77 to 100, 30% growth.

Construction Forecast Cash Flow

Starting Backlog + New Starts creates Cash Flow

- **Nonres Bldgs** Spending **70-75% from Starting Backlog**
- **NonBldg Infra** Spending **75-80% from Starting Backlog**
- **Residential** Spending **30% Bklg 70% from New Starts**
- Cash Flow = Spending = Revenue

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For nonresidential work we have 70% to 80% of expected spending this year already in backlog as the year began. For new starts within the year, approximately 20% of the spending occurs in the year started, 50% in the next year, 25% in the third year. This means nonresidential spending growth in 2019 is still being affected by starts from 2016.

Forecasting – Starts vs Spending

STARTS & SPENDING $ in billions	2014	2015	2016	2017	2018	2019	2020
OFFICE starts	28.8	31.1	40.8	41.8	46.3	44.5	
growth starts yr/yr	35%	8%	31%	2%	11%	-4%	
spend actual $	46.6	55.5	67.6	66.9	73.8	75.9	80.6
growth spending yr/yr	23%	19%	22%	-1%	10%	3%	6%
starts vs actual cashflow $	50%	48%	59%	57%	60%	55%	
TRANSPORTATION starts	13.6	14.0	18.8	41.6	29.9	30.4	
growth starts yr/yr	14%	3%	34%	121%	-28%	2%	
spend actual $	42.0	44.8	43.3	45.2	53.8	53.8	63.3
growth spending yr/yr	7%	7%	-4%	4%	19%	0%	18%
starts vs actual cashflow $	31%	31%	39%	78%	52%	49%	

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Large increases in starts could be a change in share of market captured. Starts share of market must be considered before using starts to forecast future spending.

Construction Spending Forecast

U.S. Total Construction Spending Summary

$ in billions / % growth vs prior yr	Actual 2017		Forecast 2018		Forecast 2019		Forecast 2020	
Total Construction	1246	5%	1311	5.2%	1350	3.0%	1439	6.6%
Residential	532	12%	557	5%	574	3%	595	4%
Nonresidential Buildings	419	1%	439	5%	439	0%	481	9%
Nonbuilding Infrastructure	295	-3%	315	7%	337	7%	364	8%
Educational	91.2	1%	95.3	4%	94.4	-1%	103.0	9%
Healthcare	41.9	4%	42.0	0%	41.0	-2%	47.1	15%
Amusement / Recreation	24.9	7%	27.2	10%	29.5	8%	31.5	7%
Commercial / Retail	87.7	12%	90.3	3%	89.4	-1%	91.5	2%
Lodging	28.7	6%	32.0	12%	32.5	1%	34.6	7%
Office	66.9	-1%	73.8	10%	75.9	3%	80.6	6%
Manufacturing	66.4	-13%	66.0	-1%	64.4	-2%	80.4	25%
Other Nonres Bldgs	11.7	-1%	12.2	5%	12.0	-2%	12.0	0%
Power	96.5	-5%	101.3	5%	103.5	2%	99.2	-4%
Highway / Bridge / Street	89.1	-4%	91.9	3%	106.0	15%	118.0	11%
Transportation / Air / Rail	45.2	4%	53.8	19%	53.8	0%	63.3	18%
Sewer / Water / Conservation	39.4	-10%	43.2	10%	49.6	15%	59.0	19%
Communication	24.8	12%	24.8	0%	24.0	-3%	24.1	0%

Forecast includes U.S. Census February 2019 year-to-date spending
Forecast includes Dodge construction starts data as of 3-22-19

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2019 spending growth forecast at +3.0%, but Inflation is predicted to average 4.3%. Real Volume declines by 1.3%. Major growth in Highway, Public Works Amusement/Recreation.
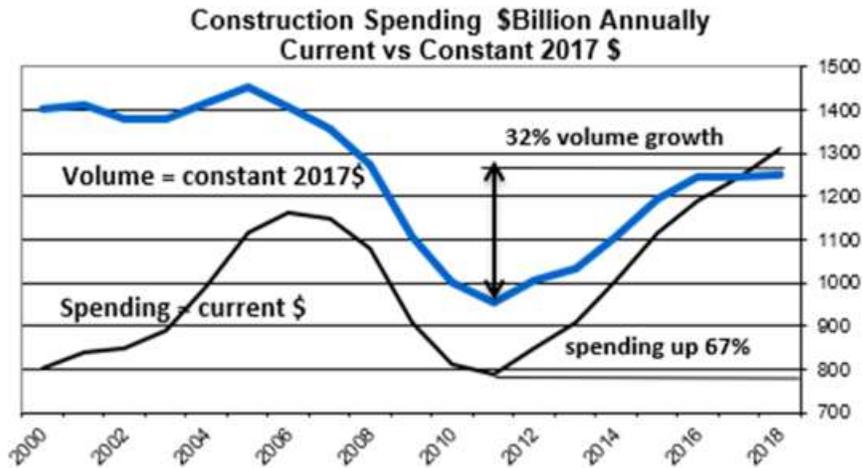
Forecasting Construction Outlook

Common Oversights in Forecasting

- Misusing Starts Data / Backlog Data
- Not Adjusting History for Inflation
- Not Using Appropriate Inflation Indices
- Ignoring Productivity
- Considering Revenue = Volume
- Staffing to meet Revenue

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Business planning choices made on data unadjusted could lead to improper business decisions.

Construction Forecasting - Volume

Construction Spending $Billion Annually
Current vs Constant 2017 $

Real Volume is still 15% below previous peak high in 2005. Volume is not growing as fast as spending (or Revenue) would indicate.

Sources of Construction Forecasting Data

Current $ Spending = Revenue

Current $ Spending is not adjusted for inflation

Constant $ Spending = Volume

Constant $ Spending = adjusted for inflation

Volume dictates Staffing Needs

Prior to recession, in 2003-2007, spending was increasing 10%+/year. Jobs increased +15% in 3 years. But inflation was 8%+/year. Real volume increased only 2% in 3 years. High rate of spending led to excess jobs growth.

Forecasting Construction Data – Jobs All

Construction added 1.6 million jobs in 6yrs 2013-2018, the fastest rate of jobs growth since 1995-2000.

29% growth in jobs but only 25% growth in real volume after inflation.