Literature review on bottom-up approaches

Review of 2019 issues of renown journals in finance

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Baruch College class presentation
Top-down (return analysis and down)

• Start from a market wide scope such as equity market, derivative, or the market’s “view”
  • Securities
  • Options, futures, forwards
  • Indices (or portfolio, institutional holdings)
  • Analysts, institutions, sentiments, attentions

• Provide implications to the participants of the underlying real assets at the firm level
  • Owners, investors
  • Managers
  • Employees
Bottom-up (firm level to valuation)

• Start from the firm-level fundamentals and/or characteristics in terms of:
  • Model
  • Data/empirical analysis

• Give general implications for the audience of:
  • The market (i.e. equity return), hence valuation
  • Firm/government policy
Literature review

• Papers on “Bottom-up” approach

• JF 2019 (2018) issues
• JFE 2019 issues
• JFQA 2019 issues

• Less RFS because of limited access
• JFQA also some limited access
Highlights of the overall topics of the bottom-up approach

• Starting from specific firm characteristics (production capacity, board diversity, labor cost, etc.) to asset pricing implications

• Topics on equity volatility

• Topics on “real options approach” in asset pricing and corporate finance (investment capacity)

• Applying tools from other areas of economics, as well as other academic fields

• Interesting identification strategies and depicting the specific channel which the effect the paper documents is being delivered through
Highlights of the overall aspects of the bottom-up approach

• The Journal of Finance papers for the bottom-up approach:
  • Results MOSTLY lead to a general asset pricing/economic implications
  • The starting point (or the baseline topic) is not “general” which are mentioned in textbooks
  • Instead, the baseline topics are very specific.
    • In general, at least two of the following are satisfied:
      1. Very specific, so a new model (theoretical) or tool (empirical) is necessary
      2. Very specific, so it relates two or more conventional concepts that were not explored prior to the paper.
      3. Very specific, such that the paper comes up with an identification strategy
      4. Very specific, in a way that it shows through which channel/mechanism their result is driven
Central economic themes of the reviewed articles

• Labor economics
  1. Carpenter, Stanton, and Wallace (JF, June 2019)
  2. Giannetti and Zhao (JFQA, June 2019)
  3. Donangelo, Gourio, Kehrig, and Palacios (JFE 2019)
  4. Chang and Hong (JFE 2019)
  5. Sun and Xiaolan (JFE 2019)
  6. Lie and Que (JFQA 2019)
  7. Stopler and Walter (RFS 2019)
  8. Green, Huang, Wen, and Zhou (JFE 2019)

• Production (function) analysis
  1. Herskovic (JF August 2018)
  2. Artez and Pope (JF June 2018)

• Note that these are the theme, not the main focus of the papers.
  • For instance, a paper could have a labor economics theme, but arrive at implications for tradeoff theory of capital structure or factor models of asset pricing
  • Carvalho (2018) has asset or investment characteristic theme, but its main implications are on financial frictions and asset pricing
Central economic themes of the reviewed articles

• Asset or investment characteristics
  1. Carvalho (JF June 2018)
  2. Sun and Xiaolan (JFE 2019)

• (+/-) Externalities
  1. Bernstein, Colonnelli, Giroud, and Iverson (JFE 2019)

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Central economic themes of the reviewed articles

• Network, connectedness, and spillovers
  1. Herskovic (JF August 2018)
  3. Smajlbegovic (JFQA 2019)
  4. Stopler and Walter (RFS 2019)

• Behavioral economics
  1. Jiang, Lee, Martin, and Zhou (JFE 2019)

• Note that these are the theme, not the main focus of the papers.
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Reviews
Carpenter, Stanton, and Wallace (JF, June 2019) – 1,2

• Key idea/motivation
  • Employee stock options are significant (labor) costs for companies.
  • Yet, existing models are inadequate in evaluating them.
  • BSM and its variants allow unlimited hedging, while employees are unable to do so. In addition, BSM is subject to errors due to firm characteristics
Carpenter, Stanton, and Wallace (JF, June 2019)

• Methodology/approach
  • $O_t =$ \textit{option value} at time t, or the cost of option to a firm

$$
O_t = \sum_{k=1}^{n} \alpha_k E^*_t \left\{ \int_{t \vee t_k}^{T} e^{-r(t-t')} (S_{t'} - K)^+ (G_{t'} + \lambda) e^{-\int_{t'}^{T} (G_s + \lambda) ds} dt' + e^{-r(T-t')} e^{-\int_{t}^{T} (G_s + \lambda) ds} (S_T - K)^+ \right\}.
$$

• $G_{t'}$ The conditional rate of voluntary exercise (logistic cdf)
  • $X_{ijt}$: price to strike ratio, volatility, dividend in next two weeks, years to expiration, stock correlation to the market, Black-Scholes employee option risk, Black-Scholes employee option wealth, vesting date, top 10 option holder dummy, executive dummy, male dummy, age (unique data from Society of Actuaries)

• Given $G_{t'}$ and $\lambda$, authors use Monte Carlo to estimate $O_t$ ($\lambda=0.10$ from data)
Firm level (starting point):
  • The paper starts from viewing employee stock option (ESO) exercise data

Provided evidence (findings):
  • The determinants of the likelihood of exercise (logistic regression/classification)
  • Evaluation of the option value using unique approach/dataset (Monte Carlo)
  • Evidence on overstatement of ESO value by the Black-Scholes model (comparison)

General implication (conclusion):
  • Employee stock option exercise affects firm value through cost, hence 
    managers and investors should care more about stock options
    • Increasing vesting frequency from annual to monthly reduces option value by 11% to 16% (to employees)
    • Men exercise faster (cheap labor)
    • Top employees slower (expensive labor)
Carvalho (JF June 2018) – 1,2,3

• Key idea/motivation
  • The idiosyncratic equity volatility is important, but is less emphasized in the literature
  • In an imperfect market, financing frictions of firms (or, financing constraints) should be reflected somehow in equity since it represents the degree of accessibility to growth options
  • (empirical) Real estate prices of which a firm own has negative relationship with its financing constraints
Carvalho (JF June 2018)

• Methodology/approach
  • IV estimation (controls in 2nd stage: industry dummy, size, age, cash flow, all controls at time t-5, and others)
    • An exogenous shock that will affect real estate prices, but not equity volatility directly
  • Exog. shock: Land availability accounting for regional factors. Affects real estate prices of firms, but not other main covariates
  • First two equations are the 1st stage, and the third equation is the 2nd stage

\[
PGrowth_{rt} = NPGrowth_t + \alpha_1 ULand_r + \alpha_2 ULand_r \times NPGrowth_t + \varepsilon_{rt},
\]

\[
\Delta REHoldings_{irt} = \theta_t + \alpha_1 ULand_r + \alpha_2 ULand_r \times NPGrowth_t + \beta_0 RERatio_{it-5}
+ \beta_1 NPGrowth_t \times RERatio_{it-5} + \beta_2 ULand_r \times RERatio_{it-5}
+ \beta_3 ULand_r \times NPGrowth_t \times RERatio_{it-5} + \gamma' X_{it} + \varepsilon_{it}, \quad (4)
\]

\[
\Delta \log (EquityVol)_{irt+1} = \theta_t + \beta \Delta REHoldings_{irt} + \gamma' X_{irt} + \varepsilon_{irt},
\]
Carvalho (JF June 2018)

• Firm level (starting point)
  • Financial constraints
  • Growth options

• Provided evidence (findings):
  • Effects of stronger balance sheet (in other words, larger real estate holdings) on equity volatility (OLS)

• General Implications (conclusion)
  • One should consider financial constraints (or stronger balance sheets) when evaluating firm’s equity volatility in the market
Key idea/motivation
- Are bankruptcies, especially liquidations, negative externalities?
- How do liquidation affect the local economy relative to reorganization?
- (Geographic) spillover effects
- Employment for the immediate neighborhood?
- Is it localized? Is it concentrated in some specific industries?

Note (U.S. bankruptcy codes)
- Chapter 7 - liquidation
- Chapter 11 - reorganization
Bernstein, Colonnelli, Giroud, and Iverson (JFE 2019)

• Methodology/approach
  
  • IV estimation: (1st, and 2nd stage eq. below)
    
    • \( i \): bankrupt firm, \( j \): judge, \( l \): location, \( p \): establishments (with at least 1 paid employee, \( establishments \in firm \)), \( k \): industry
    
    • Locations are at the level of census block. Census block is the smallest geographical area for which the Census Bureau reports information. In a city, census blocks follow the shape of streets.
    
    • Random assignment of bankruptcy judges. Exogenous variation in the likelihood of changing from reorganization (chapter 11) to liquidation (chapter 7). Creates variation in the likelihood without affecting the dependent variables.

\[
\text{Liquidation}_{p,i,t} = \rho + \pi \cdot \text{ShareCasesConverted}_{j, t} + \lambda \cdot X_{l, p, i} + \delta_{d, t} + \mu_k + \eta_{l, p, i},
\]

\[
y_{l, t+\tau} = \alpha + \beta \cdot \text{Liquidation}_{p, i, t} + \gamma \cdot X_{l, p, i} + \delta_{d, t} + \mu_k + \epsilon_{l, p, i},
\]
Bernstein, Colonnelli, Giroud, and Iverson (JFE 2019)

- Firm level (starting point)
  - Bankruptcy, financial distress
  - Liquidation

- Provided evidence (findings) – OLS/IV
  - Quantified local spillover effect through measuring the percentage change in unemployment rate of location 5 years after the bankruptcy of firm /
  - Different magnitude of spillover in different locations and industries

- General implication (conclusion)
  - Bankruptcy is not a firm specific event, but a negative externality
  - The externality effect has a geographical feature in a sense that it decays over geographical distances
  - Policy makers should take local bankruptcies into concern
Stopler and Walter (RFS 2019)

• Key idea/motivation
  • Will being similar to your customer pay off?
  • Will it pay off if you are a banker?
  • Propensity to follow financial advice

• Methodology/approach
  • Data from an anonymous bank and all its employees
  • Homophily: individuals’ affinity for others like them
Giannetti and Zhao (JFQA, June 2019) – 1,2

• Key idea/motivation
  • Will different opinion value consensus and environment lead to different corporate decisions?
  • Opinion value proxied by ancestral traits (cultural, genetic)
  • The effects of boards’ ancestral diversity on firms’ performances
Giannetti and Zhao (JFQA, June 2019)

• Methodology/approach
  • Measure=FRACTIONALIZATION (0=no ancestral diversity)
    • Herfindahl-based index
    • $s_{i,f,t}$: the share of the board members of ancestry $i$ among all board members of firm $f$ at time $t$
      \[
      \text{FRACTIONALIZATION}_{f,t} = 1 - \sum_{i}^{n} s_{i,f,t}^2,
      \]
  • Factor analysis (PCA)
    • To show the new measure of diversity is not subsumed by other existing measures
  • IV estimation (why?)
Giannetti and Zhao (JFQA, June 2019)

• Firm level:
  • The paper starts from **opinion of board members**
  • Proxy for opinion: ancestral diversity of board members

• Provided evidences (findings)
  • Ancestral diversity is a prominent determinant of board diversity (PCA)
  • Ancestral diversity is determined by the location and tobin q (OLS)
  • Ancestral diversity affects firm performance (2\textsuperscript{nd} stage)

• General implications
  • What **investors** may expect and react to a firm with diverse background
  • Higher ancestral diversity leads to higher performance volatility
    • Citations and patents
    • Strategical choices and decisions
    • Board meeting frequency
Reviews: Firm characteristics and the factor models

Long portfolios of high-characteristic firms
Short portfolios of low-characteristic firms
Some good papers on factor models, but not bottom-up

- **Characteristics are covariances: A unified model of risk and return** (Kelly, Pruitt, and Su, 2019 JFE)
- **The Cross-Section of Risk and Return** (Daniel, Mota, Rottke, and Santos, 2019 WP)
- **The Low-Minus-High Portfolio** (Andrei, Cujean, and Fournier 2019 WP)

- (personal opinion) Factor models are shifting towards
  - Controlling for the 2\textsuperscript{nd} moments
  - Trying to conclude the innumerable factors (factor zoo)
Artez and Pope (JF June 2018) -1, 4

• Key idea/motivation
  • The predictions based on real options theory on asset pricing is less visited by empirical studies
  • The theories predict the production capacity overhang will create cross sectional variation in returns
  • It was less visited as capacity overhang is hard to measure at the stock level
Artez and Pope (JF June 2018)

• Methodology/approach
  • Stochastic frontier (stock-level capacity overhang)
    • $\bar{K}$: installed capacity, $X_{i,t}$: optimal capacity determinants
      \[
      \ln(\bar{K}_{i,t}) = \alpha_k + \beta'X_{i,t} + v_{i,t} + u_{i,t} = \alpha_k + \beta'X_{i,t} + \epsilon_{i,t},
      \]
    • $K^*$: optimal capacity, the fitted value ($= \beta'X_{i,t}$)
    • $\hat{u}_{i,t}$: conditional expectation of the log capacity overhang
    • Estimate $\hat{u}_{i,t}$ using MLE(pdf:normal) (1st recursive window: Jul 1963-Dec 1971, annual rolling window)-a priori measure
      \[
      \ln(\bar{K}_{i,t}) = \ln(K^*_{i,t}) + \ln(\xi_{i,t}) = \ln(K^*_{i,t}) + u_{i,t},
      \]
      \[
      \hat{u}_{i,t} = E[u_{i,t}|\xi_{i,t}, Z_{i,t}] = \mu^*_i + \sigma^*_i \left( \frac{n(-\mu^*_i/\sigma^*_i)}{N(\mu^*_i/\sigma^*_i)} \right)
      \]
    • $Z_{i,t}$: capacity overhang determinants, $\sigma^*_i \left( \frac{n(-\mu^*_i/\sigma^*_i)}{N(\mu^*_i/\sigma^*_i)} \right)$ adjusts the errors to estimate the exact overhang
  • Portfolio sort based on $\hat{u}_{i,t}$ and long-short portfolios
Artez and Pope (JF June 2018)

• Firm level
  • Builds the model from the production curve model

• Provided evidences (findings)
  • Estimation of capacity overhang (OLS, MLE)
  • Validation of the capacity overhang measure (1 historical investments comparisons, 2 industry level underutilization survey data from BEA) (trend analysis)
  • The trading performance based on the overhang measure and performance as a factor (OLS, FM)

• General implications
  • Capacity overhang (or less than efficient capacity) creates risk premium at the equity return
• Key idea/motivation
  • Changes in the network in production are a source of systematic risk that is priced in equilibrium

• Network: sectoral network model
  • sectors are 2 digit of the NAICS code
  • Network concentration: degree to which equilibrium output is dominated by a few large sectors
  • Network sparsity: measures the distribution of sectoral linkage
Herskovic (JF August 2018)

• Methodology/approach
  • TFP residual, network concentration, and sparsity
    \[ e_t \equiv \sum_{i=1}^{n} \delta_{i,t} \log \varepsilon_{i,t}, \quad N_t^C \equiv \sum_{i=1}^{n} \delta_{i,t} \log \delta_{i,t}. \]
    \[ N_t^S \equiv \sum_{i=1}^{n} \delta_{i,t} \sum_{j=1}^{n} w_{ij,t} \log w_{ij,t}. \]
    • \( \delta_{i,t} \) output share of sector \( i \) at time \( t \)
    • \( w_{i,j,t} \) production output from \( i \) to \( j \), at time \( t \).
    • \( \varepsilon_{i,t} \): productivity level of sector \( i \) at time \( t \)
    • TFP calculated from residuals from regressing TFP growth on factor innovations, \( N_t^C \) calculated from sectors’ output shares, \( N_t^S \) from Compustat segment customer data
  • Sorted portfolio and trading strategy
    \[ r_t^i = \alpha^i + \beta_{N,S} \Delta N_t^S + \beta_{N,C} \Delta N_t^C + \text{Controls} + \xi_t^i. \]
Herskovic (JF August 2018)

• Firm Level:
  • The paper starts from network in production:
  • input output relationship of industries (NAICS)

• Provided Evidences (findings)
  • The effect of production network can be modeled in the general competitive equilibrium settings
  • Investors are compensated for the exposure to the network factors
  • Network sparsity is associated with aggregate dividend growth

• General Implications:
  • Firm performances related to concentration and sparsity are priced in the market
  • Investors should take input-output of industries as pricing factors
Golubov and Konstantinidi (JF, August 2019) – 1,2

• Key idea/motivation
  • What is the economic origin and exact mechanism of the book-to-market effect in Fama French 3 factor model?
  • Among some proposed theories to explain the effect, which one is most supported by the data?
    • Exposure to investment specific technology shocks (Kogan and Papanikolaou 2014)
    • Equity analyst risk (Lui, Markov, and Tamayo 2007)
    • Aggregate cash flow risk – formal pricing test 1 (Campbell and Vuolteenaho 2004, Da and Warachka 2009)
    • Long-run consumption risk – formal pricing test 2, ultimate consumption risk (Parker and Julliard 2005, Bansal, Dittmar, and Lundblad 2005) – formal pricing test 2
Golubov and Konstantinidi (JF, August 2019)

• Methodology/approach

  • Book-to-market decomposition (from Rhodes-Kropf, Robinson, and Viswanathan JFE 2005 RRV)

    • **Firm-specific error**, Sector error, value-to-book, total error (firm+sector error), (i:firm, j:industry, t:time)

      \[
      m_{it} - b_{it} = m_{it} - v(\theta_{it}; \alpha_{jt}) + v(\theta_{it}; \alpha_{jt}) - v(\theta_{it}; \alpha_{j}) + v(\theta_{it}; \alpha_{j}) - b_{it},
      \]

    • \( v(\theta_{it}; \alpha_{jt}) \): fitted value from cross-sectional regression of equity values on firm fundamentals following RRV(b.equity, \(|ni|x(2 if negative ni, otherwise 1),bleverage)\)

      \[
      m_{it} = \alpha_{0jt} + \alpha_{1jt}b_{it} + \alpha_{2jt}ni_{it}^+ + \alpha_{3jt}I_{(<0)}(ni_{it}^+) + \alpha_{4jt}LEV_{it} + \varepsilon_{it},
      \]

    • \( v(\theta_{it}; \alpha_{j}) \): predicted fundamental value using multiples averaged over time following RRV (industry average of the multiple for historical 5 years including time t)
Golubov and Konstantinidi (JF, August 2019)

• Firm level:
  • The paper focuses on the **fundamental value of firms** (contemporaneous fitted value from the cross section of the industry)
  • It is estimated using annual industry-specific cross-sectional regressions of equity values on firm fundamentals (price*cshout = fundamental controls)

• Provided evidences (findings)
  • Firm specific error sorting performs best among the criteria (portfolio sort test)
  • Stock return predictability test show firm specific error has the most negative relationship with monthly stock returns (FM)
  • The firm specific error is able to explain the cash flow risk, long run consumption risk, and exposure to investment specific technology shocks. (portfolio sort test, although market to book perform better for these tests)

• General implication:
  • **Investors** should focus on market-to-value, instead of market-to-book when evaluating stocks
Green, Huang, Wen, and Zhou (JFE 2019)

• Key idea/motivation
  • Workers are the key foundation of firms’ productivity
  • Firm economic conditions influence employee satisfaction
  • Will employee morale signal value-relevant information to financial markets in a systematic manner?
  • Will employee satisfaction affect firms’ performances?
Green, Huang, Wen, and Zhou (JFE 2019)

• Methodology/approach
  • Glassdoor dataset
    • Provides survey data on employees’ satisfactions on various items
    • Analysis use the raw variable (employer rating, Rating, number of stars) as well as the change in the employer rating (ΔRating) as factors
  • Traditional Fama-French style asset pricing analysis
  • Firm level analysis
    • Operating performance
    • Analyst forecast error analysis
    • Earnings announcement event analysis
Green, Huang, Wen, and Zhou (JFE 2019)

• Firm level
  • Employee satisfaction measure
  • Novel dataset

• Provided evidences (findings)
  • Determinants of employer ratings and change in employer rating
  • Portfolio performance through sorting by changes in employer rating
  • Stock return predictability through adding $\Delta Rating$ in the Fama-French style factor model
  • Firm performances ($\Delta ROA, \Delta Sales$, analyst forecast error, and announcement returns) are affected by $\Delta Rating$

• General implications
  • Employee satisfaction is reflected in the equity return as well as firm performance
  • Implications for investors in general as well as managers of firms
Reference
Donangelo, Gourio, Kehrig, and Palacios (JFE 2019)

• Key idea/motivation
  • Labor compensation
Chang and Hong (JFE 2019)
Begenau and Salomao (RFS April 2019)

• Firm level:
  • Debt-equity issuance policies during economic booms
  • During boom periods:
    • Large firms finance more through debt and payout equity
    • Small firms finance through both

• General implications:
  • Investors (for both debt and equity) can take firms responses under into consideration and exploiting the pattern
  • Some fiscal/monetary policy implications as well