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Optimistic Capital Budgeting Forecast: An Experiment

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Statman and Tyebjee (1985)

Six Questions

- What are research questions?
- What has literature documented to drive the research questions?
- How do the authors construct experiments or models to address research questions?
- If applicable, how does the dataset look like and what sources have been used?
- What do the results address in association with research questions?
- What implications do the authors argue?

Statman and Tyebjee (1985)

1. What are the Research Questions?

(Core question)

- Does **optimistic bias** exist in capital budgeting forecast?
- **Optimistic** means actual costs are generally higher than forecasted costs, and actual sales are generally lower than forecasted sales.
- Projects' forecasted rates of return are higher than actual sales of return.

$$\downarrow \frac{\text{actual sales}}{\text{actual costs}} < \frac{\textbf{forecasted sales}}{\textbf{forecasted costs}} \uparrow$$

(Additional Questions)

- Do decision-makers recognize and adjust for optimistic bias in forecasts?
- How does the level of experience affect the adjustment for forecast bias?

Statman and Tyebjee (1985)

2. What has literature documented to drive the research questions?

- These three references provides a rationale for driving the research questions of Statman and Tyebjee(1985)

Reference	Summary	Application on Statman and Tyebjee (1985)
Brown (1978)	Why does optimism happen in forecasts? → Evaluation on accepted projects.	Provides a rationale in Statman and Tyebjee's study for considering selection bias as a factor in optimistic forecasting outcomes.
Miller (1978)	Suggested that decision-makers possess experience-based knowledge that forecasters might lack, allowing them to adjust for potential biases in forecasts.	Directly affects this paper's hypothesis, testing whether experienced decision-makers adjust forecasts to correct for perceived bias.
Tull (1967)	Documented that sales forecasts, especially for new products, frequently overestimate actual overcomes.	Supports the investigation of overoptimism in sales forecasts in this paper's study, especially within the context of marketing projections.

K. C. Brown, "A Note on the Apparent Bias of Net Revenue Estimates for Capital Investment Projects," Journal of Finance (1974), pp. 1215-1227.
E. M. Miller, "Uncertainty Induced Bias in Capital Budgeting," Financial Management (1978), pp. 12-18.
D. S. Tull, "The Relationship of Actual and Predicted Sales and Profits in New-Product Introductions," Journal of Business (1967), pp.223-250.

Statman and Tyebjee (1985)

3. How do the authors construct experiments or models to address research questions?

(Questionnaire for forecast evaluation)

- 149 individuals, grouped by work experience (0-2 years, 3-5 years, 6+ years) were asked to provide forecasts of production cost and sales based upon forecasts made by two assistants.
- This experience is modeled based on the one by Cyert et al. (1961).
- Subjects weighted two forecasts provided by two assistants to determine a final forecast.

Exhibit 1. Questionnaire

	Research and Development Costs		Sales		Enter Your Forecast	
Project No.	A's Forecast	B's Forecast	X's Forecast	Y's Forecast	Research & Development Cost Forecast	Sales Forecast
I	$167,000	$272,000	594,000 units	194,000 units	$,000	,000 units
II	274,000	783,000	901,000 units	396,000 units	,000	,000 units
III	529,000	433,000	113,000 units	609,000 units	,000	,000 units
IV	357,000	866,000	894,000 units	796,000 units	,000	,000 units
V	146,000	659,000	311,000 units	108,000 units	,000	,000 units
VI	937,000	446,000	451,000 units	848,000 units	,000	,000 units
VII	906,000	811,000	641,000 units	836,000 units	,000	,000 units
VIII	483,000	379,000	162,000 units	257,000 units	,000	,000 units

Cyert, R. M., March, J. G., & Starbuck, W. H. (1961). Two experiments on bias and conflict in organizational estimation. Management Science, 7(3), 254-264.

Statman and Tyebjee (1985)

3. How do the authors construct experiments or models to address research questions?

(Questionnaire for forecast evaluation)

- $E = \boldsymbol{W}U + (1 - \boldsymbol{W})L$
  - E = final evaluated value
  - U = high forecast
  - L = low forecast
  - W = relative weight assigned by the decision maker to the high forecast

- On the First project, if the W of costs is 0.75 and of sales is 0.2, the results of E is as follows

	Cost		Sales	
	A	**B**	**X**	**Y**
I	167,000	272,000	594,000	194,000
	$\boldsymbol{W} = 0.75$ $E = 167{,}000 \times 0.25 + 272{,}000 \times 0.75 = \boldsymbol{245{,}750}$		$\boldsymbol{W} = 0.2$ $E = 594{,}000 \times 0.2 + 194{,}000 \times 0.8 = \boldsymbol{274{,}000}$	
	Based on the determination that the forecasted cost values are too **underestimated**, they adjusted the price **upwards** with a **higher weighting for the higher forecast.**		Based on the determination on that the forecasted sales values are too **overestimated**, so the price is adjusted **downwards** with a **higher weighting for the lower forecast.**	

Statman and Tyebjee (1985)

3. How do the authors construct experiments or models to address research questions?

(Questionnaire for stating the tendency of forecasters)

- They asked subjects to state their beliefs about the tendency of forecasters to submit biased forecasts.
- Subjects were asked to circle a number from 1 to 7 and the null hypothesis is $\boldsymbol{H_0 : \bar{x} = 4}$ where is the mean level of agreement with the statement.

Exhibit 3. Questionnaire

To what extent do you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Agree	Strongly Agree
Research and development people typically overestimate R & D costs	1	2	3	4	5	6	7
Research and development people typically underestimate R & D costs	1	2	3	4	5	6	7
Marketing people typically overestimate sales	1	2	3	4	5	6	7
Marketing people typically underestimate sales	1	2	3	4	5	6	7

(Circle the appropriate number).

Statman and Tyebjee (1985)

3. How do the authors construct experiments or models to address research questions?

	Cost		Sales	
	A	B	X	Y
I	167,000	272,000	594,000	194,000
	$W = 0.75$ $E = 167{,}000 \times 0.25 + 272{,}000 \times 0.75 = \mathbf{245,750}$		$W = 0.2$ $E = 594{,}000 \times 0.2 + 194{,}000 \times 0.8 = \mathbf{274,000}$	

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Marketing people typically underestimate sales	1	2	3	4	5	6	7

(Circle the appropriate number).

Statman and Tyebjee (1985)

4. If applicable, how does the dataset look like and what sources have been used?

(Data Composition)

- Eight projects with hypothetical R&D cost and sales forecasts.
- Each project had two independent forecasts (high and low estimates) provided by assistants A and B(X and Y).

(Participants Background)

- Sample included undergraduate and graduate business students with varied levels of work experience.

(Data Collection Purpose)

- To observe how subjects assign weights to high and low forecasts based on experience, indicating their approach to adjusting for optimistic bias.

Statman and Tyebjee (1985)

5. What do the results address in association with research questions?

Exhibit 2. Adjustment of Forecasts by Decision Makers

	Number of Subjects	Mean Relative Weight Assigned to the High Forecast, $\overline{W}$	Standard Deviation of the Sample Mean of W	t-Statistic
R & D Cost Forecasts H_0: $\overline{W} = 0.5$, H_1: $\overline{W} > 0.5$				
All Subjects	146	0.570		
Subjects with 0–2 Years of Full-time Work Experience	52	0.501	0.032	0.031
Subjects with 3–5 Years of Full-time Work Experience	47	0.588	0.052	1.692*
Subjects with 6 or more Years of Full-time Work Experience	47	0.630	0.037	3.514†
Sales Forecasts H_0: $\overline{W} = 0.5$, H_1: $\overline{W} < 0.5$				
All Subjects	148	0.351		
Subjects with 0–2 Years of Full-time Work Experience	52	0.425	0.023	3.261†
Subjects with 3–5 Years of Full-time Work Experience	47	0.303	0.034	5.629†
Subjects with 6 or more Years of Full-time Work Experience	49	0.319	0.041	4.415†

*Indicates a 95% level of significance.
†Indicates a 99% level of significance.

(Cost Forecasts)

- Subjects tended to assign higher weights to the higher R&D cost estimates with the average weight $\boldsymbol{W = 0.570}$.
- Because subjects believed that the forecasted estimates of cost were underestimated.

(Sales Forecasts)

- Subjects generally assigned higher weights to the lower sales forecasts with the average weight $\boldsymbol{W = 0.351}$.
- Because subjects believed that the forecasted estimates of sales were overestimated.

Statman and Tyebjee (1985)

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*Indicates a 95% level of significance.
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(Work Experience)

- Subjects with more work experience were more likely to recognize and adjust for optimistic bias in their forecasts.
- In particular, subjects with 3-5 years of work experience were more likely to assign greater weight to high values for cost forecasts and greater weight to lower values for sales forecasts (Miller, 1978).

E. M. Miller, “Uncertainty Induced Bias in Capital Budgeting,” Financial Management (1978), pp.12-18

Statman and Tyebjee (1985)

5. What do the results address in association with research questions?

(Tendency of forecasters to submit biased forecasts)

- Even subjects with minimal works experience believe that R&D and marketing people tend to bias forecasts in an optimistic direction.
- Belief becomes stronger as the number of years of full-time work experience increases.

Exhibit 4. Level of Agreement with Statements on Forecast Biasing

	Number of Subjects	Mean Level of Agreement, $\bar{x}$	Standard Deviation of the Mean Level of Agreement, $\bar{x}$
Research and Development People Typically Overestimate R & D Costs H_0: $\bar{x} = 4$, H_1: $\bar{x} < 4$			
Subjects with 0–2 Years of Full-time Work Experience	50	3.48	0.21
Subjects with 3–5 Years of Full-time Work Experience	47	3.30	0.21
Subjects with 6 or more Years of Full-time Work Experience	50	2.82	0.24
Research and Development People Typically Underestimate R & D Costs H_0: $\bar{x} = 4$, H_1: $\bar{x} > 4$			
Subjects with 0–2 Years of Full-time Work Experience	50	4.58	0.21
Subjects with 3–5 Years of Full-time Work Experience	47	4.60	0.25
Subjects with 6 or more Years of Full-time Work Experience	50	5.00	0.24
Marketing People Typically Overestimate Sales H_0: $\bar{x} = 4$, H_1: $\bar{x} > 4$			
Subjects with 0–2 Years of Full-time Work Experience	50	4.92	0.18
Subjects with 3–5 Years of Full-time Work Experience	47	5.13	0.22
Subjects with 6 or more Years of Full-time Work Experience	50	5.74	0.14
Marketing People Typically Underestimate Sales H_0: $\bar{x} = 4$, H_1: $\bar{x} < 4$			
Subjects with 0–2 Years of Full-time Work Experience	50	3.14	0.17
Subjects with 3–5 Years of Full-time Work Experience	47	2.75	0.19
Subjects with 6 or more Years of Full-time Work Experience	50	2.38	0.18

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6. What implications do the authors argue?

(Confirmation of Optimistic Bias)

- Systematic optimistic bias exists in capital budgeting forecasts.
- Cost are often underestimated, while sales are frequently overestimated, affecting project outcomes.

(Impact of Decision-Maker Experience)

- Experienced decision-makers more recognize and adjust for bias.
- More experience leads to a more cautious approach, with higher weights given to conservative cost and sales estimates.

(Practical Implications for Companies)

- Companies should focus not only on forecast accuracy but also on training decision-makers to adjust for bias.
- Cultivating awareness of forecasting bias can lead to better, more realistic capital budgeting decisions.

Thank you

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