

**The Effects of Founder-Favorable Deal Terms on Evaluators' Perceptions of Pitch
Ambiguity Under Knightian Uncertainty**

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Abstract

Information-asymmetry theory predicts that terms unusually favorable to the recipient can increase perceived ambiguity because the recipient infers hidden defects. Under Knightian uncertainty, however, future value cannot be known by either party, so founder-favorable terms may instead increase ambiguity by placing more future value outside what current evidence supports. We test this claim in a randomized experiment in early-stage technology finance. Sixty-four people with informal investment experience screened 12 Techstars pitch decks across three conditions: no deal terms, evaluator-favorable deal terms, and founder-favorable deal terms. The manipulation varied the valuation cap, round size, ownership percentage offered, and capital already committed. Founder-favorable terms produced higher perceived ambiguity than evaluator-favorable terms ($b = 0.261$, $SE = 0.122$, $p = .033$, $n = 544$). A joint Wald test did not reject equality of effects across the four dimensions ($\chi^2(3) = 3.400$, $p = .334$). The findings suggest a boundary condition for information-asymmetry predictions: in early-stage venture pitches, founder-favorable terms increase ambiguity relative to evaluator-favorable terms. *Keywords:* pitch decks; deal terms; perceived ambiguity; entrepreneurial finance; randomized experiment; Knightian uncertainty

Introduction

Early-stage companies often need to sell equity to investors to obtain the capital they need to operate, and use pitch decks that describe the team, the product, the market, and the competition to present their businesses to potential investors [1,2]. In some cases, entrepreneurs present specific deal terms within these decks, including valuation caps, round sizes, ownership percentages, and committed capital [3]. When they do so, they must decide how favorable to make those terms to potential investors [4].

Economic research has long held that a seller's effort to name a price is not a neutral act [5]: when a better-informed seller names a price, they reveal private information, and in this way, transaction terms signal unobserved quality [6,7]. Theory predicts that when founders, who are the better-informed party, propose terms more favorable to the investor than to themselves, investors will perceive greater ambiguity about the venture's underlying value, inferring that the founder must know something unfavorable that justifies the unusually generous terms.

Prior research provides evidence of this behavioral dynamic: recipients in ultimatum bargaining games often reject offers that look too good to be true, even when accepting them would leave them better off [8]. Similarly, consumers presented with unusually large advertised price discounts reduce their estimate of the offer's credibility, inferring that the seller must have private information about reduced product quality or market conditions that justifies the steep markdown [9].

The theory depends on the assumption that the proposer has more information than the recipient about the value of a knowable asset [5,6,7]. Knight [10] argued that under uncertainty, when outcome probabilities are unknown, the information-asymmetry assumption does not hold. Under uncertainty, a seller cannot have information that the buyer lacks about success probabilities, simply because such information does not exist *ex ante*.

Early-stage venture finance is one of the most economically important settings in which this condition applies, because new companies drive a disproportionate share of employment and innovation [11] and raise equity from outside investors to do so

[12,13,14]. We examine whether the information-asymmetry prediction holds in this setting.

Early-stage venture outcomes are uncertain in Knight's sense: they depend on future market evolution, competition, product-market fit, and execution under conditions that have not yet been observed and cannot be characterized by known probability distributions [15,16,17]. In this context, a founder cannot know *ex ante* whether the venture will succeed or attach known probabilities to that outcome [15,16,18]. An evaluator, therefore, cannot read evaluator-favorable terms as concealing private information about known success probabilities.

Instead, the evaluator reads founder-favorable terms through the lens of uncertainty. Founder-favorable terms place more of the deal's claims outside the bounds of what the available evidence can support. This increase in the fraction of claims that is unverifiable increases the evaluator's perceived ambiguity [19,20], defined here as the uncertainty an evaluator feels when information is unverifiable; perceived ambiguity is a property of the evaluator's perception, not of the underlying venture.

As we shall now describe, we tested our theorizing with 64 participants with informal investment experience, who evaluated 12 real Techstars pitch decks across three randomly assigned conditions: no deal terms, evaluator-favorable deal terms, and founder-favorable deal terms. Favorability varied across four financial dimensions: valuation cap, round size, ownership percentage offered, and capital already committed.

Methods

Participants

Participants were recruited via Prolific and screened using self-reported investment experience criteria. Eligible participants were required to report investment experience, be aged between 30 and 100, have English as a first language, hold at least an undergraduate degree, be employed full-time or part-time, have a Prolific approval rate between 75% and 100%, and have completed between 100 and 10,000 previous submissions. Participants also had to report experience with at least one of the following

investment types: an angel syndicate, a private equity fund, or a venture capital fund. Participants who had taken part in related earlier studies of the authors were excluded. Of 129 recorded responses, 68 participants completed the study, together providing 814 pitch evaluations. One participant was excluded before analysis for reporting an implausible value on the prior-investment measure (above 200). At the evaluation level, 36 evaluations were dropped because the participant reported prior exposure to the deck, and 84 were dropped for missing one or more scale items; one further participant was then dropped for retaining fewer than six evaluations.

The final analytic sample comprised 64 participants and 681 evaluations (285 founder-favorable, 259 evaluator-favorable, and 137 control). Participants had a mean age of 44.0 years ($SD = 10.3$), 64.1 percent identified as male, and they reported a mean of 8.8 ventures in which they invested. All participants provided informed consent.

Stimuli

Stimuli were 12 pitch decks from real startup companies that had recently participated in the Techstars accelerator program [21]. The decks were not modified except for the manipulation of deal terms. Three pitch decks were assigned to each of the four financial dimensions: valuation cap, round size, ownership percentage offered to investors, and capital already committed. For each deck, we generated three conditions: a Control version of the deck with no deal-terms slide, a Low (i.e., evaluator-favorable) version with a deal-terms slide, and a High (i.e., founder-favorable) version with a deal-terms slide. The Low and High versions differed in the deal-term values displayed on the deal-terms slide. Higher valuation cap, larger round size, lower ownership offered per dollar invested, and greater committed capital were treated as founder-favorable because each reduced the evaluator's economic upside, allocation availability, or bargaining leverage relative to the Low condition. All other slides were identical across the three versions of a deck. The specific values for each deck appear in Supplementary Table S1.

Design and procedure

Each participant evaluated all 12 decks. For each deck, the participant was randomly assigned to the Control, Low, or High condition with probabilities of .20, .40, and .40, respectively. The decks were presented in randomized order; after each deck, the participant answered the perceptual items below.

Measures

Perceived ambiguity was measured by a three-item scale rated on a 1–7 agreement scale (1 = strongly disagree, 7 = strongly agree). The items refer to the pitch’s general numerical environment (key metrics, figures) rather than to deal-term content. The three items were averaged to form the participant-by-deck ambiguity score. Internal consistency was high (Cronbach’s $\alpha = 0.901$). Item-total correlations were 0.81, 0.81, and 0.79. Verbatim items appear in Supplementary Table S2.

Data cleaning

Data cleaning rules were applied uniformly. Evaluations were dropped if the participant indicated they had seen the deck before or if responses were missing from the perceptual scale items. Participants with fewer than six retained evaluations after the above steps were excluded entirely.

Analysis plan

We conducted a linear mixed model with a random intercept by participant, regressing perceived ambiguity on a binary High indicator within the High/Low subset ($n = 544$). The primary model was $ambiguity_{ij} = \beta_0 + \beta_1 High_{ij} + u_i + \varepsilon_{ij}$ with u_i as a participant random intercept.

The test of cross-stimulus generalization was a joint Wald test of the three High $\times$ financial-dimension interaction terms in the same mixed model that includes financial-dimension effects. Models were estimated using maximum likelihood in R with lme4 [22] and lmerTest; fixed-effect p-values were computed using Satterthwaite degrees of freedom via lmerTest. All tests were two-tailed with $\alpha = .05$. Deck dependence was assessed in a robustness specification with deck fixed effects because the 12 decks were fixed stimuli rather than a random sample of decks.

All analyses were conducted in R version 4.3.3, using the lme4 package (1.1.35.1) for mixed-effects model estimation and the lmerTest package (3.1.3) for the associated significance tests.

Results

Descriptive means

Table 1 reports descriptive means and standard deviations by condition. Perceived ambiguity averaged 3.99 in the Control condition, 3.78 in the Low condition, and 4.04 in the High condition.

Table 1. *Mean perceived ambiguity by condition.*

Condition	n	Mean perceived ambiguity (1–7)	SD
Control (no deal terms)	137	3.99	1.53
Low (evaluator-favorable terms)	259	3.78	1.55
High (founder-favorable terms)	285	4.04	1.51

Primary test: founder-favorable versus evaluator-favorable deal terms

Table 2 shows the primary results. Evaluator-favorable deal terms produced lower perceived ambiguity than founder-favorable deal terms. In the mixed model on the evaluations in the High and Low conditions, the High indicator estimate was $b = 0.261$ ($SE = 0.122$, $p = .033$). Including the financial-dimension factor as a covariate did not significantly change the estimate ($b = 0.257$, $SE = 0.121$, $p = .035$). The effect is small in absolute terms—about a quarter of a scale point on a seven-point scale—and statistically detectable.

Table 2. *Mixed-model estimates of condition effects on perceived ambiguity.*

Specification	Contrast	b	SE	p	n evaluations
Primary	High	0.261	0.122	.033	544
Factor- controlled	High	0.257	0.121	.035	544
Deck fixed effects	High	0.276	0.121	.023	544
Three- condition model	Low vs. Control	−0.138	0.147	.351	681
Three- condition model	High vs. Control	0.108	0.146	.459	681

Note. All models include a random intercept by participant. The factor-controlled model includes financial-dimension controls; the deck fixed effects model includes deck fixed effects; the three-condition model uses Control as the reference category.

Cross-stimulus generalization

The favorability manipulation was implemented across four financial dimensions. The joint Wald test on the three High $\times$ financial-dimension interaction terms failed to reject the null of uniformity: $\chi^2(3) = 3.400$, $p = .334$. The joint heterogeneity test did not reject the null of no differences across the four financial dimensions.

Table 3 reports the within-dimension estimates; each dimension has roughly 120-150 evaluations. Three of four estimates are in the predicted direction (round size $b = 0.369$, $p = .185$; valuation cap $b = 0.245$, $p = .240$; ownership $b = 0.362$, $p = .125$; committed capital $b = -0.143$, $p = .608$). None individually clears $p < .05$, which is consistent with a uniform true effect at this within-dimension sample size. The relevant inferential test is the joint heterogeneity test above; within-dimension non-significance should not be interpreted as evidence against uniformity.

Table 3. *Within-dimension mixed-model estimates of the High condition effect on perceived ambiguity.*

Dimension	n	b	SE	p
Round size	118	0.369	0.277	.185
Valuation cap	150	0.245	0.208	.240
Ownership	150	0.362	0.235	.125
Committed capital	126	-0.143	0.279	.608

Contrasts with the no-terms baseline

Contrasts with the Control condition are reported as additional comparisons. In a three-level mixed model with Control as the reference category ($n = 681$), the Low condition was not significantly different from Control on perceived ambiguity ($b = -0.138$, $SE = 0.147$, $p = .351$), and the High condition was not significantly different from Control ($b = 0.108$, $SE = 0.146$, $p = .459$). The three-level omnibus test was not significant ($\chi^2(2) = 4.210$, $p = .122$). The descriptive gap between the Low condition (3.78) and the Control condition (3.99) is in the direction expected from evaluator-favorable terms, but the formal test does not reject the null. The High-versus-Low difference is the only contrast that meets conventional significance criteria.

Robustness checks

Table 4 reports robustness checks for the High coefficient. An alternative four-item ambiguity scale (including the item “*Ambiguous information about this deck reduced my willingness to invest*,” which we dropped from the primary scale because it directly referred to deal-term content and would have confounded the dependent variable with the manipulation) yields a similar coefficient. Allowing the High effect to vary across participants via a random slope yields $b = 0.259$ ($SE = 0.123$, $p = .036$). Dropping participants who reported investing in more than 30 ventures yields $b = 0.255$ ($SE = 0.126$, $p = .043$, $n = 520$), which is within sampling error of the primary estimate. REML estimation produced the same coefficient and standard error as maximum likelihood at three decimals, with a p-value of .034.

Table 4. *Robustness checks for the High coefficient on perceived ambiguity.*

Specification	b	SE	p	n evaluations
Primary (baseline)	0.261	0.122	.033	544
+ Deck fixed effects	0.276	0.121	.023	544
Random slope for High by participant	0.259	0.123	.036	544
Four-item ambiguity scale	0.240	0.118	.043	544
Dropped participants with > 30 ventures	0.255	0.126	.043	520
REML estimation	0.261	0.122	.034	544

Discussion

This study supports the claim that founder-favorable deal terms in an early venture pitch produce higher perceived ambiguity than evaluator-favorable deal terms ($b = 0.261$, $p = .033$). The joint heterogeneity test did not reject the null of equal differences across the four financial dimensions; the within-dimension estimates should not be interpreted as independently powered tests.

The effect is stable across alternative specifications. Adding deck fixed effects, allowing the High effect to vary across participants, using a four-item rather than a three-item ambiguity scale, and dropping participants with the highest reported investment experience produce High coefficients ranging from 0.240 to 0.276. The primary result does not depend on the specification chosen.

The results are consistent with Knightian-uncertainty reasoning. Founder-favorable terms produced higher perceived ambiguity than evaluator-favorable terms ($b = 0.261$, $p = .033$). The measured pattern is consistent with the interpretation that evaluators treated founder-favorable terms as placing more of the deal outside the available evidence, rather than as evidence of concealed private information.

The study has some limitations. The sample consists of 64 self-reported informal investors, rather than professional venture capitalists. Each participant could evaluate decks in more than one condition, which might expose them to the manipulation more than a real investor would experience in any one pitch evaluation, and to avoid priming, it includes no direct manipulation check on whether participants perceived the Low and High versions as differentially favorable to the founder versus the evaluator.

These findings suggest a boundary for information-asymmetry theory. The theory's predictions about how recipients respond to proposed transaction terms apply in settings in which value is knowable [6,7]. Yet in uncertain situations, this condition does not hold [10]. This does not refute the theory in the settings for which it was developed; it identifies a domain where its predictions may not extend.

This study shows that in an early-stage venture pitch setting, founder-favorable deal terms led to higher perceived ambiguity than evaluator-favorable terms. It shows that, for practitioners raising capital, founder-favorable deal terms can increase evaluators' perceived ambiguity relative to evaluator-favorable terms.

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Author contributions

Sebastiano Massaro (S.M.): Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Writing – review & editing. Scott Shane (S.S.): Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. Frédéric Ooms (F.O.): Investigation, Data curation, Writing – review & editing.

Competing interests

S.M. is affiliated with Organizational Neuroscience Ltd.; this affiliation is unrelated to the present study and does not constitute a competing interest. S.S. and F.O. declare no competing interests.

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Data availability

The analytical dataset supporting the findings of this study is not publicly available because it contains participant-level experimental responses linked to stimulus materials used under research-access restrictions. The analytical anonymized dataset is available from the authors upon reasonable request for non-commercial research purposes, subject to institutional approval where required. Approved requestors may use the data only to reproduce or verify the analyses reported in this article and may not redistribute the data.

Materials availability

The original pitch decks used as stimuli are not publicly available because they are third-party materials from startup companies, and the authors do not hold the rights to redistribute them. The manipulated deal-term values used in the experiment are provided in Supplementary Table S1. Additional information about the stimulus materials is available from the authors upon reasonable request for non-commercial research purposes, subject to rights and confidentiality restrictions.

Code availability

The analysis code supporting the findings of this study is available from the authors upon reasonable request for purposes of reproducing or verifying the analyses reported in this article. Approved requestors may not redistribute the code without the authors' permission.

Generative AI use

Generative AI (Claude, ChatGPT) was used to assist with copy-editing the manuscript. The authors reviewed, revised, and approved all AI-assisted text and take full responsibility for the accuracy, integrity, and originality of the final manuscript.

Ethics

The study received ethical clearance under the University of Surrey Research Integrity, Governance and Ethics Office of the Faculty of Arts, Business and Social Sciences (RIGO/FABSS) self-assessment route; no protocol numbers are assigned under that route. The study was performed in accordance with relevant guidelines and regulations and with the principles of the Declaration of Helsinki. All participants provided informed consent before participation.