

Online Appendix for *Training Aspiring Entrepreneurs to Pitch Experienced Investors*

A. Proofs of Model Results

In this section, we provide proofs for the three main theoretical results presented in section 2.2. The option value of conducting due diligence on an investment idea after receiving the pitch signal s is given by equation 2 from the main text, reproduced here as equation A1.

$$v(s, p, \ell, \tilde{r}) = (\tilde{r} - z - k) \int_{-\infty}^{\tilde{r}} \phi\left(\frac{s\lambda\ell}{p+\lambda\ell}, \frac{1}{p+\lambda\ell}\right) dR + \int_{\tilde{r}}^{\infty} (R - z - k) \phi\left(\frac{s\lambda\ell}{p+\lambda\ell}, \frac{1}{p+\lambda\ell}\right) dr - (\tilde{r} - k) \quad (A1)$$

Solving the integrals and simplifying yields the expression

$$v(s, p, \ell, \tilde{r}) = \frac{e^{-\frac{(p\tilde{r} + \lambda\ell(\tilde{r} - s))^2}{2(p + \lambda\ell)}}}{\sqrt{2\pi(p + \lambda\ell)}} - \frac{(p\tilde{r} + \lambda\ell(\tilde{r} - s)) \operatorname{Erfc}\left(\frac{p\tilde{r} + \lambda\ell(\tilde{r} - s)}{\sqrt{2(p + \lambda\ell)}}\right)}{2(p + \lambda\ell)} \quad (A2)$$

where $\operatorname{Erfc}(x) = \frac{2}{\sqrt{\pi}} \int_x^{\infty} e^{-t^2} dt$ is the complementary error function.

Result 1 considers the how the value of due diligence is affected by a change in the number of elements ℓ in the pitch. Increasing the number of elements is the goal of pitch training. Differentiating equation A2 with respect to ℓ yields

$$\frac{\partial v}{\partial \ell} = -\frac{\lambda e^{-\frac{(p\tilde{r} + \lambda\ell(\tilde{r} - s))^2}{2(p + \lambda\ell)}}}{2\sqrt{2\pi(p + \lambda\ell)^3}} + \frac{\lambda p s \operatorname{Erfc}\left(\frac{p\tilde{r} + \lambda\ell(\tilde{r} - s)}{\sqrt{2(p + \lambda\ell)}}\right)}{2(p + \lambda\ell)^2} \quad (A3)$$

Intuitively, increasing the precision of the pitch signal gives the investor better information about the true value of r . This ought to increase the value of pursuing due diligence when the venture quality is high and decrease it when the signal is low.

Figure A1 plots equation A3 with fixed investment cost $k = 2.33$ and signal precision $\lambda\ell = 1/10 \times 10 = 1$ for three combinations of p and \tilde{r} . Since the true return has unit variance, this chosen value of k implies that about 1% of new ventures at the idea stage have a return exceeding the cost of investment, which is realistic. The figure shows that whether additional elements have a positive or negative effect on option value depends on whether the signal is high or low. Additional elements increase the option value for high levels of s and decrease it for low levels. Comparing the three curves

shows how changing values of the prior precision p , which distinguish experienced investors from novices, and default investment return \tilde{r} , affect the point at which the effect of elements switches from positive to negative.

We cannot find an analytic expression for the value of s that sets equation A3 to zero because the complementary error function cannot be inverted. We will therefore analyze equation A3 numerically. Let \bar{s} be the value of s at which $\frac{\partial v}{\partial \ell} = 0$. Table A1 shows values of \bar{s} over relevant ranges of parameter values. As with Figure A1, the numerical analysis takes $k = 2.33$. The default return \tilde{r} varies from 2.33, meaning that 1 percent of ideas return more than the default, up to 3.33, where only 0.05 percent of ideas return more than the default. The prior precision p varies from 0.25 to 2 and the signal precision $\lambda\ell$ varies from 0.5 to 2. We have verified that $\frac{\partial v}{\partial \ell}$ is increasing at each \bar{s} shown, implying that additional elements have a positive effect for $s > \bar{s}$ and a negative effect for $s < \bar{s}$.

Result 2 holds that the threshold \bar{s} is decreasing in prior precision p and increasing in the default return \tilde{r} . The sections of Table A1 displays this pattern for three different values of ℓ . For each of the values of ℓ shown, the value of \bar{s} is increasing in the default return \tilde{r} and decreasing in the prior precision p .

Result 3 concerns the effect of the prior precision p on the option value of due diligence.

Differentiating equation A1 with respect to p gives

$$\frac{\partial v}{\partial p} = -\frac{e^{-\frac{(p\tilde{r} + \lambda\ell(\tilde{r} - s))^2}{2(p + \lambda\ell)}}}{2\sqrt{\pi}(p + \lambda\ell)^3} - \frac{s\lambda\ell \operatorname{Erfc}\left(\frac{p\tilde{r} + \lambda\ell(\tilde{r} - s)}{\sqrt{2(p + \lambda\ell)}}\right)}{2(p + \lambda\ell)^2} \quad (\text{A4})$$

Increasing the prior precision raises the weight placed on the prior mean, which is zero, in the posterior density. Since option values are positive for values of $r > \tilde{r} > 0$, we should expect increasing the prior precision to have a negative effect on option value. We again rely on numerical methods to evaluate equation A4 for relevant parameter values. Figure A2 plots equation A3 for the same set of parameter values used to construct Table A1. It shows that $\frac{\partial v}{\partial p} < 0$ is negative over a wide range of signal values.

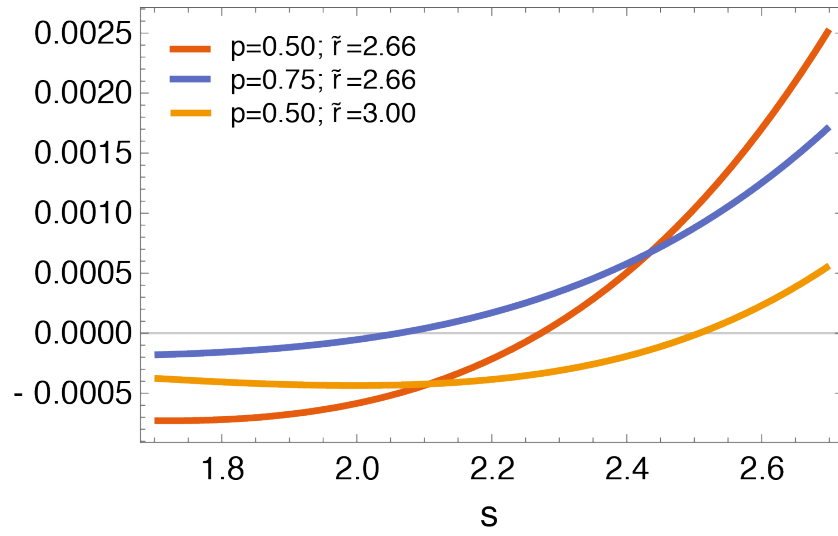
Result 4 considers how option value changes with the return to the default investment \tilde{r} .

Differentiating equation A1 with respect \tilde{r} to gives us

$$\frac{\partial v}{\partial \tilde{r}} = -\frac{1}{2} \text{Erfc} \left(\frac{p\tilde{r} + \lambda\ell(\tilde{r}-s)}{\sqrt{2(p+\lambda\ell)}} \right). \quad (\text{A5})$$

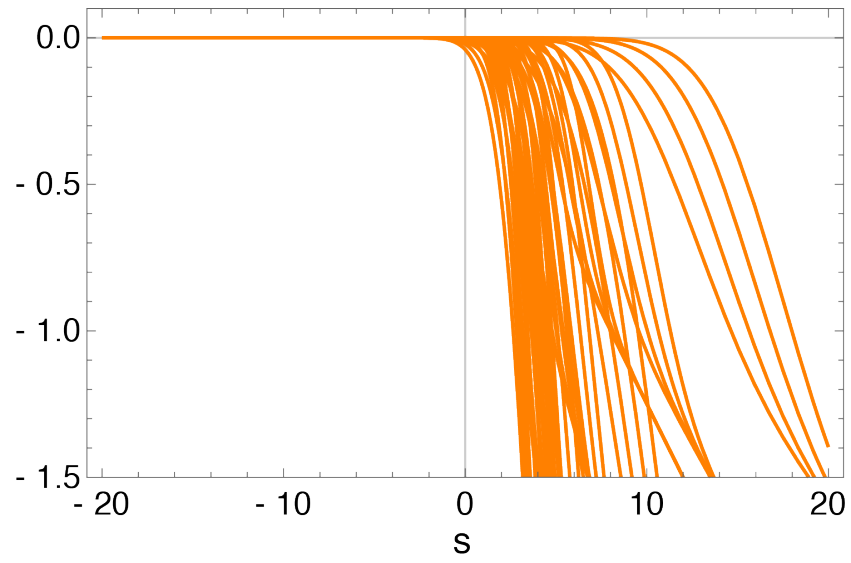
The complementary error function is always positive, which means that $\frac{\partial v}{\partial \tilde{r}} < 0$.

Figure A1: $\frac{\partial v}{\partial \ell}$ for different values of p and \tilde{r}



Notes: This plot sets $k = 2.33$, $\lambda = 1/10$, and $\ell = 10$.

Figure A2: $\frac{\partial v}{\partial p}$ for different values of p , \tilde{r} , and ℓ



Notes: This plot sets $k = 2.3$ and $\lambda = 1/10$. Parameter choices are all combinations of $\tilde{r} \in \{2.33, 2.66, 3.00, 3.33\}$, $\tilde{p} \in \{0.25, 0.5, 1, 2\}$, and $\ell \in \{5, 10, 15\}$.

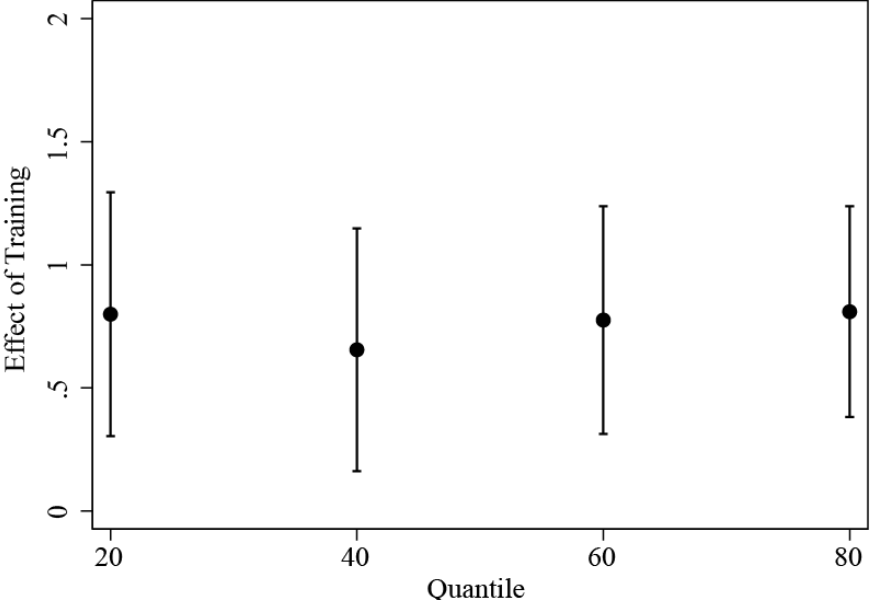
Table A1: Values of \bar{s} at which $\frac{\partial v}{\partial \ell}(\bar{s}) = 0$

ℓ	5				10				15				
\tilde{r}	2.33	2.66	3.00	3.33	2.33	2.66	3.00	3.33	2.33	2.66	3.00	3.33	
p	0.25	2.26	2.47	2.70	2.92	2.43	2.68	2.94	3.19	2.56	2.83	3.11	3.38
	0.50	1.86	2.05	2.26	2.46	2.05	2.27	2.51	2.74	2.23	2.49	2.75	3.00
	1.00	1.57	1.75	1.94	2.13	1.73	1.93	2.14	2.35	1.92	2.15	2.39	2.63
	2.00	1.39	1.56	1.74	1.92	1.49	1.68	1.88	2.07	1.65	1.86	2.08	2.29

Notes: Computations assume $k = 2.33$ and $\lambda = 1/10$.

B. Additional Figures and Tables

Figure B1: Effects of Pitch Training on Final Draft Elements by Quantile



Notes: The graph show treatment effects on quantiles of the score distribution with 95% confidence intervals. The effects are estimated using quantile regressions of score on pitch training, controls, and judge and order dummies. Controls include first draft elements, whether pitched before, experience operating a business, gender, whether a graduate student, and university affiliation. Panel dummies indicate the panel of judges to which a participant pitched. Order dummies indicate randomly assigned pitch order.

Table B1: Randomization Check on Judge Experience Interactions

	Elements in First Draft (1)	Idea Quality (2)	Elements in First Draft (3)	Idea Quality (4)
Pitch Training	-0.04 (0.28)	-0.08 (0.23)	-0.22 (0.31)	-0.14 (0.24)
Training X Judge High Volume	0.13 (0.24)	0.25 (0.19)		
Training X Judge VC/Angel/Mentor			0.47 (0.29)	0.34 (0.22)
Adjusted R ²	0.14	0.24	0.14	0.24
Controls	Y	Y	Y	Y
Judge, Order Dummies	Y	Y	Y	Y

Notes: Standard errors are corrected for clustering at the participant level. Stars indicate statistical significance of tests of the null hypothesis that the coefficient is zero: * mean $p < 0.10$; ** means $p < 0.05$; and *** means $p < 0.01$. Controls include first draft elements, whether pitched before, experience operating a business, gender, whether a graduate student, and university affiliation. Judge dummies indicate identity of randomly assigned judge. Order dummies indicate randomly assigned pitch order. Main effects for judge experience variables not included because they are collinear with judge fixed effects.

Table B2: Effects of Training on Pitch Elements

Panel A: General Elements

	Convey Key Message (1)	Something Compelling (2)	Request to Continue Conversation (3)
Pitch Training	-0.02 (0.02)	0.02 (0.02)	-0.05 (0.03)
N	271	271	271
Adjusted R ²	0.12	0.10	0.10
DV Mean	0.95	0.87	0.06

Panel B: Content Elements

	State Customer Need (1)	Statement of Value Proposition (2)	Market Size (3)	Team Qualifs. (4)	Comp. Advantage (5)	Deal For Investors (6)
Pitch Training	0.02 (0.03)	0.01 (0.02)	0.09 (0.06)	0.05 (0.05)	0.03 (0.04)	0.09*** (0.03)
N	271	271	271	271	271	271
Adjusted R ²	0.17	0.08	0.08	0.02	0.08	0.04
DV Mean	0.53	0.96	0.40	0.30	0.66	0.14

Panel C: Style Elements

	Tells A Story (1)	Use Engaging Language (2)	Attractive Framing (3)	Evidence of Prep. (4)	Evidence of Energy/ Enthus. (5)	Clear Comm. (6)
Pitch Training	0.07 (0.05)	0.05 (0.04)	0.07*** (0.03)	0.03 (0.03)	0.05* (0.03)	0.05* (0.03)
N	271	271	271	271	271	271
Adjusted R ²	0.05	0.14	0.18	0.27	0.09	0.12
DV Mean	0.65	0.54	0.69	0.76	0.89	0.86

Notes: Standard errors are robust. Stars indicate statistical significance of tests of the null hypothesis that the coefficient is zero: * mean $p < 0.10$; ** means $p < 0.05$; and *** means $p < 0.01$. All regressions include controls and dummy variables for pitch panel and pitch order. Controls include first draft elements, whether pitched before, experience operating a business, gender, whether a graduate student, and university affiliation Panel dummies indicate identity of randomly assigned panel. Order dummies indicate randomly assigned pitch order.

Table B3: Standard Deviation of Score by Judge Experience in Null Treatment

	Experience Defined As High Early-Stage Deal Volume <hr/> (1)	Experience Defined As Being a VC, Angel Investor, or Mentor <hr/> (2)
Experienced Judge	5.51	5.46
Inexperienced Judge	5.58	5.35

Table B4: Quantile Treatment Effects

Panel A: Overall

	(1)	(2)	(3)	(4)
Pitch Training	-1.53*** (0.40)	-1.04*** (0.31)	-0.37 (0.30)	-0.10 (0.41)
Quantile	20	40	60	80
<i>N</i>	897	897	897	897

Panel B: By Judge Volume

	(1)	(2)	(3)	(4)
Pitch Training	-2.06*** (0.45)	-1.55*** (0.41)	-1.25 (0.80)	-1.86*** (0.43)
Training X Judge High Volume	1.26** (0.61)	1.05* (0.54)	1.36 (1.00)	2.90*** (0.55)
Quantile	20	40	60	80
<i>N</i>	897	897	897	897

Panel C: By Judge Being VC/Angel/Mentor

	(1)	(2)	(3)	(4)
Pitch Training	-1.95*** (0.55)	-1.56*** (0.46)	-0.98 (0.65)	-1.88*** (0.64)
Training X Judge VC/Angel/Mentor	0.60 (0.76)	1.15* (0.59)	1.20 (0.85)	2.55*** (0.73)
Quantile	20	40	60	80
<i>N</i>	897	897	897	897

Notes: Standard errors are corrected for clustering at the participant level. Stars indicate statistical significance of tests of the null hypothesis that the coefficient is zero: * mean $p < 0.10$; ** means $p < 0.05$; and *** means $p < 0.01$. All regressions include controls, judge dummies, and order dummies. Controls include first draft elements, whether pitched before, experience operating a business, gender, whether a graduate student, and university affiliation. Judge dummies indicate identity of randomly assigned judge. Order dummies indicate randomly assigned pitch order.

Table B5: Interacted Regressions of Score on Pitch Training

	(1)	(2)
Pitch Training	-1.54*** (0.58)	-1.55*** (0.58)
Training X Judge High Early Stage Deal Volume	1.83*** (0.69)	
Training X Judge VC/Angel/Mentor		1.75** (0.75)
<i>N</i>	897	897
Adjusted R ²	0.34	0.34
Controls	Y	Y
Order, Judge Dummies	Y	Y
DV Mean	14.54	14.54

Notes: Standard errors are corrected for clustering at the participant level. Stars indicate statistical significance of tests of the null hypothesis that the coefficient is zero: * mean $p < 0.10$; ** means $p < 0.05$; and *** means $p < 0.01$. Controls include first draft elements, whether pitched before, experience operating a business, gender, whether a graduate student, and university affiliation. Judge dummies indicate identity of randomly assigned judge. Order dummies indicate randomly assigned pitch order.

Table B6: Interactions Between Pitch Training and Judge Characteristics

Judge Characteristic	Pitch Training Main Effect	Interaction of Training with Characteristic
(1) -	-0.62 (0.46)	
(2) Crunchbase Record	-1.13** (0.53)	1.17 (0.73)
(3) Investor in Crunchbase	-0.96* (0.52)	0.96 (0.77)
(4) Positive Exit in Crunchbase	-0.88* (0.49)	1.00 (0.84)
(5) High Volume of Early Stage Investments	-1.46*** (0.55)	1.65** (0.67)
(6) Board Member of at Least One Portfolio Company	-0.84* (0.50)	0.71 (0.76)
(7) Venture Capitalist	-1.01** (0.51)	2.01** (0.94)
(8) Angel Investor	-0.75 (0.49)	0.65 (0.93)
(9) Mentor	-1.01** (0.49)	1.47* (0.81)
(10) VC/Angel/Mentor	-1.49*** (0.56)	1.62** (0.72)
(11) Entrepreneur	-0.26 (0.49)	-2.23** (0.93)
(12) Female	-0.64 (0.50)	0.19 (0.81)
(13) Student Interaction	-0.69 (0.51)	0.43 (0.92)
(14) Lawyer	-0.69 (0.51)	-1.01 (0.87)
(15) MBA	-0.86 (0.54)	0.61 (0.70)
(16) Biomedical Industry Experience	-0.58 (0.53)	-0.19 (0.87)
(17) Software Industry Experience	-0.65 (0.47)	0.16 (0.91)

Notes: Each row reports coefficients from a regression of score on pitch training and, in rows 2 through 17, and interaction between pitch training and the judge characteristic listed. All regressions include pitch order dummies, judge effects, and controls. The main effect of a judge characteristic is captured by the judge dummies. Standard errors are clustered at the participant level.