Money in Space:

How social scientists can help get commercial space over the Tipping Point

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A little tipping-point game theory

Stag Hunt game

- Two players; each chooses to hunt a hare or a stag

- Hares can be hunted individually; stags must be hunted together

- Stags are worth much more than hares

	Hare	Stag
Hare		
Stag		

Strategy and equilibria in the stag hunt

- If one hunts hares, the other should hunt hares

  – Hunting the stag would be risky

- If one hunts the stag, the other should hunt the stag

- Two equilibria, one much better than the other

- How do we get from one to the other, over the tipping point?

	Hare	Stag
Hare	1,1	1,0
Stag	0,1	4,4

Expect more social scientists at ISPCS

1. Why am I here?

2. Why are so few people like me here?

3. Why *will* more people like me be here?

4. Why *should* more people like me be here?

How we can help

- Inform government policy through academic research
- Provide frameworks for thinking about your business challenges, such as…
  - Working with the public sector: Blue Origin and the business strategy of PPPs
  - Working with regulators: Planetary Resources and the legal status of property rights in space
  - Working with each other: Astroscale and coordinated action on space sustainability
  - Working with financial markets: Space Angels and the allocation of capital in commercial space

A plug: HBS and Cambridge, MA

- At HBS, we want to create a hub for *space thinking*
  - Research, teaching, unique events
  - Please talk with Alissa Haddaji, my collaborator
- Part of a broader effort to leveraging local assets (MIT, Harvard, BU, etc.) to create an interdisciplinary Cambridge Space Group
  - We are eager to link up with you and your efforts

Stag hunt and complementarities

- Each hunter is a complement to the other when hunting stags

- But neither gets compensated for those complementarities if acting alone

- Economists have identified at least two solutions:

  - Public (or private) incentives

  - Private coordination

- Both of these are relevant for commercial space

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Stag	0,1	4,4

Public (or private) incentives

- Suppose the government (or venture capital) changes the payoffs through subsidies and taxes (or through investments)
  - Subsidizes (supports) unsuccessful stag hunting
  - Taxes (takes a share of) successful stag hunting
- Now, *only* equilibrium is Stag
- Over the tipping point: all win!
  - The government (or investor) solves complementarities

	Hare	Stag
Hare	1,1	1,0
Stag	0,1	4,4

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	Hare	Stag
Hare	1,1	1,2
Stag	2,1	3,3

Private coordination and the stag hunt

- Say A announces it will hunt the stag alone and does so
- Next time, what will B do?
  - Say A announces it will hunt the stag and thinks that B will trust A, and also hunt the stag, with probability p
  - Then, A hunts the stag again if
    $$0(1-p)+4p > 1(1-p)+1p$$
    $$p > 0.25$$
- If A is credible, they get over the tipping point together
  - Why? Reputation; repeated play

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	Hare	Stag
Hare	1,1	1,0
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Conceptual thinking on economics of space

- The Stag Hunt game is an example of the sort of framework, or conceptual thinking, that we can provide.

- See my article, "Space, the final economic frontier," *Journal of Economic Perspectives*

  - A framework for the role of government in space based on solving market failures such as the complementarities in the Stag Hunt

In closing

- Social scientists are eager to meaningfully aid your efforts

- So, an appeal:
  - What challenges could scholars with the time to search for best practices and test hypotheses solve?
  - What companies' stories of success or failure would yield powerful lessons for others?
  - What questions do you set on the back burner because of the everyday demands of your work?

- Come up to me or Alissa, or email mweinzierl@hbs.edu