Shirking, Shelving and Sharing Risk: The Role of University License Contracts

Marie Thursby
College of Mgmt, Georgia Tech &
National Bureau of Economic Research

Jerry Thursby
Department of Economics
Emory University

Emmanuel Dechenaux
Department of Economics
Kent State University

MOTIVATION

UNIVERSITY LICENSE CONTRACTS (%)

Fixed fees	**84**
Running royalties	**84**
Annual payments	**78**
Milestones	**58**
Equity	**23**
Consulting	**58**

EXISTING THEORY CAN'T EXPLAIN COMPLEXITY

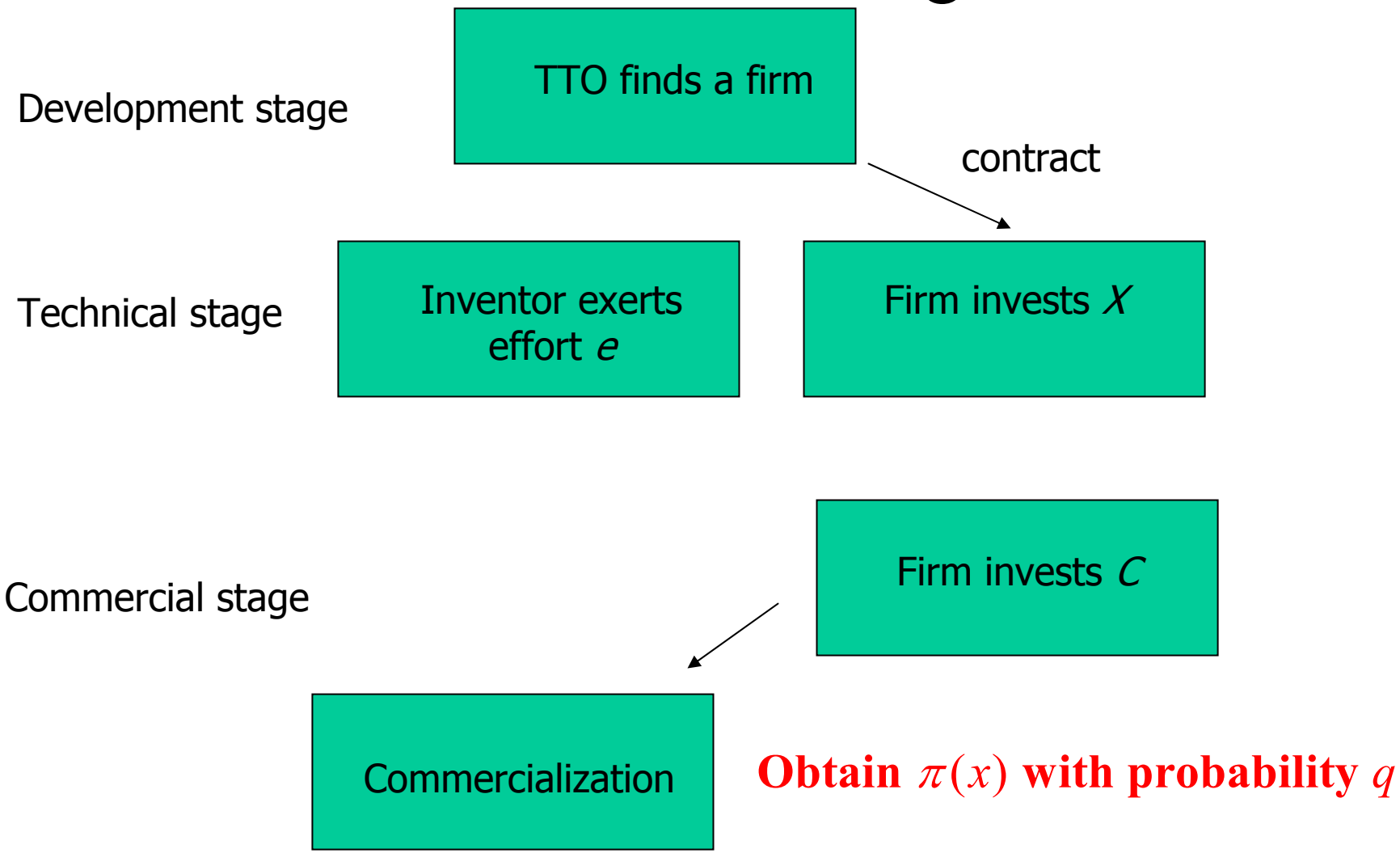
MULTIPLE INCENTIVE PROBLEMS

- **Risk**
- **Moral Hazard**
  - **Noncontractible inventor effort**
  - **Shirking**
- **Adverse selection**
  - **Noncontractible firm effort**
  - **Shelving**

POLICY ISSUE—BAYH DOLE

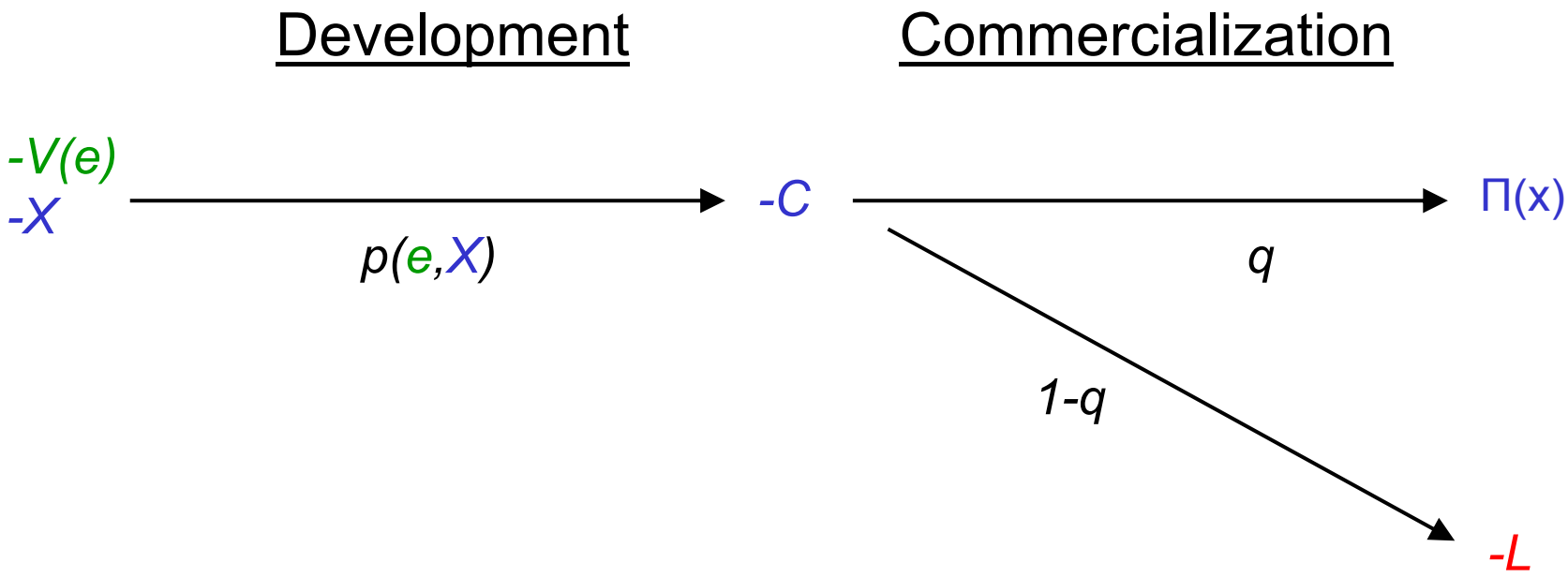
- **Contingent university ownership**
- **March-in rights**

The basic setting

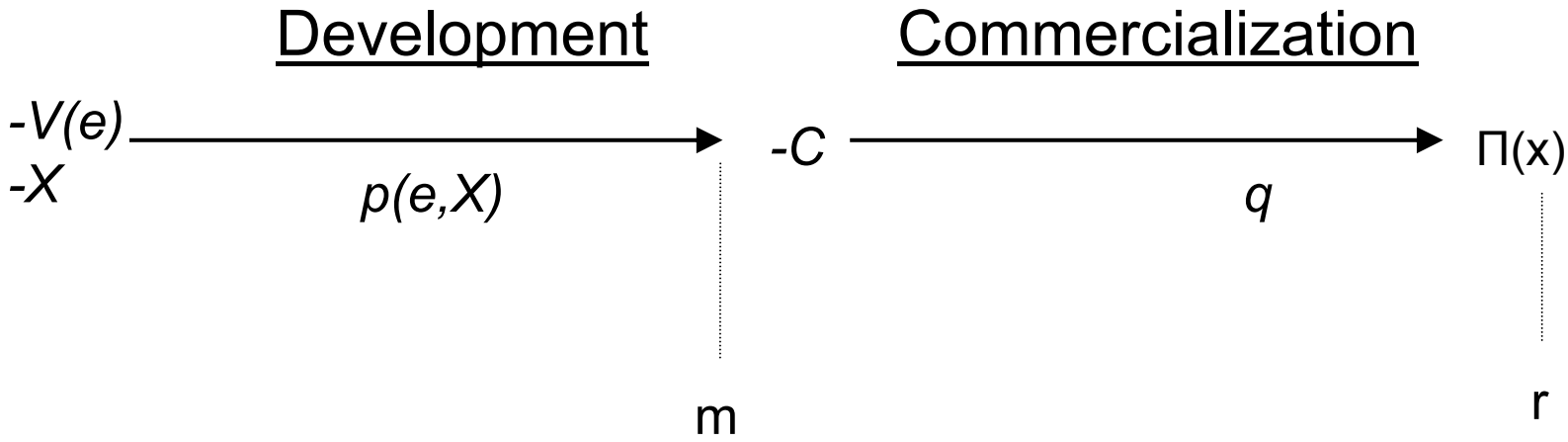


Basic Model

- Invention that needs inventor & firm effort
  - Firm: expected profit
  - Inventor: expected utility
  - TTO: revenue + successful commercialization *(march in)*

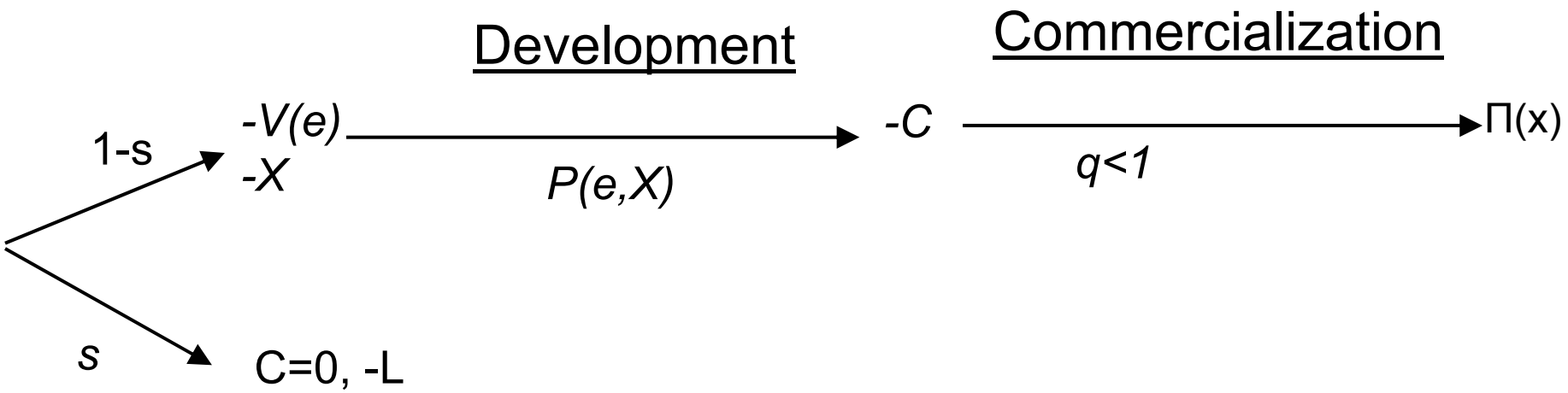


Noncontractible Inventor Effort



- Moral hazard solved by *m* without distortion of raising licensee marginal cost
- Royalty optimal only if firm is risk averse
- Consulting a complement for milestones/royalty

Intentional shelving



If the first firm turns the offer down **or** the TTO decides to take back the license, the TTO can search (once) at a cost *K* to find another firm with probability $z<1$.

Firm effort X is observable by the inventor

If...

- "shelving incentives" are not too high compared to "commercialization incentives"

- the search cost is low and the probability of a second firm is sufficiently high

then the TTO can enforce the second best $\{m^{**}, f^{**}\}$ even in the presence of shelvers. In equ., shelvers separate from non-shelvers by turning down the contract.

Intuition:

- The inventor has an incentive to turn in a firm that shirked.

- In equilibrium, the inventor reports truthfully given contract offered to the second firm (i.e., does not turn in a firm that worked).

Firm effort X is <u>not</u> observable by the inventor

The second best $\{m^{**}, f^{**}\}$ cannot be supported in a PBE in the presence of shelvers.

If...

- "shelving incentives" are not too high compared to "commercialization incentives"

- the search cost is low and the probability of a second firm is sufficiently high

then, in the unique PBE in pure strategies, $f > f^{**}$ and $m < m^{**}$. In equ., shelvers separate from non-shelvers by turning down the contract.

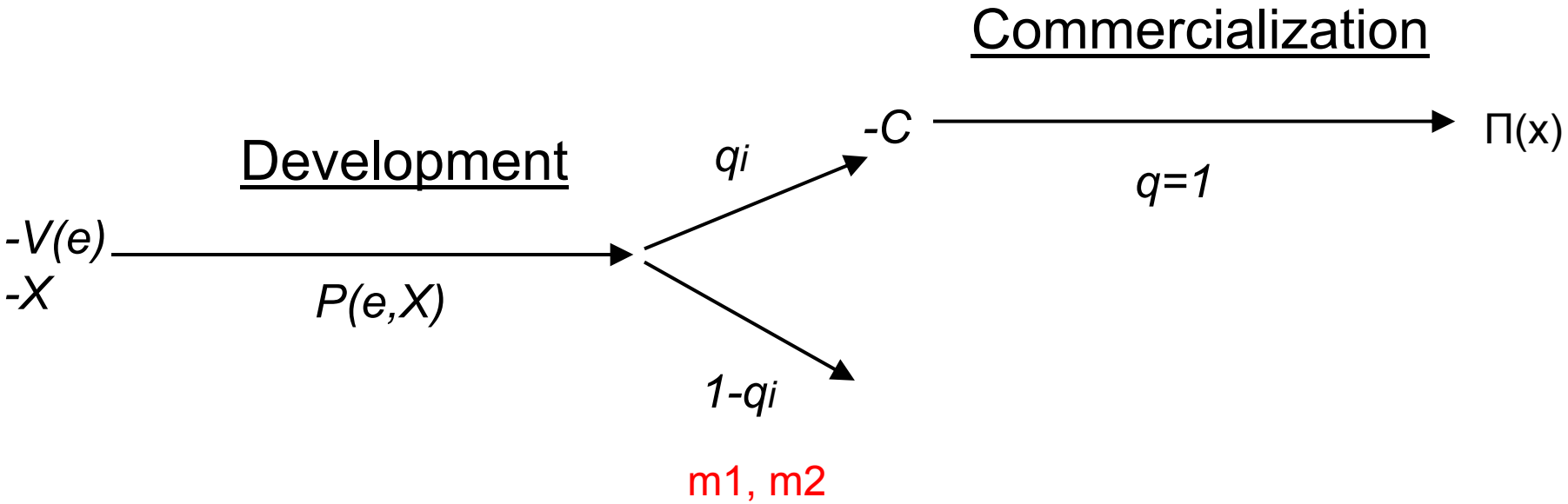
Intuition:

- A high upfront fee that shelvers refuse to pay is required in order to separate (substitutes for the inventor's report),

- Distortion: the milestone is lower, so effort is lower,

- Note: Shelvers saty out, so in this equ., the TTO never takes back the license.

Unintentional shelving



•Separating contract

- sufficiently high probability of finding second firm
- an additional fee to be paid after the first milestone
- annual payments

Summary of results

	Risk	Moral Hazard	Unintentional Shelving	Intentional Shelving
Fixed fees				
Upfront		0/-		+
Annual			+	
Milestone	+	+		+
Royalty	+	+	-	-
Consulting		+		

Table 1: Theoretical results

Table 2. Business Survey Questions

On Importance of Payment Types

1. When you license-in an *early* stage technology (e.g., proof of concept or lab scale prototype only), how important to you is it to include the following payment types?

2. When you license-in a *late* stage technology (e.g., nearly ready for commercial use)), how important to you is it to include the following payment types?

3. When faculty input *is* critical for further development of a technology, how important is it that the license-in agreement include the following payment types?

4. When faculty input *is not* critical for further development of a technology, how important is it that the license-in agreement include the following payment types?

$$R_{ip} = \beta_0 + \beta_1 EARLY_{ip} + \beta_2 CRIT_{ip} + \beta_3 NOTCRIT_{ip} + \varepsilon_{ip}$$

$i = 1, \ldots, n \qquad p = 1, \ldots, 4$

R_{ip} = importance respondent i attaches to payment type p

$EARLY_{ip}$ = 1 if early stage invention

$CRIT_{ip}$ =1 if faculty are critical

$NOTCRIT_{ip}$ = 1 if faculty are not critical

Milestones

1. Can be used to solve moral hazard
2. Can be used to share risk

Milestone Results

- Faculty Critical
- Early Stage
- Faculty Not Critical = Late Stage

Royalties

1. Can be used to share risk and early stage riskier than late stage
2. Harder to define royalties for early stage than for late stage
3. Can be used to solve moral hazard

Running Royalties Results

- Late Stage
- Early Stage
- Faculty Critical = Faculty Not Critical

Consulting: IV Results

	Coef.	t-Stat	
SPONRESEARCH	-0.588	-1.54	
DISTANCE	-0.026	-2.39	**
SMALL	19.073	1.81	*
PROOF	0.016	0.1	
PROTOTYPE	0.272	1.81	
MILESTONE_IMPORT	13.821	3.11	***
CONSTANT	77.495	5.24	***
No. Obs.	36		
r-Square	0.5		

*** Significantly different from zero at 1% level.

** Significantly different from zero at 5% level.

* Significantly different from zero at 10% level.

University Questions

In what circumstance is it desirable to include annual license fees in a license agreement instead of running royalties?

Have you had problems with companies despite proper due diligence terms acquiring a technology and shelving it to prevent its commercialization?

When the university has terminated an agreement, what was the most common reason?