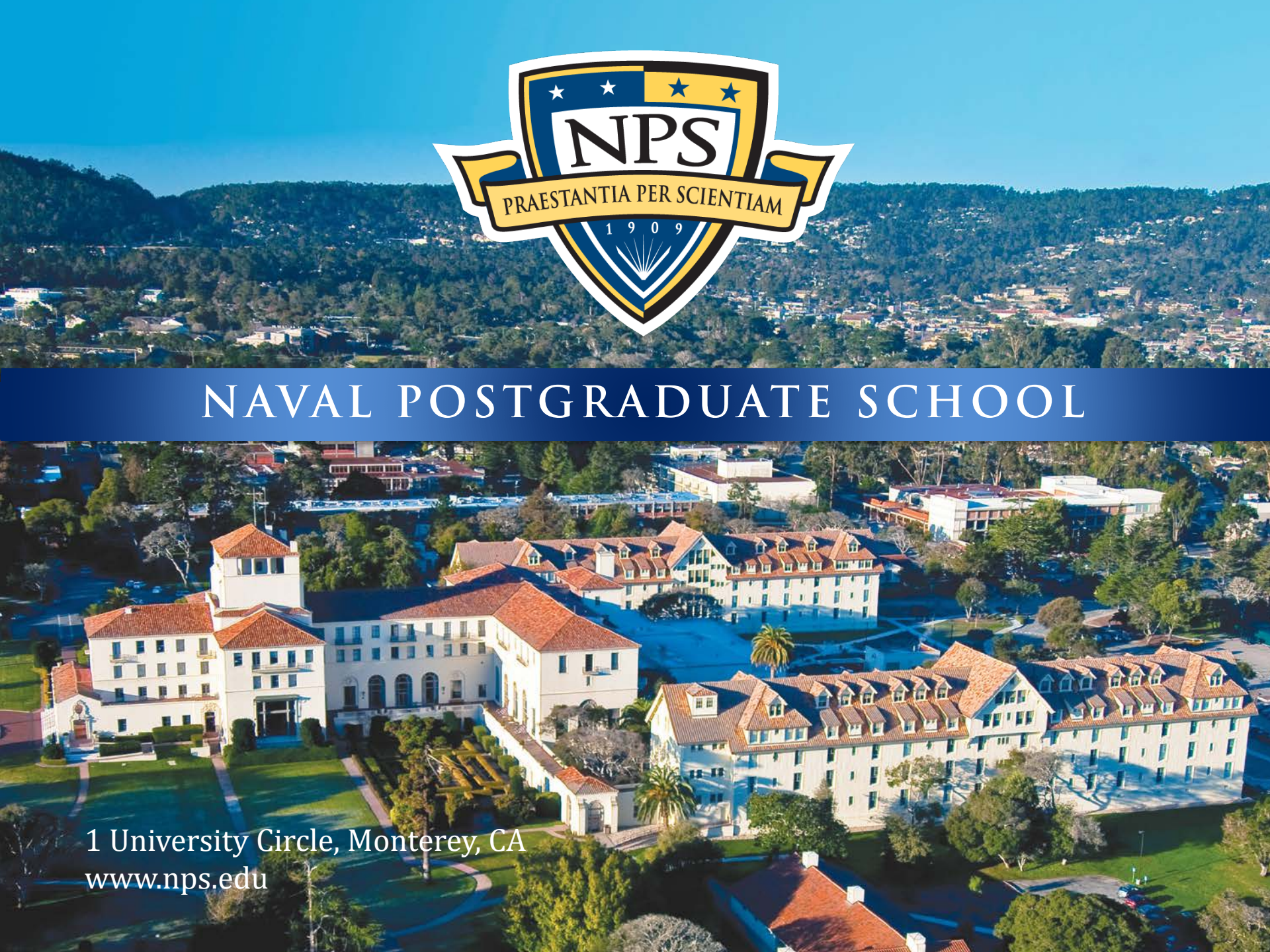
NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9
NAVAL POSTGRADUATE SCHOOL
1 University Circle, Monterey, CA
www.nps.edu

NAVAL
POSTGRADUATE
SCHOOL

An Economic Analysis of the Truth in Negotiations Act (TINA)

Chong Wang
Rene Rendon

Crystal Champion
Meredith Ellen
Jenny Walk

Roadmap

- Framework of the Study
- Truth In Negotiations Act
- Literature Review
- Major Analysis
- Policy Implications
- Conclusion

Framework of the Study

- Purpose: To perform an economic analysis of TINA
- Economics based, incentive-centric approach
- Policy Implications

Truth in Negotiations Act (TINA)

- TINA was first enacted in 1962 (Public Law 87-653)
- TINA requires contractors (often sole-source or near sole-source) to submit "cost or pricing data" that is "current, complete, and accurate."
- Failing to disclose truthful information could lead to civil or criminal investigation.

Economic Literature Review

- Principal-Agent Contract Setting
- DoD procurement is subject to two kinds of problems

  Adverse Selection (Hidden Information)

  Moral Hazard (Hidden Effort)

Economic Literature Review (cont'd)

- Two objectives of optimal contracting: limit information rents earned by agent; induce the agent's best effort.

- Power of Incentive Schemes varies across the spectrum of contract types

FFP: high power incentive scheme

CPFF: low power incentive scheme

Economic Literature Review (cont'd)

- The non-commitment nature of the government contracts naturally leads to contractors' fears of being "ratcheted up" if they reveal their lowest possible cost.

- *Cost Padding* includes, but is not limited to, incurring excessive costs to the government, such as leisurely meetings, first class travel, and business lunches. Other examples are shifting overhead costs from commercial business to government contracts and engaging in various bookkeeping tricks to manipulate costs.

Major Analysis:

Distorted Incentives: Use of TINA with Firm Fixed Price (FFP) Contracts

- Background: there is a current policy push toward more use of FFP contracts.
- FFP contracts *without TINA*, despite many weaknesses, are free of the moral hazard problem.
- FFP contracts, *with TINA*, lose the benefit of being a high power incentive scheme.
- "*TINA cannot force defense contractors to reveal the lowest possible cost that they could produce at if they exerted an optimal effort. Rather, it essentially tells them that the price they negotiate must be close to the cost they actually incur.*" ---Rogerson (1994)

Major Analysis:

A numerical example

- We use the theoretical framework in Laffont and Tirole (1993), under which a contractor's cost function is specified as follows:

$$c = c(\beta, e) \qquad (1)$$

where β is a state parameter (e.g., technology) and e is the effort. One can interpret that β is the adverse selection parameter and represents a contractor's private information, and e is the moral hazard parameter.

Without losing generality, assume the state parameter β has three possible outcomes: good, neutral, or bad, with equal probability of occurring. Moreover, the contractor can choose either work hard (e=10) or shirk (e=1).

Major Analysis:

A numerical example (cont'd)

- Imagine the cost function takes the following form:

$$c = \beta + \frac{10}{e}$$

Note that the cost increases with β (so β is an inverse indicator of state parameter) and decreases with e (effort reduces cost).

- Case 1) Good situation: (β=10), with probability 1/3

$$c = 10 + \frac{10}{e} \qquad (2)$$

- Case 2) Neutral situation: (β=20), with probability 1/3.

$$c = 20 + \frac{10}{e} \qquad (3)$$

- Case 3) Bad situation: (β=30), with probability 1/3.

$$c = 30 + \frac{10}{e} \qquad (4)$$

Major Analysis:

A numerical example (cont'd)

- Hidden Information: The contractor knows the probability distribution of the natural state, whereas the government does not know.
- Assume that the contractor's negotiation strategy is to ensure breakeven even in the bad situation, and he or she can still shirk.
- Consequently, the contractor will submit $40 as the cost estimate by equation (4), and the less informed government would most likely accept.
- Assume that the government imposes TINA, stating that if the incurred cost is more than 25% lower than $40 (i.e., below $30), then the contractor is subject to a TINA audit.

Major Analysis:

A numerical example (cont'd)

- One-shot game
- The sequences of actions: The contractor submits the bidding price, accepted by the government, who attaches TINA to the FFP contract. Then the natural state reveals, the contractor chooses effort, and finally, the cost is incurred.
- If a bad situation happens, the contractor will choose to work hard (e=10), so the cost is \$31 by equation (4), a TINA audit is not triggered, and the contractor earned a profit of \$9. There is no moral hazard problem in this situation.

$$c = 30 + \frac{10}{e}$$

Major Analysis:

A numerical example (cont'd)

- In the case of a neutral situation, if the contractor works hard (e=10), his or her cost would be $21 by equation (3), which is good in the absence of TINA, yet not good when TINA is in place; this is because any cost below $30 would trigger a TINA audit. The contractor, knowing this risk, would choose to shirk (e=1), so the cost will be $30 by equation (3), which successfully hides the contractor under the radar of TINA. In this scenario, the moral hazard problem is *created* by TINA.

$$c = 20 + \frac{10}{e}$$

Major Analysis:

A numerical example (cont'd)

- What if the most favorable natural state emerges? In that case, if the contractor works hard, he or she will incur a cost of $11 by equation (2), which is going to raise a big red flag to the government. Therefore, the contractor is going to shirk; however, because the natural state turns out to be so favorable, even shirking is not enough to mute the alarm of TINA. (Note that shirking in case 1 would yield a cost of $20, which is below the audit threshold value of $30, and hence will trigger the TINA audit.) So what would the contractor do to evade the TINA investigation? The contractor will engage in cost padding and artificially increase the reported cost to at least $30, so he or she will not get into trouble. Now in this scenario, TINA not only created a Moral Hazard problem, but also generated bad incentives for defense contractors to engage in unethical and opportunistic cost padding.

$$c = 10 + \frac{10}{e}$$

Policy Implications:

Fixing Incentives: From Static to Dynamic Perspective

- One-shot Static Game

A good starting point is a static situation where no further contract is possible. Using the numerical example, the government already paid $40; because the contractor can avoid a TINA audit in all three possible scenarios by either shirking or cost padding or both, the government payment becomes fixed. Therefore, any higher profit of a contractor will lead to a higher social welfare. The implication is straightforward: In order to correct the ill incentives created by TINA in the context of FFP, policy makers need to undo the bundling, that is, remove TINA from FFP, so the FFP is back to a high power incentive scheme.

Policy Implications:

Fixing Incentives: From Static to Dynamic Perspective

- Repeated game with non-commitment

In the one-shot static game, when TINA is removed from an FFP contract, the contractor is fully motivated to exert the best effort to maximize profit. Since no future contract is possible, the contractor is not afraid to reveal private information (i.e., the minimum cost that can be achieved through the best effort), because there is no possibility for the government to exploit the private information revealed against the contractor in the future.

In a repeated game where contracts have one base year and option years which can be exercised by the government, a simple removal of TINA from a one-year FFP contract may not be sufficient to induce the contractor's best effort. The contractor is in a very vulnerable position in the sense that if he or she chooses to reveal private information at the early stage of the game, that information may be used against him or her later so no future information rents would be possible.

If a one-year FFP contract without TINA is not enough to motivate, the government should consider multiple-year FFP contracts without TINA. This is especially useful if the product is demanded on a continuous basis. The idea is this: Make the reward of revealing the best-effort cost big enough that the contractor voluntarily tells the government the lowest achievable cost. It is wise to let the contractor win early, win big, but win only once. The government, and hence the taxpayers, win in the long run and win even bigger.

Policy Implications:

Fixing Incentives: From Static to Dynamic Perspective

- Multiple-years contracts:

  Numerical example continued

Without losing generality, assume the government needs to order this product every year for 15 years. If each year, TINA is attached for 15 annual contracts, the contractor will always choose to shirk or "shirk and cost padding" in order to avoid the TINA audit, as well as keep the information rents for the future. Hence, the government will end up paying $600.

Assume that a five-year FFP contract is sufficient to induce the contractor to exert his or her best effort. Therefore, the government commits to pay $40 each year for five years with no TINA strings attached. With this commitment, the contractor is fully motivated to work as hard as possible, and the lowest possible cost is revealed to the government. The government, who observes that the true expected lowest possible cost is $21 (i.e., $\frac{1}{3} * 11 + \frac{1}{3} * 21 + \frac{1}{3} * 31$), will use that information to price the future 10-year contracts. Under the assumption that a 10% profit is allowable, the government will offer a $23.1 ($21*1.1) annual FFP contract for the remaining 10 years. So the total government payment now becomes $40*5+$23.1*10=$431, a savings of $169 relative to the original situation. Note that if the time span is longer—say, 25 years as opposed to 15 years—then the government savings will be even larger.

Conclusions

- Current TINA practices, despite the good intentions of the act, are subject to unintended negative consequences that arise from contractors' bad incentives. Such bad incentives are inherently associated with the current TINA framework.

- A lax use of TINA may be better than a strict one.