Retraction Notice

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Comment:

The paper does not meet the standards of "Theoretical Economics Letters".

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Editor guiding this retraction: Prof. Moawia Alghalith (EiC, TEL)

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Reference Points as Information Frames

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Abstract

In order to study the idea of a context provided by an informed principal I propose the idea of an information frame. An information frame controls the nature of information that the agent has access to and depends on some simple parameters such as compatibility of interests and complexity of the uncertain parameter. In the process, I define the condition for a feasibly stable information frame for the case of a principal interacting with a single agent as well as with multiple agents.

Keywords

Information Frame, Reference Point, Context, Contracts, Principal-Agent

1. Introduction

The focus of this paper is to provide a contribution to the incomplete contract literature,[1] which now rests predominantly on the idea of uncertainty emanating from a variable that is not common knowledge to both parties in a relationship. The idea of reference points [2] is the most compelling justification for incompleteness, yet what constitutes a reference point seems to be vague. With that as impetus this paper presents the idea of an information frame. Such a frame can exist in a variety of settings that are formally or informally "contractual" in nature, so the idea is developed for a principal-agent relationship without appealing to a formal contract. The benefit of an information frame can be broader than such relationships—indeed, perhaps it is most useful in defining the idea of a broader context more formally.

The characteristics of the information frame in this paper depend simply upon the trust that the agent has in the principal's announcement of her information, the compatibility of interests and the complexity of the uncertainty parameter. In the following section I develop a model by first considering the case of an information frame for a single agent and then extend the intuition to the multi-agent case.

[1] A useful synopsis of this vast literature can be found in Aghion and Holden (2011) [1].

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2. A Model of Information Frames

Consider, to begin with, the situation where an agent's utility function depends on an action *a*, and *ex ante* uncertain market price, υ; assume the functional form $f(\upsilon,a)=\upsilon a-a^2/2$, where the agent's cost of labor is captured by $a^2/2$, $a\geq 0$ and, assume that $\upsilon=\{1,3,7\}$ with equal probabilities. The agent, therefore, maximizes the expectation $E_\upsilon\left(f(\upsilon,a)\right)$, which is essentially just $(E\upsilon)a-a^2/2$. The agent's efficient action is thus $a^*=11/3$.

Imagine, further that a principal frames the agent's informational environment. Specifically, this occurs in a simple manner: while the principal is informed about the market price, she announces only the expected range of the market price and the agent trusts the announcement. Thus, if the principal announces the range of υ to be $\{3,7\}$, declaring 1 to be impossible, the agent's efficient action is now $a^*=5$. It is easy to see that principal can frame the informational environment in 7 different ways to elicit any of 7 desired actions from the principal.

This caricatured situation may not be unrealistic if the principal is better informed and the agent and the principal have incentives that are fairly well aligned. However, consider the case where the agent harbors doubts that the principal's announcement is advantageous to him. What would the informational frame look like?

Let $g(\upsilon,a)$ be the principal's objective function and let $m\in M$ be a message from the principal. The principal's message is then dependent on the state, $m(\upsilon)$, and the agent's strategy relies on the announcement, or $a(m)$. Assuming the distribution over Υ is known to both parties, consider the following timeline for this interaction: first, the principal announces $m(\upsilon):\Upsilon\to M$; second, the real value of υ is revealed; third, the principal announces $m\in M$; finally, the agent selects $a=a(m)$. At the third stage of the interaction, the agent processes the message as $\{\nu\in\Upsilon \mid m(\nu)=m\}$.

Crucially, since this time round, at the third stage of the interaction, the agent processes the message as $\{\nu\in\Upsilon \mid m(\nu)=m\}$, we assume that the principal revises the announcement with a partition *M* at the outset such that $M=\{\Upsilon_1,\cdots,\Upsilon_k\}$, where $\bigcup_{i=1}^{k}\Upsilon_i=\Upsilon;\Upsilon_i\cap\Upsilon_j=\varnothing\ \forall i\neq j$.

At the third stage the principal provides the agent with an informational frame $\Upsilon_i\in M, i\in K\in\{1,\cdots,k\}$. Imagine that the agent receives this frame and trusts it. The agent's efficient action must maximize the conditional expectation of his utility from the relationship, given that the values ν may assume are curtailed to Υ_i. Thus:

$$A_i^*=\underset{a\in A}{\operatorname{Argmax}}\,E_{\nu\in\Upsilon_i}f(\nu,a),\ i=1,\cdots,k$$

where A^* is the set containing all feasible efficient actions for the agent.

2.1. A Feasibly Stable Frame for a Single Agent

Any given informational frame belonging to *M* provided by the principal to the agent is defined as being a *feasibly stable frame* if for any $\nu\in\Upsilon$ the principal benefits from announcing a member of *M* that includes ν. Thus,

$$\forall i\in K\ \forall\nu\in\Upsilon_i\ \forall a^*\in A_i^*\ \forall a\in A^*: a\in A_i^*;\text{or } g(\nu,a^*)\geq g(\nu,a)$$

With a feasibly stable frame, the agent and the principal both benefit. The principal benefits from truthful revelations and the agent benefits from relying on the principal's informational frame.

However, whether the condition is satisfied relies on the partition *M* since it dictates the number of elements, *k*, the elements themselves, Υ_i, and the sets of feasible efficient actions, $A_i^*, i=1,\cdots,k$. Therefore, feasible stability requires that the informational frame be conformable with the partition *M*. Since we assume that Υ is finite, so is the partition *M*. In the case of an infinite set Υ, the partition *M* is not necessarily infinite: $M=\{\Upsilon_z\}, z\in Z$. However, the assumption that each element of the partition be measurable is needed in order to evaluate the efficient action of the agent.

In contrast with the example at the beginning of this section, assume now that the agent does not believe the truthfulness of the information frame provided by the principal. The principal therefore has to adjust the frame to make it *feasibly stable*.

Assume for the purpose of illustration that the principal's objective has the functional form: $g(\nu,a)=\xi\nu a-a^2/2$, where $\xi > 0$ captures the degree of compatibility between the interests of the principal and the agent. As before, assume that ν represents an uncertain outcome, such as the market price, and is drawn from $\Upsilon = \{1,3,7\}$ with equal probability. The principal is revealed the true value of ν, and she then announces it to the agent. The costs of production are shared equally and the surplus is divided between the principal and the agent based on ξ.

Consider then, how the principal might make *M* feasibly stable by placing restrictions on ξ.[2]

In the present case, we have

$$k = 3, \Upsilon_1 = \{1\}, \Upsilon_2 = \{3\}, \Upsilon_3 = \{7\}, A_1^* = \{1\}, A_2 = \{3\}, A_3 = \{7\}$$

The feasibly stable frame can be provided with the following parameters:

$$g(1,1) \geq g(1,3) \Leftrightarrow \xi - 1/2 \geq 3\xi - 9/2;$$

$$g(1,1) \geq g(1,7) \Leftrightarrow \xi - 1/2 \geq 7\xi - 49/2;$$

$$g(3,3) \geq g(3,1) \Leftrightarrow 9\xi \geq 3\xi - 1/2;$$

$$g(3,3)) \geq g(3,7) \Leftrightarrow 9\xi - 9/2 \geq 21\xi - 49/2;$$

$$g(7,7) \geq g(7,1) \Leftrightarrow 49\xi - 49/2 \geq 7\xi - 1/2;$$

$$g(7,7) \geq g(7,3) \Leftrightarrow 49\xi - 49/2 \geq 21\xi - 9/2.$$

The solution for the system is bounded between $5/7 \leq \xi \leq 5/3$ providing an upper limit for the principal's incentives to provide the agent with an untruthful frame.

Proposition 1:

When the objective functions of the agent and the principal are identical, the complete partition *M* (*i.e.*, every member of the partition is exactly equal to a member of the set) is feasibly stable.

Proof.

Feasible stability for the information frame is always satisfied when the objective functions of all parties are identical.

$$\forall \nu \in \Upsilon \, \forall a^* \in A_\nu^* \, \forall a \in A^* : a \in A_\nu^*, \text{ or } \; f(\nu, a^*) \geq f(\nu, a),$$

where

$$A_\nu^* = \operatorname*{Argmax}_{a \in A} f(\nu, a), A^* = \bigcup_{\nu \in \Upsilon} A_\nu^*.$$

Proposition 2:

A partition *M* that comprises a unique member, such that $M = \{\Upsilon\}$, provides for a feasibly stable frame.

Proof.

The proof is simple since, a principal that announces the entire set Υ to the agent, provides no "frame" and the agent selects efficient action based on the known distribution of Υ.

2.2. A Multi-Agent Information Frame

It is readily imaginable that an information frame can be used across several agents. The announcement itself can contain another parameter beyond the information she possesses on the uncertain variable-the information possessed by other agents. While it is possible that the information frames themselves can vary by the agent, we consider the case where the frames is identical and announced to all agents.

Assume that there are *n* agents, each of who select actions $a_i \in A_i$, and with objective functions characterized by $f_i(\nu, a_1, \cdots, a_n), i = (1, \cdots, n)$. Yet again, the distribution of the uncertain market price $\nu \in \Upsilon$ is commonly known to all participants (*i.e.* it is known commonly that it is commonly known).

[2]Note that a feasibly stable, and, indeed, a truthful, information frame corresponds to the partition $M = \{\{1\},\{3\},\{7\}\}$ which would announce the true realized value of ν.

Without an information frame, any vector of optimal actions for the agents in equilibrium must satisfy

$$a_i^* \in \underset{a_i \in A_i}{\operatorname{Argmax}} E_\nu f_i\left(\nu, a_1^*, \cdots, a_{i-1}^*, a_i, a_{i+1}^*, \cdots, a_n^*\right), i = (1, \cdots, n).$$

If we assume that the agents believe a principal's announcement of $\breve{\Upsilon} \subset \Upsilon$, the equilibrium action vector then must satisfy

$$a_i^* \in \underset{a_i \in A_i}{\operatorname{Argmax}} E_{\nu \in \breve{\Upsilon}} f_i\left(\nu, a_1^*, \cdots, a_{i-1}^*, a_i, a_{i+1}^*, \cdots, a_n^*\right), i = (1, \cdots, n).$$

Now assume that the principal provides an information frame based on the partition $M = \{\Upsilon_\beta\}, \beta \in B$, and the Nash equilibria $NashEq(\Upsilon\beta)$ are nonempty for all β. Let A_β^* denote the agents' equilibrium action vectors based on the principal's announcement of Υ_β:

$$A_\beta^* = NashEq\left(\Upsilon_\beta\right).$$

Like the single-agent case, let A^* be the set of all equilibrium action vectors for a given information frame from the principal:

$$A^* = \bigcup_{\beta \in B} A_\beta^*.$$

Thus, we have the following definition.

2.3. Definition of a Multi-Agent Feasibly Stable Information Frame

The *multiagent feasibly stable frame* case can be restated as

$$\forall \beta \in B\ \forall \nu \in \Upsilon_\beta\ \forall a^* \in A_\beta^*\ \forall a \in A^* : a \in A_\beta^*$$

$$\text{or } g\left(\nu, a^*\right) \geq g\left(\nu, a\right).$$

While propositions 1 and 2 hold true for the multi-agent case as well, the key distinction for the multi-agent case is in the stability of the outcome when the average benefit across all agents decreases. To see this consider the outcome with the principal and two agents. Assume that the uncertain market price is simply drawn from $\Upsilon = \{1, 2\}$, with $P(\Upsilon = 1) = 3/5$ and $P(\Upsilon = 2) = 2/5$. Payoffs for the agents are given by the following matrices with the rows represent the strategies for the first agent:

$$\overset{\nu=1}{\begin{pmatrix} (4,4) & (0,0) \\ (0,10) & (6,6) \end{pmatrix}} \overset{\nu=2}{\begin{pmatrix} (4,4) & (0,0) \\ (15,0) & (1,1) \end{pmatrix}}$$

The principal's payoff is given by

$$g\left(\nu, a_1, a_2\right) = \begin{cases} 10, & \text{if } \nu = a_1 = a_2 \\ 0, & \text{otherwise} \end{cases}$$

In the absence of an information frame (or with a unique member in the partition), the agents simply maximize the expectations of their payoffs, resulting in the equilibrium $a_1 = 2, a_2 = 1$ and $E_\nu f_1(\nu, 2, 1) = E_\nu f_2(\nu, 2, 1) = 6$. The principal's payoff is thus nil.

Naturally, the outcome changes if the principal announces ν to the agents since the frame is then feasibly stable. $M = \{\{1\}, \{2\}\}$, $A_1^* = \{(1,1)\}$, $A_2 = \{(2,2)\}$,

$$g(1,1) = 10 > 0 = g(1,2),$$

$$g(2,2) = 10 > 0 = g(2,1).$$

When $\nu = 1$, $a = (1,1)$ and the agents receive a payoff of 4. For $\nu = 2$, $a = (2,2)$ and the agents receive 1; in either case the principal's payoff is 10. Thus, the feasibly stable information frame $\{\{1\}, \{2\}\}$ is optimal albeit with the outcome that the agents receive reduced payoffs.

3. Concluding Remarks

This paper proposed the idea of an information frame: essentially, an intuitive restatement of the notion of contracts serving as reference points, or for the general idea that the broader context matters to transactions. I have taken a simple view in this paper—simply that the the principal controls the informational environment of the agent—and shown some of the key constraints that such a frame would rely upon. Naturally, several extensions are possible to this setup such as examining frames that might differ by classes of agents, and perhaps even nested frames that can be derived from the frames that they rely upon in order to study institutional contexts for contracts more formally.

References

[1] Aghion, P. and Holden, R. (2011) Incomplete Contracts and the Theory of the Firm: What Have We Learned over the Past 25 Years? *Journal of Economic Perspectives*, **25**, 181-197. http://dx.doi.org/10.1257/jep.25.2.181

[2] Hart, O. and Moore, J. (2008) Contracts as Reference Points. *Quarterly Journal of Economics*, **123**, 1-48. http://dx.doi.org/10.1162/qjec.2008.123.1.1