Fundamental Theory of Institutions

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"Fundamental theory of institutions: a lecture in honor of Leo Hurwicz," Review of Economic Design 13:59-75 (2009).
http://home.uchicago.edu/~rmyerson/research/hurwicz.pdf

"Perspectives on mechanism design in economic theory," in American Economic Review 98(3):586-603 (2008), and in Les Prix Nobel (2007).
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Overview

- Hurwicz's idea of incentive compatibility has extended the framework of economic analysis to allow comparison of different economic systems.

- The advantages/disadvantages of private property or collectivization can be analyzed by models of *moral hazard* and *adverse selection*.

- Analyzing moral hazard problems in the state itself can help us to understand the foundations of the state and constitutional limits on state powers.

Hayek: institutions as mechanisms for coordination

"The economic problem of society is not merely a problem of how to allocate 'given' resources. It is rather a problem of how to secure the best use of resources known to any of the members of society, for ends whose relative importance only these individuals know. It is a problem of the utilization of knowledge not given to anyone in its totality."

"This character of the fundamental problem has, I am afraid, been rather obscured than illuminated by many of the recent refinements of economic theory, particularly by many of the uses made of mathematics."

F. A. Hayek, "The use of knowledge in society," Amer. Econ. Review (1945).

Inconclusiveness of old **debates about socialism vs. capitalism** (Barone, Lange; Mises, Hayek) showed limits of price theory for evaluating other institutions.

Hayek (1945): To answer such questions about fundamental institutions, we must recognize that markets are mechanisms for communication.

Hurwicz introduced incentive compatibility

Hurwicz accepted this challenge, to show how mathematical models can provide a general framework for analyzing different institutions.

Hurwicz (1972) extended Samuelson's (1954) remark on misrepresentation of public-good benefits, and found incentives to misrepresent values in private-good markets too.
Then he introduced the general concept of **incentive compatibility**.

When Hurwicz defined incentive compatibility, "the issue of incentives surfaced forcefully, as if a pair of blinders had been removed" (Makowski-Ostroy, 1993).

Incentive compatibility and incentive constraints

When individuals have private information and choose hidden actions, social planners face two kinds of incentive constraints:

Informational incentive constraints (adverse selection): individuals need incentives to report their private information honestly.

Strategic incentive constraints (moral hazard): individuals need incentives to act obediently according to the plan.

In an **incentive-compatible coordination plan**, individuals send confidential reports to a central mediator, who then confidentially recommends their actions under the plan, such that it is an equilibrium for everyone to report honestly and act obediently.

In applied problems, the incentive-compatible coordination plans can be characterized by simple mathematical inequalities, which say that individuals' expected payoffs from honestly obeying the plan must be greater than from dishonesty or disobedience.

The revelation principle

Without loss of generality, a trustworthy mediator can plan to make honesty and obedience the best policy for everyone.

For **any coordination plan, any equilibrium** of people's (dishonest) reporting and (disobedient) reactions is **equivalent to an incentive-compatible** plan that makes honesty-and-obedience an equilibrium.
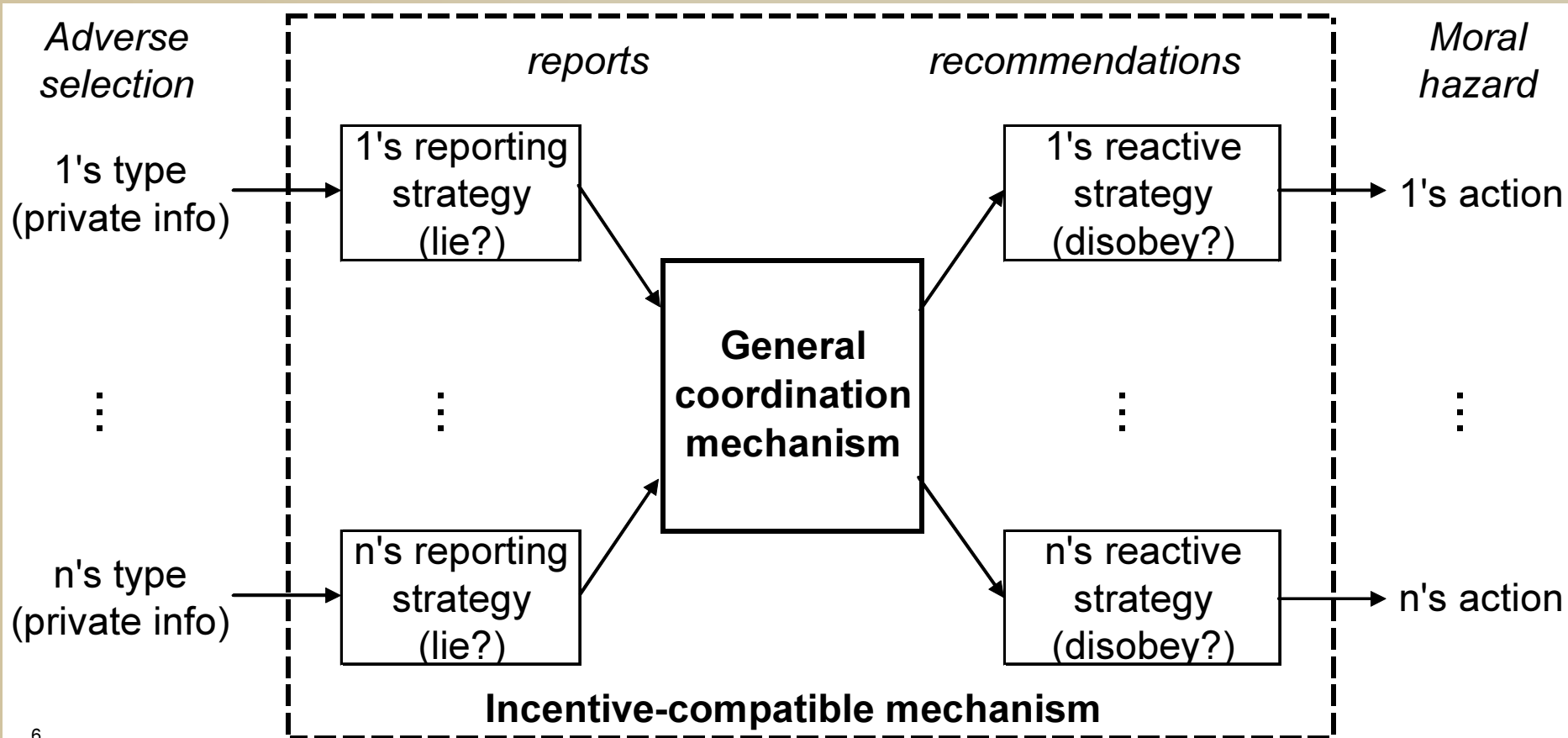
The old debates did not consider incentive constraints

Before 1972, economists could model resource constraints, but not incentive constraints.

Hayek's arguments showed an awareness of incentive problems

But with no formal analytical models of incentives, his arguments were rhetoric without tight logical support.

Now economists have general tools for analyzing incentive problems in any economic system.

How can we formulate Mises and Hayek's arguments against socialism in the modern incentivist framework?

Mises saw the essential problem arising in socialist allocation of capital, because state ownership of means of production implies lack of any capital market.

Corporate finance and allocation of capital

Questions about incentive mechanisms for allocating capital are a topic of corporate finance.

Jean Tirole's *Theory of Corporate Finance* (2006) has many models analyzing incentives in corporate finance, but these are based on two
  • a basic model of **moral hazard** in capital allocation   ,
  • a basic model of **adverse selection** in capital allocation

Each model describes a simple world which we can transform by socialist reforms and then see how the efficiency of capital allocation is affected. The result may show something about what is fundamental in this debate.

A basic moral-hazard model

A project's probability of success depends on manager's hidden effort.

To deter abuse of power, **manager must have stakes** to lose in failure.

Under socialist egalitarianism, who has stakes commensurate with the temptations in managing industrial concentrations of capital?

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p_G = P(success if act good) = 1/2, p_B = P(success if act bad) = 1/4,
K = (capital input) = 100, R = (returns if success) = 240,
B = (agent's private benefit of bad action) = 30. *So* $p_G R > K > p_B R + B$.

Given agent's collateral A < 60, choose w = (wage if success) $\geq$ −A
    to maximize expected social profit $V = p_G(R − w) + (1−p_G)A − K$
    subject to: $p_G w − (1−p_G)A \geq 0$,   [*participation*]
    $p_G w − (1−p_G)A \geq B + p_B w − (1−p_B)A$.   [*G-obedience*]

Solution: w = 120−A, and so V = A−40.
    $V \geq 0$ is not feasible unless the agent has collateral $A \geq 40$.
    The agent gets ***moral-hazard rents*** worth $p_G w − (1−p_G)A = 60 − A$.

In this example, even if we allow punishment of managers who fail, the investing society cannot expect to profit from the investment unless the manager has substantial assets to lose (A>20).

But the state could profitably motivate managers who have no assets by punishing failure if there were no participation constraint (coercive recruitment of managers).

$p_G = 1/2$, $p_B = 1/4$, $K = 100$, $R = 240$, $B = 30$, $A < 60$.

Choose w = (wage if success) $\geq -A$ and z = (punishment if fail) ≥ 0
 to maximize expected social profit $V = p_G(R - w) + (1-p_G)A - K$
 subject to: $p_G w - (1-p_G)(A+z) \geq 0$,   [*participation*]
 $p_G w - (1-p_G)(A+z) \geq B + p_B w - (1-p_B)(A+z)$.   [*G-obedience*]

Solution: $z = 60-A$, $w = 60$, and so $V = 0.5A-10$.

$V \geq 0$ is not feasible unless the agent has collateral $A \geq 20$.

Without participation constraint: w=0, z $\geq$ 120 motivates G, yields V=20.

Lessons about achieving full efficiency

There are two **ways to achieve full efficiency** with such moral hazard:

(1) allow some individuals to hold more wealth, (perhaps favoring heroes of the Socialist Revolution, or of the Norman Conquest);

(2) drop the participation constraint, force people to become managers without compensation for punishment risks (perhaps prisoners or enemies of the state).

Either way, **socialism looks rather less appealing** from the perspective of this model! As a source of insights into the flaws of Soviet communism, this simple moral-hazard model does well, capturing the implicit logic in some of Hayek's intuitive arguments:

> *"To assume that it is possible to create conditions of full competition without making those who are responsible for the decisions pay for their mistakes seems to be pure illusion."* (Hayek,1935)

A basic adverse-selection model

A project's probability of success depends on the manager's hidden type, good or bad. The manager can misrepresent his type.

Socialist monopoly of capital can facilitate honest communication, as bad agents cannot gain from imitating good if nobody gets profits.

Given $p_GR > K > p_BR$ [*E(Return| GoodType) > K > E(Return| Bad)*], π=Pr(G).

Choose (q_G, q_B, w_G, w_B) to maximize expected social profit:
$$V = \pi\, q_G[p_G(R-w_G) + (1-p_G)A - K] + (1-\pi)q_B[p_B(R-w_B) + (1-p_B)A - K]$$
subject to: $w_G \geq -A$, $w_B \geq -A$, $0 \leq q_G \leq 1$, $0 \leq q_B \leq 1$,   [*resources*]

$q_G[p_Gw_G - (1-p_G)A] \geq 0$, $q_B[p_Bw_B - (1-p_B)A] \geq 0$,   [*participation*]

$q_G[p_Gw_G - (1-p_G)A] \geq q_B[p_Gw_B - (1-p_G)A]$,   [*honesty-G*]

$q_B[p_Bw_B - (1-p_B)A] \geq q_G[p_Bw_G - (1-p_B)A]$.   [*honesty-B*]

In socialism, the ideal q_G=1, q_B=0 is feasible even if A=0, with w_G=0=w_B.

In capitalism, competitive lending implies V=0 in equilibrium, but then the ideal q_G=1, q_B=0 is not feasible if agent's collateral A is small.

Socialism looks good in the adverse-selection model

Under socialism, there is no problem getting the manager to reveal type honestly: just pay him 0 (above standard wage) no matter what he says.

This example was interesting in Tirole's book because he assumed that competitive investors must get E(NetProfit)=0 given their beliefs about the manager.
So bad types who imitate good types could get favorable terms of credit.

Under socialism, the monopolistic state lender can fully exploit good types.

Moral hazard, adverse selection, and property rights

Socialism differs from capitalism in allowing less property rights.
Moral hazard can explain why efficient institutions give individuals property rights.

Our second model suggests that adverse selection might be less problematic under an ideal form of socialism if there were no moral hazard.
Property rights give people different vested interests, which can make it more difficult to motivate them to share their private information.
Collectivizing property can ameliorate adverse-selection problems, but it can exacerbate moral-hazard problems.

But moral hazard provides a fundamental economic rationale for some property rights that must apply even under socialism.
So adverse-selection problems can also be important under socialism.

In the basic moral-hazard model without punishment (z=0), add a small probability of the manager being a bad type who only has the p_B probability of success.
With small A, such bad types would imitate good types to get moral-hazard rents.

Capitalism and liberalism

Proponents of the free-market system do not advocate it merely as an excuse for abandoning egalitarianism.
A free market system is supposed to distribute power widely:
Milton Friedman argued for "capitalism and freedom."

To formalize such arguments, costs of unrestrained central power should be analyzed in models with moral hazard at the center of government.

To encourage investments that increase his tax base, even the ruler may prefer to create political guarantees of private property rights, even when such liberalization entails a risk of his losing power.

Efficient investment may require a broad distribution of property rights to many people, who then need political power to protect their rights.
In this sense, efficient capitalist investment may be associated with political liberalism that constrains the ruler's power.

Economic moral hazard at the center of government

To encourage investments that increase his tax base, even a ruler may prefer to create political guarantees of private property rights, even when such liberalization entails a risk of his losing power.

Incentives for such liberalization may depend on natural resources.

$Y(\kappa)$ = (output flow if κ invested) = $(\kappa+n)^{0.5}$, n = (natural resources) = 12, r = (discount rate) = 0.05, b = (basic political-risk rate) = 0.05, a = (additional risk per liberalization) = 0.05. [κ is durable, mobile.]

Choose κ = (total capitalist investment) and λ = (political liberalization) to maximize the ruler's expected value $V = (Y(\kappa) - r\kappa)/(r+b+a\lambda)$ subject to $V \geq (1-\lambda)(\kappa + Y(0)/(r+b))$. [*no incentive to expropriate*]

With n=12, ruler's optimal regime is: $\lambda = 0.504$, $\kappa = 52.4$. ($\lambda=0 \Rightarrow \kappa=0$.)

With n=0, optimal regime becomes $\lambda = 0$, $\kappa = 44.44$.

With n=25, optimal regime becomes $\lambda = 0$, $\kappa = 0$.

Moral hazard at the foundations of the state

Leo Hurwicz's last papers focused on questions of how the rules of basic social institutions, like a nation's political constitution, are enforced.
Who guards the guardians? Who enforces the law on the law enforcers?

Institutional rules are enforced by officials, who prosecute others' violations.
Motivating officials to enforce institutional rules is a moral-hazard problem.

Becker Stigler (1974) showed that such officials must be motivated by expectation of back-loaded rewards for fulfilling their institutional responsibilities.
Efficient incentive plans promise large late-career rewards for good records.

Such incentives for agents of the state must be guaranteed by its leaders.
Institutions are established by leaders with reputations for reliably rewarding good service by followers in a network of patronage.

Distribution of moral-hazard rents in high office

Legal and constitutional rules of government are effective only when enforced by actions of individual agents of government.

Powerful government agents could profit from abusing power, and so they must expect greater long-run rewards from good service.
Candidates would be willing to pay for such highly rewarded offices.

Agents' rewards must depend on judgments of their superiors in the network, and so incentives ultimately depend on top leaders.
Promises of back-loaded rewards become a debt owed by the state, which leaders could be tempted to repudiate (by false accusations).

To build a state, a leader (Cyrus) must solve this central moral hazard problem of binding himself credibly to reward past service.
Solution: organize top supporters in a court or council where they monitor his distribution of rewards and offices, as they serve him. [My *APSR* '08]
The leader's personal constitution: keep the courtiers' collective trust.

The first economist's fable on foundations of the state

A fable by Xenophon (who also wrote the *Oeconomicus* around 360BC).

In *Education of Cyrus*, Xenophon tells us that Cyrus apparently[*] loved "justice" and was the best leader to distribute booty from battles generously and in proportion to valor.
([*]Or maybe he loved the wealth and power from his good reputation?)

So Cyrus the Great founded the Persian Empire with one essential quality of leadership: a reputation among his followers for reliably rewarding their service.

I develop a formal theoretical model that makes a similar point about the vital importance of such reputations for political leaders in:
"The autocrat's credibility problem and foundations of the constitutional state," American Political Science Review 102 (2008), 125-139.
http://home.uchicago.edu/~rmyerson/foundatn2008.pdf

Xenophon's *Education of Cyrus* (from book 1, chap 3)

When at dinner with his daughter and [her son] Cyrus, Astyages [King of Media] wished the boy to dine as pleasantly as possible. He thus put before him fancy side dishes and all sorts of sauces and meats.

Astyages said, "Does it not seem to you that this dinner is much finer than among the Persians?"

To this Cyrus answered, "No, grandfather, for the road to satisfaction is much more simple and direct among us [Persians] than among you [Medes]."

Astyages said, "Feast at least upon these meats, so that you may go home a vigorous youth."

Cyrus said, "Are you giving me all this meat, grandfather, to use however I want?" "Yes, my child, by Zeus I am," he said.

Then Cyrus, taking the meat, distributed it to his grandfather's servants and said to each, "This is for you, because you teach me to ride with enthusiasm; for you, because you gave me a javelin; for you, because you serve my grandfather nobly; for you, because you honor my mother."

He proceeded like this until he had distributed all the meat that he received.

(Cyrus later usurped the throne of Media.)

Conclusions (economic)

Since Hurwicz 1972, economists have added incentive constraints to resource constraints in our definition of the economic problem.

This advance has given us tools for analyzing different economic systems, which early-20th-century economists lacked.

The cases for private ownership or collectivism may depend on trade-offs between moral-hazard and adverse-selection incentive problems.

Distributing power more broadly in a liberal state can help to reduce the investment-limiting cost of moral hazard problems within the state itself.

Conclusions (political)

The foundations of the state depend on political leaders solving moral hazard
problems and commiting themselves to reliably reward good service.
Institutional rules are enforced by actions of leaders and officials
who must be motivated by an expectation of rewards and privileges
as long as they fulfill their institutional responsibilities.

Like the 19th-century socialists, we may dream of great social reforms.
But we should understand that the institutions of any such brave new world
would be built on narrower factional foundations, organized by political
leaders whose first imperative is to maintain their reputation for
rewarding loyal supporters.

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