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INSURANCE AS A SOLUTION TO THE TRAGEDY OF THE COMMONS

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Abstract

Tragedy of the commons is an old, yet important problem in economic theory. It refers to the process of depletion of a shared resource by people, who act independently and rationally according to their own self-interest, but with possible detrimental effects on other people, and most importantly, depletion of common resource. This depletion happens even with participants' understanding that depleting the common resource is contrary to the group's long-term best interests.

There exist three main proposed solutions to this very important problem:

- Arthur Pigou's tax on activities causing harm to others or depletion of common resources,
- Ronald Coase's proposal for property rights as a market solution of the problem,
- Elinor Ostrom's research on community management of common resources.

In this paper, we propose insurance as a solution to the tragedy of the commons.

Tragedy of the Commons

In economics, the *tragedy of the commons* is the name given to the process of depletion of a shared resource by people, who act independently and rationally according to their own self-interest, despite their understanding, or without an understanding, that depleting the common resource is contrary to the group's long-term best interests. The issue has been known and studied for a long time in economics.

One infamous example in the United States, was the use of the Cayahoga River in the late 1960's. The river was considered a "common good" and manufacturers around the Cleveland area used it to dump their chemical waste. The river became so polluted that it actually caught fire in 1969. Without any costs assigned to the use of this common good, manufacturers acted in their own interest in disposing of waste at no cost, but in reality eventually passing along the true cost of their production to American taxpayers. This case illustrates the concept of *externalities*.

Let us also note that the overuse of certain resources may happen not just because they are common, and hence are perceived as free by members of the group. It is also possible that resources are over-utilized because some costs of their use are not accounted for in transactions involving their use (e.g., the long-term storage of nuclear waste is extremely uncertain in its cost, and accounting for it in the expenses paid by a nuclear power plant or its customers may turn out to be inadequate, even if all participants in the transaction had full comprehension of the transaction and willingness to pay for resources they use, because those participants may not be around when the costs are fully realized). On the flip side, we may also overcharge for the use of certain resources, if we do not fully understand the long-term consequences of their use.

People who utilize resources without paying for them are termed *free-riders* in economics. There is no widely used term for those who under-pay, but we could call them *discounted riders.* People who receive benefits without paying for it, are very likely to maximize the use of such benefit, and increase the cost on the society even more.

Externalities

In economics, an *externality* is defined as a cost or a benefit that affects a third party, not directly involved in a transaction or activity, who did not choose to incur that cost or benefit. Externalities typically occur when the production or consumption of a product or service's price does not or even cannot reflect the true costs or benefits of that product or service for society as a whole. This results in the market equilibrium formed in presence of an externality to not be optimal.

Externalities can be either positive, i.e., beneficial, or negative, i.e., detrimental. When they are detrimental to others, they are typically a cause for significant concerns and social problems. But even when they are beneficial, they create an inefficiency, as the value of work of one market participant accrues to another one, who did not do the work for the value creation.

Governments and even private firms often take actions to correct externalities, so that market transactions can include, in some form, all the benefits and costs associated with transactions between economic agents. One approach is by imposing taxes on the producers of negative externalities, or to subsidize the producers of positive externalities. We will discuss existing solutions to the tragedy of the commons in what follows.

Existing Solutions of the Tragedy of the Commons

The existing solutions to the tragedy of the commons in economic literature come in the following three main groups:

- Arthur Pigou's tax on activities causing harm to others or depletion of common resources,
- Ronald Coase's proposal for property rights as a market solution of the problem,
- Elinor Ostrom's research on community management of common resources.

The first solution is a *Pigouvian tax*. It is a tax applied to a market activity that is generating negative externalities, i.e., imposing costs on other market participants that are not properly paid for. The tax is intended to correct an inefficient market outcome, and does so by being set equal to the cost of those negative externalities. A standard example of such an externality is for environmental pollution: A factory that produces an industrial product and pays for the use of the land, for wages of its employees, regular taxes, and the cost of materials, may still be not counting all of its costs properly if it causes environmental pollution. If the company pays a tax that allows the government to fully remove resulting pollution and its effects, the outcome of the production process will be restored to the level of maximum efficiency. Arthur Pigou (1920) developed the concept of Pigouvian tax, and it is named after him, while William Baumol (1972) brought Pigou's work into modern economics. Carbon tax, proposed for addressing the external costs of carbon emission, is a practical application of the Pigouvian tax concept.

Pigouvian tax has been critiqued and discussed widely, and alternatives have been proposed. Pigou himself, already, then followed by Friedrich von Hayek, pointed out that the assumption that the government can determine the marginal social cost of a negative externality and convert that amount into a monetary value is a weakness of the Pigouvian tax – the government may simply not have complete information to impose an efficient outcome. To quote Arthur Pigou (1954) himself: "It must be confessed, however, that we seldom know enough to decide in what fields and to what extent the State, on account of the gaps between private and public costs could interfere with individual choice." Such arguments about limited knowledge in general, and for policymakers in particular, of course have been also made specifically by Friedrich von Hayek. James Buchanan (1969) also argues for great relevance of the difference between the theoretical costs, possibly calculated by economist under the assumption of equilibrium conditions (but, of course, the very need for the introduction of the Pigouvian tax implies a disequilibrium situation), and actual implementation of the tax measure, which will be a part of the political process, with outcome dictated by practical political considerations and other issues currently addressed by policymakers, as well as the method of creation of the statue implementing the tax, and its interpretation by the tax authority.

The two most prominent alternatives have been developed by Ronald Coase (1960) and Elinor Ostrom (1990). Coase argued that market participants can come to an agreement with an efficient result, without the need for government correction or intervention, when transaction costs are low. For example, it is simple and less costly for two neighbors to arrive at an agreement about a fence, or even grazing of animals, than it is for these two neighbors to approach a third party to solve the situation for them, or worse yet, lobby for a tax properly compensating one of them for the cost imposed on the other one. Those two neighbors, by bargaining with each other, can arrive at proper compensation for any such cost. Coase also points out that even if an efficient amount of Pigouvian tax were calculated, it would not remain

efficient much longer. Let us explain this by an example. Imagine that the issue between two neighbors is the fact that the first neighbor, Mr. Smith, has decided to paint his house bright red, with blue polka dots all over it. This not only annoys his neighbor Mr. Brown, but also causes Mr. Brown to worry that the strange house of Mr. Smith will cause other people to not want to move to the area, thus lowering the market value of the house of Mr. Smith. Hence these two neighbors enter into negotiations, and after some bargaining they agree that Mr. Smith will pay Mr. Brown ten thousand dollars to compensate him for the troubles caused by strange colors. Within weeks, the news spreads that Mr. Smith pays people for living next to him, and a hundred applications are filed with local government board for new buildings to be built next to Mr. Smith.

Coase's work was formulated mostly under the assumption of market participants engaged in mutual bargaining and compensating each other. This concept is directly applicable to external costs imposed on one group by another group, but less applicable to the problem of free-riders depleting the resources of the entire community (the classical Tragedy of the Commons). Elinor Ostrom (1990) found the Tragedy of the Commons not as prevalent or as difficult to solve in practice as it appears in theory, since community participants often come up with solutions to the problem themselves. Her research looked at how real-world communities manage communal resources, such as fisheries, land irrigation systems, and farmlands, and identified a number of factors conducive to successful commons management. One factor is the nature of the resource: resources with definable boundaries (e.g., land) can be preserved more easily. A second factor is resource dependence: There must be a perceived threat of resource depletion, and it must be difficult to find substitutes. The third is the nature of the community: Small and stable populations with a reliable social network and social norms promoting conservation tend to succeed. One final condition is that there should be community-based rules with incentives for responsible use and punishments for irresponsible use. It should be noted again that Ostrom's work does not assume any form of market exchanges or bargaining, instead community works on its internal social arrangements to produce desirable outcomes.

Insurance as a solution to the tragedy of the commons

We posit how the insurance industry incorporates the best of both features of all three proposed solutions to the problems of the commons and economic externalities: the Pigou solution, the Coase's solution, and the Ostrom's solution.

In fact, the insurance industry incorporates the best features of all three proposed solutions? First, if the market participants purchase insurance against overuse of the commons, or against the cost of externalities they put out, they pay the insurance premium that acts as a tax on their resources and causes them to have an incentive to reduce the costs, especially if premium is continuously adjusted in response to evolving nature of the risk. One additional bonus is that the insurance firm has natural incentives to assess the risk realistically, and is less restricted by political calculus of power in adjusting the premium or risk management policies. It is true that the insurance firm can capture its regulators and seek rents by using the government for its self-enrichment, but this problem is not limited to insurance companies, and should be addressed by the society in general, as its very existence indicates serious problems in functioning of the common government.

Secondly, the payment of insurance premium also creates property rights that the Coase's solution calls for. Costs of damages to others must now be paid by the insurance firm, and the

insurance firm must follow insurance accounting, which requires it to reserve properly for payments of future claims.

Finally, we should remember that early insurance companies were mostly mutual firms, which were actually owned by its policyholders, resulting in better incentives for self-government. Even modern stock companies (i.e., insurance companies owned by stockholders, who are not necessarily its customers) often implement mechanisms, which are equivalent to limited property rights in the insurance firm by its policyholders, such as experience refunds (where insurance company pays some of the previously collected premium back to the policyholders when it finds that the funds were not needed to pay the claims), or participating dividends (where the insurance company shares some of its profits with its policyholders, by paying them back a portion of the company profits in the form of dividends, treated as refund of a fraction of the premium for tax purposes).

Modern large-scale production needs have resulted in large-scale industrial organizations, and large-scale corporate ownership that often appears non-personal and far removed from its customers and its employees. A mutual insurance company is a rare modern organization that may still keep some sense of community and common ownership.

The Unique Nature of Insurance

What is it about insurance that makes it unique and able to respond to risks in ways that other businesses and products do not? Insurance is a rational way for the entire society to undertake more risks, and properly account for their costs. In absence of insurance, banks would be less willing to loan money to homebuyers, businesses would be less willing to engage in construction projects, or build new facilities, and the risks of transportation would likely fall back on society. Insurance is, in fact, the only business whose (often only implicit) purpose is to increase risk taking. But this, of course, creates the issue of *moral hazard*: The tendency of insured parties to assume more risk than appropriate for the circumstance. How do insurance companies address this issue of moral hazard? The first line of defense of an insurance firm is: pricing of its products. It is also its main line of defense. An insurance product does not just have a price, it also has a complex contract structure. It excludes certain losses, it included deductibles, copays, limits, etc. In fact, the insurance contract is something very unusual and unknown in other human endeavors: Flexible and often re-negotiated property rights between the insured and the insurer. The distribution of property rights for outcome of economic activity is at the very heart of finance: Modigliani-Miller Theorem (Modigliani and Miller, 1958, see also Brealey and Myers, 2008), which roughly stated says that the value of a firm, in the absence of taxes, bankruptcy cost and agency cost, is unaffected by the method of financing it. By implication, if value is created solely by finance, it must be because of reduction of taxes, or bankruptcy costs, or agency costs. If an insurance policy creates value, it must be for similar reasons. In fact, there are insurance products, whose value is created by tax reduction. And insurance against catastrophic losses reduced cost of bankruptcy. But it should be also noted that insurance affects the behavior of the insured, and mostly in the manner causing them to assume more risk. If that risk assumption results in a commensurate increase in their economic output and their income, the overall process contributes to the welfare of the society in general.
The long-term risk is a unique challenge. We often hear that long-term risks are hard to predict. Given such great uncertainty, some say we should over-prepare just in case, and some say we should not care at all. We have already pointed out that this bears great similarity to an actuary

setting the price for the cost of retirement of a young person, say 25 years old. An actuary working on issuing a life insurance policy on a 25-year old in 1973 did not seek to
(a) Quit the business because this was too hard, or
(b) Charge $1000 for each $1 worth of benefit, to be on the safe side, and to provide for profits and expenses, or
(c) Promise to pay the benefit regardless of what the insured pays the insurer, because in the future, when the insured dies at age 80, his/her family will really need the money and the insurer has lots of it anyway.
We are now living in the future of those people from 1973. While there is considerable trouble with pension benefits in Greece and in Detroit, private annuity benefits are paid, and insurance companies other than AIG survived the recent crisis relatively intact. And of course, AIG problems were created by its, unfortunately not properly supervised, banking subsidiary in London.

Not all individuals, businesses, or political decision makers have real and clear long-term perspective and benefit from long-term success. But insurance business is long-term by nature. Even for short-term contracts. An American company, USAA, shows commercials of heirs of their past customers still being USAA's customers, partly because they know that these are their most profitable customers. It is expensive to enter insurance business, expensive to issue new polies, and most of the profits come in the long run. In the long run, people are dead, businesses go bankrupt, but insurers must survive. While the insurance firm is commonly perceived as a business just like any other business, it is not. A life insurance company can be considered to be a co-owner of the insured's human capital (Ostaszewski, 2003), and a property/casualty company can be considered a co-owner of the insured property, while a business insurance company can be viewed a co-owner of the underlying business.

Another unique feature of the insurance business is its accounting methodology. Banks gave loans of which they know some would not be paid back. How many and when -- they do not know. When do they show the credit losses as expenses? When losses happen. If this happens to a lot of banks at the same time, we have a credit crisis and the society has a problem. But if banks purchased insurance for those losses (under an insurance contract, not as a Credit Default Swap), the insurance companies would have to start showing future losses immediately as expenses in the financial statement. Note that this means that insurance accounting methodology causes profits to be lower in current period, but higher in later periods. This means no bonuses for management at loan origination, but after many years, once it is firmly established that the profits are real.

Would you like to know a fast way to become a millionaire? Sell hurricane insurance in Florida, not as an insurance policy, but as structured finance. Then if there is no hurricane, you are a millionaire. If there is a hurricane, you need to get a flight to Brazil, because U.S. has no extradition treaty with Brazil, and Brazil is a nice country with warm weather and a lot of beaches. Why is (or should be, according to business principles) this story unimaginable with real insurance? Because insurance accounting practices require that a large portion of premium must be placed in reserve to account for future losses. Why has this story happened so many times in human history with other business activities? Because outside of insurance contract structure risk is not properly accounted for, resulting in either underpricing or over-pricing of risk, with consequences that are damaging to the society. Economic literature is full of examples of mispricing of natural resources, or labor, or final products, and its detrimental effect on the society. But mispricing of risk is not that commonly addressed. Under-pricing of risk results in

excessive risk-taking in pursuit of short-term gains. This was painfully visible in practices of managers in the banking industry, who could participate in large gains if their risky bets paid off, but could not participate in losses generated by risky activities even if they wanted to, because those losses in 2008 exceeded the wealth of any individual person in the world. Over pricing of risk, on the other hand, results in less risk taking, stifling of innovation, and less opportunity for social advancement within the society. This is best illustrated by governance practices of command economies, which simply prohibited certain risky activities, including business startups, or business ownership, or speculation. Such prohibition could not eliminate all undesirable risk taking, but it imposed heavy non-monetary costs on them, including property expropriation, jail, or even death in certain circumstances. While this is an extreme example, it is illustrative of a society where risk-taking is unduly subdued.

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