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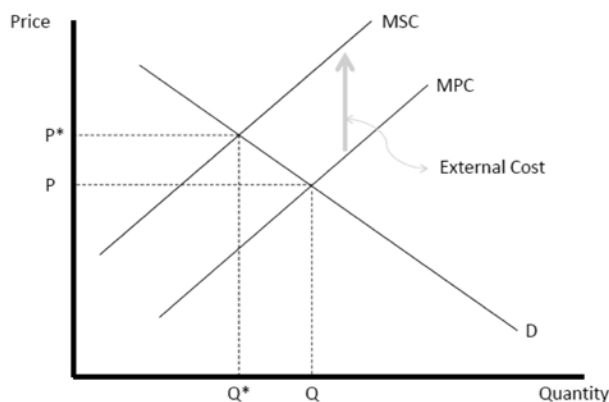
## NEGATIVE EXTERNALITY: A FRAMEWORK FOR CONTEMPLATING SYSTEMIC RISK

By Rick Gorvett

The problem of firms or industries that engage in activities that ultimately have harmful effects on other organizations or people is a difficult and longstanding economic issue. Even before Ronald Coase published his Nobel Prize-worthy insight more than half a century ago (Coase, 1960), many well-known economists had analyzed and opined on this question. It is a measure of the difficulty, importance, and applicability of this problem that significant debate continues to this day.

The classic example of this type of activity and the resulting harm it imposes on otherwise innocent parties—a situation commonly referred to as a *negative externality*—is that of a polluting industrial firm and its consequent impact on the nearby surrounding community. However, another example that can be interpreted and analyzed within the framework of negative externality, is the *systemic risk* associated with a potential broad-based failure of the financial or economic system. The recent financial crisis exemplifies how important are such risks and considerations for global economic health and prosperity.

### Negative Externality



This article briefly examines systemic risk in the context of an economic analysis of a negative externality. First, the characteristics of negative externalities are described, and then insights for the analysis and management of systemic risk are examined.

### WHAT IS A NEGATIVE EXTERNALITY?

A negative externality occurs when an organization undertakes an activity that causes harm or costs to one or more third parties—for example, to society. In particular, when an operational decision is made, a negative externality exists if the total cost associated with that operational decision is not borne entirely by the firm, but rather is borne in part by another party. The classic example of a negative externality is pollution, in which the impact of a firm’s industrial activity causes harm to those geographically proximate to the polluting firm (which is why negative externalities are sometimes called local or neighborhood costs).

In the context of traditional neoclassical economic theory, a simple supply-demand diagram can help to understand the distorting effect that a negative externality can have on a market:

Here, demand curve  $D$  represents marginal benefit, and supply curve  $MPC$  represents marginal private cost. Based on these curves, the market will find an equilibrium at  $(Q, P)$ . However, when actions are taken to recognize and reflect the social costs, the supply curve is more realistically expressed as  $MSC$ , marginal social cost, which includes both private costs and the negative external costs. This “corrected” analysis would find an equilibrium at  $(Q^*, P^*)$ . Thus, the negative externality leads to too high an equilibrium quantity. This leads to a level of social gain that is lower than it could be.

At the time Coase published his paper, this problem of “social cost” was well-known amongst economists. Probably the most influential thinking on this issue at

that time stemmed from Arthur Pigou's *The Economics of Welfare* (Pigou, 1920), in which he considered, for instance in the polluting-firm example, two categories of costs/benefits: private and social. This led to accepted remedies such as direct governmental regulation, or taxing the polluter (either to recompense the social costs incurred from the firm's operations, or perhaps to discourage the cost-producing activity itself). This latter approach has come to be known as a Pigou, or Pigovian, tax. Conceptually, if the firm is liable for the tax, and the tax is based on the marginal social cost associated with the damages produced by the firm's activity, the firm is forced to recognize and internalize the true total (private plus social) cost of the activity.

While this was the common wisdom at the time, Coase's 1960 paper presented a new conceptual framework for negative externalities. To quote from that paper:

"The traditional approach has tended to obscure the nature of the choice that has to be made. The question is commonly thought of as one in which A inflicts harm on B and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature. To avoid the harm to B, would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm."

Within this framework, Coase analysis ultimately results in the following prescriptions and observations regarding situations involving negative externalities:

- Traditional approaches—e.g., Pigou taxes—may not be either appropriate or desirable.

- Under the assumption of no transaction costs, private negotiation amongst parties will produce an efficient solution, regardless of the liability promulgated by the legal system.
- When transactions costs are recognized, the best and most appropriate solution must be determined on a case-by-case basis, and is heavily dependent upon the specifics of the legal system.
- The "problem has to be looked at in total *and* at the margin."

Thus, when it comes to identifying potential remedies for negative externalities, there are traditional interventionist policies such as direct regulation and Pigou taxes, but there are also market-based remedies involving negotiations and bargaining between and amongst the parties and society. All such prescriptions should be considered, especially when realities such as the existence of transaction costs are taken into account.

## SYSTEMIC RISK AS A NEGATIVE EXTERNALITY

The recent (and, to some degree, continuing) financial crisis has led to consideration of a variety of proposed interventionist remedies, designed to signal and help prevent potential systemic risk problems. *Systemic risk* is the possibility of a significant impairment to the overall economic and financial system. Due to the ever-increasing interconnectedness and interdependence of economies and financial markets, the failure or collapse of one or more financial intermediaries at the "micro" level can lead to broad-based market instability at the "macro" level, as a result of undercapitalization, liquidity, and flight-to-quality issues.

One can readily imagine that an individual financial firm, whether because of regulatory requirements or internal risk management procedures, might make decisions or take actions to protect *itself* from major impairment, but that

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## // ... SYSTEMIC RISK CAN BE VIEWED AS A NEGATIVE EXTERNALITY. //

those decisions or actions might not serve, and might not be in the best interest of, the health of the financial system *overall*. In fact, individual firm activity might act *against* the common good by serving to *decrease* the solvency of the system. Such perverse incentives can easily result from non-risk-based regulation, or from regulation that focuses on the status of individual firms rather than their potential contribution to overall system health. Thus, systemic financial risk can be viewed as a negative externality: actions of an individual firm, while justifiable and beneficial to the firm on a stand-alone basis, may produce external costs on the overall financial system and society.

As mentioned in the prior section, there are several types of potential remedies for situations involving negative externalities. In considering possible responses to systemic risk, it is important to remember that, as Coase advocated, all options should be considered, and each situation should be assessed on an individual-case basis. For our purposes, in evaluating systemic risk as a negative externality, we can categorize each of the remedies as one of two types: interventionist policies, and market-based solutions.

Interventionist policies include, for example, direct regulation, and Pigovian taxes.

*Direct regulation:* With direct regulatory control, the main issue in addressing systemic risk would be how to manage overall systemic risk through regulations and requirements directed at individual firms. Part of that issue would be practical: structuring regulations such that they have the desired effect both on the individual company and on the financial system and society at large. Another part of the issue would be quantitative: identifying and measuring the marginal impact of an individual firm's actions and decisions on the overall system and determining the marginal cost to society of adding an additional unit of systemic risk to a firm's operations. It is important here to understand and model

the financial market as a complex system, with multi-firm interconnectedness and interdependencies. Such financial risk modeling and analysis would be an area where actuarialies could provide significant value.

*Pigovian taxes:* By taxing the firm whose activity produces the external societal cost, an incentive is provided for the firm to reduce or even avoid the activity. This basic approach has much intuitive appeal and familiarity. By basing the level of the tax (at least conceptually) on the marginal social cost—the marginal increase in systemic risk—of the firm's activity, the true cost of the externality is explicitly recognized and is allocated to the appropriate party. A Pigovian systemic risk tax could be risk-based (determined as a function of an individual financial intermediary's specific characteristics—its financial attributes, liquidity situation, and modeled contribution to macro risk), pre-assessed (so that the tax is paid by all firms, including and especially those firms most likely to fail and thus to impose macro costs on the overall markets), and collected for the purpose of partially offsetting future systemic loss costs. As Coase pointed out, however, a Pigou tax may not produce an appropriate or desirable (or particularly efficient) societal outcome.

As an alternative to interventionist approaches, a market-based solution might be, for example:

*Tradable permits:* As has been proposed with respect to carbon-producing activities, a tradable systemic risk permit system would involve the identification of an overall "permissible" level of systemic risk, the initial allocation of that total level of risk to those firms that contribute to the overall risk of the financial system, and the potential for trading such permits amongst firms. The market would provide a basis for appropriate and socially-efficient pricing of these transactions. Of course, a big issue in such a scheme would involve how the level of "acceptable" overall systemic risk

would be determined (and then distributed or allocated to the various financial firms). Once that is determined, however, this approach largely becomes an optimization problem: how to optimize societal benefits (or minimize societal costs) within specified risk-level constraints. Again, actuarial and modeling skills could provide techniques of significant value to such a process.


#### SUMMARY

It is becoming increasingly clear that systemic risk can be viewed as a negative externality. The key question now is the best approach to dealing with systemic risk in this light.

Although most of the current public policy approaches tend to be interventionist, additional attention to actuarial-based modeling of potential market-based solutions may suggest and encourage viable, or even preferable, alternatives.

#### REFERENCES

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