

## Market power and regulation

*Jean Tirole is one of the most influential economists of our time. He has made important theoretical research contributions in a number of areas, but most of all he has clarified how to understand and regulate industries with a few powerful firms. Tirole is awarded this year's prize for his analysis of market power and regulation.*

### Regulation is difficult

Which activities should be conducted as public services and which should be left to private firms is a question that is always relevant. Many governments have opened up public monopolies to private stakeholders. This has applied to industries such as railways, highways, water, post and telecommunications – but also to the provision of schooling and healthcare. The experiences resulting from these privatizations have been mixed and it has often been more difficult than anticipated to get private firms to behave in the desired way.

There are two main difficulties. First, many markets are dominated by a few firms that all influence prices, volumes and quality. Traditional economic theory does not deal with this case, known as an *oligopoly*, instead it presupposes a single monopoly or what is known as perfect competition. The second difficulty is that the regulatory authority lacks information about the firms' costs and the quality of the goods and services they deliver. This lack of knowledge often provides regulated firms with a natural advantage.



## Before Tirole

In the 1980s, before Tirole published his first work, research into regulation was relatively sparse, mostly dealing with how the government can intervene and control pricing in the two extremes of monopoly and perfect competition.

At this time, researchers and decision-makers were still looking for general principles that would apply to every industry. They advocated simple rules for regulatory policies, such as capping prices for monopolists and prohibiting cooperation between competitors in the same market, while permitting cooperation between firms at different positions in the value chain. Tirole's research would come to show that such rules work well in some conditions, but that they do more harm than good in others. Price caps can provide dominant firms with strong motives to reduce costs – a good thing for society – but may also permit excessive profits – a bad thing for society. Cooperation on price setting within a market is usually harmful, but cooperation regarding patent pools can benefit everyone involved. The merger of a firm and its supplier may lead to more rapid innovation, but it may also distort competition.

To arrive at these results, a new theory was needed for oligopoly markets, because not even extensive privatization creates enough space for more than a small number of firms. There was also a need for a new theory of regulation in situations of *assymetric information*, because regulators often have poor knowledge of firms' conditions.

## New theoretical tools

Tirole's research would come to build upon new scientific methods, particularly in game theory and contract theory. There were great hopes that these methods would contribute to practical policy. Game theory would aid the systematic study of how firms react to different conditions and to each other's behavior. The next step would be to propose appropriate regulation based on the new theory of incentive contracts between parties with different information. However, even though many people could see the research questions, they were difficult to solve.

Jean Tirole began his research on regulation and oligopoly in the early 1980s. He had already received degrees in engineering from École Polytechnique and École Nationale des Ponts et Chaussées in Paris, and in mathematics from Université Paris-Dauphine. In 1981, he was awarded a Ph.D. in economics by the Massachusetts Institute of Technology in Cambridge, USA. The new tools of economic theory and deep insights into the production conditions of a number of regulated industries gave Tirole an exceptionally good foundation on which to renew and deepen the analysis of regulation and market power.

## The regulator's information problems

In 1986, Tirole and his now deceased colleague Jean-Jacques Laffont made an important contribution to the theory of regulation. They demonstrated how a clever set of production contracts can circumvent the problem of assymetric information in a market where the regulatory authority lacks complete knowledge of a monopoly's costs and choices of production techniques.

The central problem is to provide compensation that is high enough for production to be worthwhile, without using tax money for unnecessarily high profits. Laffont and Tirole demonstrated how the regulatory authority can solve this dilemma. The elegant result is that the authority can compensate for its lack of information about the firm's conditions by allowing it to choose from a menu of ingeniously constructed contracts. Regardless of the type of producer, he will choose the right kind of contract purely

out of self-interest. A producer with high costs that are difficult to influence will choose a contract with relatively high compensation for his costs – and thus have little motivation to reduce them. A producer that has greater opportunities to reduce his costs will choose a contract with relatively low compensation for its costs, but with a higher price for the services he delivers – and thus have a strong incentive to reduce costs. A single contract that strikes a compromise between these aspects would result in unnecessarily large profits if it is easy for the firm to cut its costs.

During the 1980s and 1990s, Laffont and Tirole applied their theory to a range of issues. They summarized the results in a book on public procurement and regulation, published in 1993, which has greatly influenced regulation in practice. The theoretical results for how different types of regulation might work have also received convincing support in empirical studies of individual industries.

## The dynamics of regulation

In many cases, questions arise about the time frame for regulation: for what period should the first set of regulations be designed, and how should it be reviewed and renewed? Laffont and Tirole analysed these questions in two significant articles from 1988 and 1990, which were based on work carried out by Freixas, Laffont and Tirole in 1985.

Assume that the regulator and the producer cannot sign a long-term contract, but only a series of short-term contracts. This means that the producer's current actions may affect his future regulation. If a low-cost producer works hard and thus achieves large profits during the first contract period, the regulatory authority may tighten the demands of the next contract in order to reduce the profit potential. The risk is that the producer predicts this *ratchet effect* and thus works less hard, disadvantaging the business. If the authority cannot draw up long-term contracts it is impossible to get the producer to choose the appropriate effort at a reasonable cost, and thus indirectly reveal its cost conditions. Instead, the authority should choose to use weaker incentives and gradually learn these conditions – this will happen quickly if the business is complex and unprofitable, and more slowly if it is simpler and more profitable.

## The regulator's independence

In most countries, the framework for regulation is first decided at a higher level (the government) and a public authority is then tasked with designing the precise terms of the regulation. In 1986, Tirole had analysed the optimal reward system in a similar hierarchical relationship, studying a more general case with one principal (owner), one supervisor (foreman) and one agent (worker). The primary problem is that the authority and the firm have more information about the business than the government. A poorly designed framework means that there is a risk of the two colluding to hide this information from the government, to the benefit of the business: the authority becomes the firm's advocate. In 1991, Laffont and Tirole examined how regulation should be designed to minimize this risk.

The main result of their analysis is that the government should establish a framework that explicitly considers the risk of the regulator hiding information and colluding with the regulated firm. Even with a well-designed framework, a regulator will sometimes appear to be an advocate of the firm, but despite this she will nevertheless not allow herself to be bribed or actively withhold information.

## Competition and strategic investments

It is not only monopolies that require regulation, oligopoly markets do too. Along with his co-authors, Tirole has provided a number of important contributions to theories of competition law, such as analyses of the competitive effects of patents, technical advances and strategic investments.

Patents can provide firms with a strategic advantage. In 1983 Tirole, working with Drew Fudenberg, Richard Gilbert and Joseph Stiglitz (one of the 2001 Economics Laureates), analysed the conditions for patent races between firms. They predicted intense races in areas where several companies are at roughly the same level, but lower levels of investment in research and development when one of the companies is far ahead.

In an article from 1984, Fudenberg and Tirole used game theory to analyse how a firm can influence its competitors strategically. A strategic investment has long-term effects on the firm's profitability. One vital question is whether the investments make the firm more (or less) aggressive in future competition. One example is an investment that reduces the firm's marginal costs. The next question is the way in which competing firms best deal with such competition. In some markets, aggressive investments will bring rewards, as competitors will abstain from market shares. In other markets, such investments are unprofitable, as they will in turn be met with aggressive behavior. In-depth understanding of the particular conditions of a specific industry is therefore necessary to determine what type of strategy is most profitable for firms in that industry. These are important insights for both practitioners and competition authorities. Practitioners may make mistakes if they uncritically try to transfer lessons learned in one market to another one, and the authorities may make mistakes if they regulate firms without taking specific market conditions into account.

## Competition in specific markets

There are no simple, standard solutions for regulation and competition policy, as the most appropriate ones will vary from one market to another. Jean Tirole has therefore also studied the conditions of specific markets, and contributed new theoretical perspectives. Traditionally, undercutting prices has been disciplined under competition law, because setting prices below production costs is one way of getting rid of competitors. However, this is not necessarily true of all markets. Consider the newspaper market, for example, where giving away papers for free can be a way of attracting readers and thus new advertisers to cover the losses due to production and distribution. In this case, it is doubtful whether undercutting should be banned. Along with Jean-Charles Rochet, Tirole has increased our understanding of these *platform markets* where there is a strong link between players on different sides of a technical platform, such as readers and advertisers in the case of newspapers. Other examples of similar platforms are credit/debit cards, search engines, and social media.

## Competition and vertical restraints

What happens when someone has a monopoly in an area that is an important link in a production chain? This classic problem is illustrated by a modern phenomenon: a particular firm's software or operating system becomes dominant in its area. Formerly, the belief was that such companies may well make monopoly profits in their own area, but that competition prevents them from benefitting from their position in the next link of the production chain.

In two studies – one with Patrick Rey in 1986, one with Oliver Hart in 1990 – Tirole has demonstrated that this belief is not justified; mastering one link of a chain can allow a monopolist to make profits in the market of the next link. In reality, it is often by distorting competition in a neighboring

market that a monopolist is able to make a profit. One example is the producer of a cost-reducing, patented innovation. If the firms that are potential purchasers of this innovation operate in a market with stiff competition, the producer will find it difficult to earn a lot of money if he sells to all the firms at the same time; market competition produces low profits even after the reduction in costs, so the producer must maintain a low price. However, if the innovation is sold to only one firm, this firm makes a high profit because it becomes more efficient than its competitors. The producer can then set his price considerably higher.

However, it is far from clear that the producer can commit to selling to only one firm. Once the sale has taken place, it is worthwhile for the producer to sell to additional firms, but if the first customer realizes this risk, his willingness to pay significantly diminishes. The producer must therefore promise not to make any more sales. In order for this promise to be credible, it is necessary to either sign some form of exclusive contract or actually merge the two firms. Competition law therefore has to weigh these two considerations against each other: on the one hand, vertical contracts can limit competition but, on the other hand, they encourage innovation. This type of reasoning has provided a new and robust foundation for legislation and legal usage concerning vertical contracts and mergers.

So, this is yet another example of the same general result: desirable competition policies are different from market to market.

## Overall contribution

Jean Tirole's research contributions are characterised by thorough studies, respect for the peculiarities of different markets, and the skilful use of new analytical methods in economics. He has penetrated deep into the most central issues of oligopolies and asymmetric information, but he has also managed to bring together his own and other's results into a coherent framework for teaching, practical application, and continued research. Tirole's emphasis on normative theories of regulation and competition policy has given his contributions great practical significance.

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## LINKS AND FURTHER READING

Additional information on this year's prizes, including a scientific background article in English, are available on the website of the Royal Swedish Academy of Sciences, <http://kva.se>, and at <http://nobelprize.org>. They also include web-TV versions of the press conferences at which the awards were announced. Information on exhibitions and activities related to the Nobel Prizes and the Prize in Economic Sciences may be found at [www.nobelmuseum.se](http://www.nobelmuseum.se).

### Books

**Dewatripont, M., Rochet, J. and Tirole, J.** (2010) *Balancing the Banks: Global Lessons from the Financial Crisis*, Princeton University Press

**Laffont, J-J. and Tirole, J.** (1999) *Competition in Telecommunications*, MIT Press

**Laffont, J-J. and Tirole, J.** (1993) *A Theory of Incentives in Procurement and Regulation*, MIT Press

Tirole, J. (1988) *The Theory of Industrial Organization*, MIT Press

**Lecture**

Tirole, J. (2013) *Two-sided markets*, [www.ut-capitole.ubicast.tv/videos/jean-tirole-two-sided-markets-feb-26-2013-part-1/](http://www.ut-capitole.ubicast.tv/videos/jean-tirole-two-sided-markets-feb-26-2013-part-1/)

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## THE LAUREATE

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