



MARKET FAILURES AND PUBLIC POLICY

Jean Tirole, December 8, 2014

Nobel Lecture in Economic Sciences

Dedicated to the memory of Jean-Jacques Laffont



I. INTRODUCTION

II. RESTRAINING MARKET POWER

III. TWO-SIDED MARKETS

IV. INTELLECTUAL PROPERTY

V. CONCLUDING REMARKS

Economists have long extolled the virtues of markets. Unfettered competition protects consumers from political whims and forces producers to deliver products and services at cost. Alas, competition is rarely perfect, markets fail, and market power -the firms' ability to raise price substantially above cost or to offer low quality- must be kept in check.

Industrial organization studies the exercise and control of market power. To this purpose, it builds models that capture the essence of the situation. The predictions of the model can then be tested econometrically and possibly in the lab. In the end, the reasonableness of, and robustness to modelling assumptions and the quality of empirical fit determine how confident economists are in making recommendations to public decision-makers for intervention, and to companies for the design of their business model.



Industrial organization's long tradition

- French engineer-economists Cournot (1838) and Dupuit (1844)



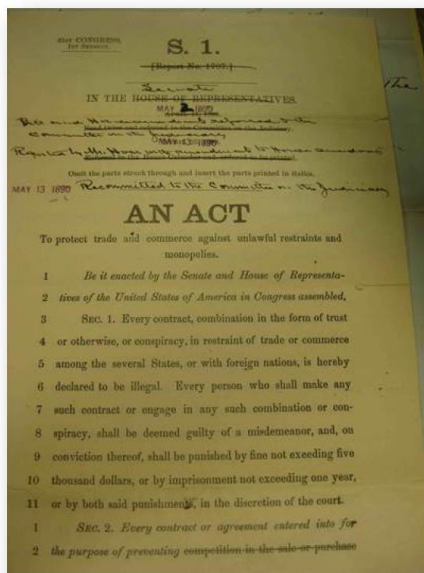
Antoine Augustin Cournot



Jules Dupuit

First theoretical, with the work of French “engineer-economists” Augustin Cournot (1838) and Jules Dupuit (1844);

- Antitrust revolution post Sherman Act (1890)...



Then policy-oriented with the enactment of the Sherman Act (1890) and subsequent legislation;



- ...comforted by Harvard Structure-Conduct-Performance paradigm (1930-1970)



Then descriptive with the studies of the Harvard school (“Structure-Conduct-Performance”) comforting and refining the antitrust drive;

- Chicago school critique (“empiricism without theory”) and counterrevolution (1960-1980)



And finally sceptical with the Chicago school. The Chicago school correctly pointed out the lack of underlying theoretical doctrine and went on to cast doubt on the whole edifice. It however did not develop an alternative antitrust doctrine, perhaps because it was broadly suspicious of regulation.



A collective effort

- Closest collaborators on the Prize's awarded field



Drew Fudenberg



Eric Maskin



Jean-Jacques Laffont



Patrick Rey



Jean-Charles Rochet



Paul Joskow



Josh Lerner

By the late seventies and early eighties, the antitrust and regulation doctrine was in shambles and had to be rebuilt. The modern intellectual corpus that then emerged has been very much a collective effort, involving not only me, but also my closest collaborators on the topic (chronologically, and very unfairly to the others, Drew Fudenberg, Eric Maskin, Jean-Jacques Laffont, to whose memory this lecture is dedicated, Patrick Rey, Jean-Charles Rochet, Paul Joskow, and Josh Lerner)...



- And a global research environment







... and the many scholars whose own work, discussions with me and comments on my articles and books have deeply influenced my thinking. My being under the spotlight today owes more to their contribution than to my own talent.

But I claim credit for having been in the right places at the right time and in having learnt from fabulous colleagues and students, in the area for which the prize was awarded and in other fields as well.



A stroke of good fortune

- My awakening to industrial organization at MIT 
- Breakthroughs in game theory and information economics 
- Growing awareness of inefficiency of old style public utility regulation 
- Independent agencies and an increased attention to economic reasoning 

With sometimes a bit of luck, as when my MIT fellow classmate, and like me Eric Maskin advisee, Drew Fudenberg told me about an interesting field (I actually did not know what “industrial organization” meant...). Having already taken my generals, I then sat in fascinating lectures given by Paul Joskow and Dick Schmalensee, and started fruitful collaboration with Drew.

A stroke of good fortune indeed, as the required tools, game theory and information economics, were witnessing a series of breakthroughs.

On the policy front, there was widespread recognition that old-style public utility regulation led to inflated cost and poor customer satisfaction, so reforms were called for.

To crown it all, institutional change favoured the use of economic reasoning. Where disputes were settled and regulations designed opaquely in the minister’s office, transparent processes run by independent agencies were put in place. For instance, competition authorities and regulatory agencies sprung up in Europe, which used economic reasoning.

This most fortunate conjunction of circumstances led to a new paradigm. As was emphasized in the committee’s scientific background report, this paradigm is rich and complex. First, counting the number of firms or their market shares provides only a rough indication as to whether the market is competitive. Second, industries have their specificities. Competition in IT, payment cards, innovation or cement is different.



The economist's social responsibility

(Case-by-case) “rule of reason” right approach, but daunting informational requirements for the regulator. Economists must

- (1) develop a rigorous analysis of how markets work, accounting for
 - specificities of industries
 - what regulators do and do not know
- (2) participate in policy debate.

Economists accordingly have advocated a case-by-case or “rule of reason” approach to antitrust, away from rigid “per se” rules (which mechanically either allow or prohibit certain behaviors). The economists’ message however comes with a social responsibility:

First, economists must offer a rigorous analysis of how markets work, taking into account

- the specificities of particular industries,
- what regulators do and do not know; this latter point calls for “information light” policies, that is, policies that do not require information that is unlikely to be available to regulators.

Second, economists must participate in the policy debate. The financial crisis, whose main ingredients could be found in academic journals, is a case in point. But of course, the responsibility here goes both ways. Policymakers and the media must also be willing to listen to economists.



I. INTRODUCTION

II. RESTRAINING MARKET POWER

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Regulators affect industries in multiple ways:

Curbing market power to the benefit of consumers

It often boils down to regulation of rate of return

- Sectoral (utility) regulation



- Antitrust



- Patent and Trademark Offices and specialized intellectual property courts

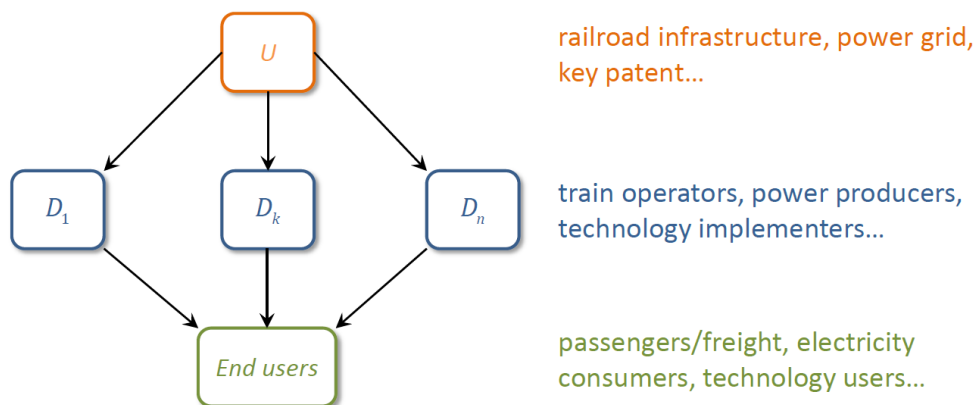


- Sectoral regulators in telecoms, electricity, railroads or postal services regulate incumbent operators' rate of return and monitor the conditions under which they give rivals access to the bottlenecks that they control.
- Antitrust authorities allow or invalidate horizontal as well as vertical mergers and agreements, and decide whether certain behaviors and contractual covenants constitute an abuse of a dominant position.
- Patent and trademark offices and courts grant, uphold or reject a patent, and determine its scope, its breadth, whether the grantee can seek injunctions and so forth.

Ultimately, these various forms of regulation have in common that regulators face a trade-off between lowering the price for the users, thereby ensuring wider diffusion, and granting a fair return to the firm.



Illustration: the foreclosure doctrine (1)



Fair access creates downstream competition and low prices for end users.

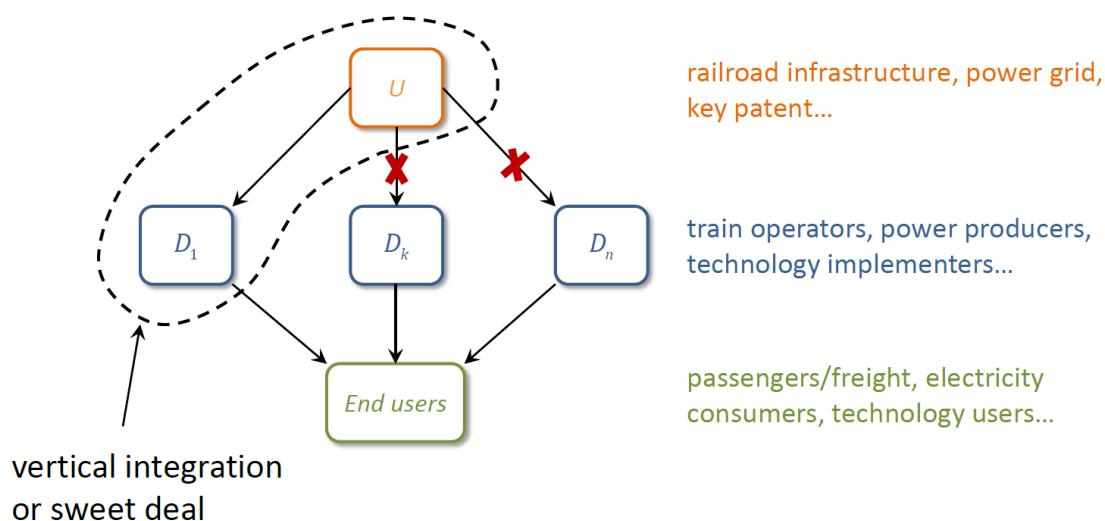
Consider for example the foreclosure doctrine in its modern form. An upstream firm U has a unique access to an “essential facility”, “infrastructure” or “bottleneck input”, some input that cannot be reproduced at a low cost: a railroad tracks & stations network, a power transmission grid, a key patent...

The issue is whether the upstream firm should give equal access to all downstream suppliers (alternative train operators, power producers, technology implementers, D_1 , ..., D_n in the figure). Such a fair access allows downstream firms to compete for the end users on a level playing field.

The downstream competition enabled by fair access dissipates the profit that can be extracted from end-users. And so, because the upstream profit is capped by this downstream profit, fair access jeopardizes the ability of the upstream firm to profit from the essential facility.



Illustration: the foreclosure doctrine (2)



Hart-Tirole (1990), Rey-Tirole (2007)...

In practice therefore, the upstream firm often favors its downstream subsidiary (D_1 in the figure) in a myriad of ways, for example by refusing to deal with rivals or to grant them a license, by charging prohibitive access prices, or by making its technology incompatible with the rivals'. If not vertically integrated, it may enter a "sweet deal" with a downstream firm to the same effect. In short, the upstream firm uses exclusivity to restore its market power. For example, a biotech company with a patent on a new drug will grant exclusive rights for the product approval, production and marketing stage to a single pharmaceutical company, either in-house (Sanofi for Genzyme) or external.



Common sense prescription about handling market power

Market power is

deserved

undeserved

So, whether the antitrust authority tolerates such exclusionary behavior or not de facto regulates the rate of return on the upstream infrastructure. Should the authority clampdown on exclusionary behaviors? The (common sense) answer hinges on that to the following question: Does the bottleneck result from an investment, an innovation? Or from political connections, wrong market design or sheer luck? Simply, is there an investment worth of a reward or not? For instance:

Common sense prescription about handling market power

Market power is

	deserved	undeserved
concession	competitive, well-designed auction	unpaid-for legal monopoly

- the beneficiary of a highway, harbour or airport concession deserves its monopoly power if the monopoly position was acquired through a competitive, well-designed auction, but not if it was acquired free of charge or through a biased auction design.



Common sense prescription about handling market power

Market power is

	deserved	undeserved
concession	competitive, well-designed auction	unpaid-for legal monopoly
intellectual property	major innovation	obvious, not novel innovation

- An inventor should be allowed to exploit the innovation himself or grant an exclusive license if the innovation is major, but not if the innovation lacks novelty or is obvious, but nonetheless is protected by intellectual property law.

Common sense prescription about handling market power

Market power is

	deserved	undeserved
concession	competitive, well-designed auction	unpaid-for legal monopoly
intellectual property	major innovation	obvious, not novel innovation
utility regulation	investment/effort	lucky cost and demand conditions

- A utility should earn reasonable profit on investment, but not benefit from lucky cost and demand conditions.

The same reasoning underlies much of antitrust doctrine, which, following Schumpeter, does not condone the existence of monopoly power, but frowns upon the further acquisition of market power through merger or abuse of dominant position.



Handling the firm's informational superiority (1)

about

- its environment: technology/demand (“adverse selection”)
- its actions: effort to reduce cost, increase demand, give access to rivals (“moral hazard”)

Principle #1: reduce informational asymmetries: data collection, benchmarking, auction.

Regulators face a double asymmetry of information, called adverse selection and moral hazard respectively.

- First, regulated firms have superior knowledge about their environment: their technology, the cost of their inputs, the demand for their products and services.
- Second, they take actions that affect cost and demand: human resource management, strategic choices of plant capacity, R&D and brand image, quality control, risk management and so forth.

Unsurprisingly, authorities that neglect the asymmetry of information fail to deliver effective, cost-efficient regulation. There are two broad principles here.

The first is obvious: authorities should attempt at reducing the asymmetry of information:

- by collecting data of course, but also
- by benchmarking the firm's performance to that of similar firms operating in different markets, and finally
- by auctioning off the monopoly rights (as firms reveal information about industry cost when competing with each other).



Handling the firm's informational superiority (2)

Principle #2: one size does not fit all; offer menu of options, e.g.

- cost plus: high cost and low profit
- fixed price: low cost and high profit.

The second principle is that one size does not fit all: one should let the regulated firm make use of its information. Before we get to this, imagine that you are in charge of dealing with a contractor. Two familiar contracts will probably come to your mind:

- you can offer to fully reimburse the contractor's cost, plus some set payment over this cost; such a contract is called a "cost plus" or "rate-of-return" contract;
- or you can fix the total payment and tell the firm that this payment will cover its return as well as its cost, whatever the latter turns out to be; such a contract is called a "fixed price " or "price cap" contract.

The two contracts differ in the strength of incentives provided to the contractor:

- the cost-plus contract shelters the firm from fluctuations in its cost performance ;
- the fixed price contract by contrast makes the firm fully accountable for its cost performance.

The fixed price contract obviously elicits more cost-reducing effort from the firm. It however has the drawback of leaving substantial profit to the firm in lucky circumstances in which costs turn out to be particularly low or demand high, independently of any effort made by the firm.



Returning to the “one size does not fit all” idea, one can show that regulated firms should be confronted with a menu of options; to oversimplify, this menu might take the form of a choice between a fixed-price and a cost-plus contracts. The firm then self-selects: an efficient firm will opt for being accountable for its cost, while an inefficient firm will opt for the protection of cost-plus.

Implications of efficiency/rent extraction trade-off

Can't have cake and eat it too. Incentives generate rents.

Implications (knowing them could have avoided some wishful thinking):

1. Carefully monitor quality
2. Promote regulatory commitment
3. Beware capture by industry

Latter two call for agencies that are independent w.r.t. politics and industry.

Laffont-Tirole (1986 → 1993)

Powerful incentives have been key to remedy the dismal cost performance of traditional regulation. However, theory and practice indicate some caveats:

First, making the firm accountable for its cost performance also provides the firm with an incentive to skimp quality; so powerful incentives must go together with a more thorough monitoring of quality.

Second, the observation that powerful incentives generate both high effort and high profit (or rent) implies that regulators cannot have their cake and eat it too: While the regulators under the pressure of public opinion may be tempted to take back this rent ex post, such policy reversal destroys the firm's incentive to reduce cost. A wider knowledge of this principle would have prevented some wishful thinking when powerful incentives were introduced.



Thus, powerful incentives require commitment; this commitment in turn requires an independent regulatory agency, protected from the pressure of public opinion.

Third, the possibility of high rents increases the benefit for the firm of capturing its regulator. So, if you cannot guarantee the regulator's independence from industry, don't go for powerful incentives.

Be careful about tinkering with price structure, use decentralized information

- Curbing market power constrains price *level*. What about the price *structure*?
- Firm has more information than regulator, administered pricing dangerous. Besides, it is much less obvious that firm has conflicting objective with regards to price structure.

Message: ○ regulate price level
○ don't tinker with price structure without in-depth analysis.

The essence of regulation is often to ensure that undeserved market power does not translate into high overall prices. Traditionally, though, regulators have gone way beyond price-*level* regulation; they also have mingled with the ratio of prices, that is, with the price *structure*. There, too, they face a substantial informational handicap; moreover the need for intervention is much less obvious than in the case of the price level: While it is clear that a monopoly has incentives to charge high prices, it is a priori less clear that it is biased in its choice of letting Bob rather than Anna bear the brunt of market power.



- Ramsey-Boiteux: business oriented (what the market can bear)

$$\frac{p_i - c_i}{p_i} = \frac{\theta}{\eta_i}$$

price charged to i -segment

marginal cost of i -segment

where $0 < \theta < 1$
($\theta = 1$: unregulated firm
 $\theta = 0$: first best (no budget constraint))

elasticity of demand on segment i

- Well-designed global price cap (constraint on firm's weighted average price) as way of implementing Ramsey-Boiteux pricing

Laffont-Tirole (1990, 1994, 2000)

In 1956, Marcel Boiteux, building on earlier work by Franck Ramsey, showed that regulated firms should exhibit a price structure similar to that of ordinary, unregulated ones: the price p_i in segment i should be low if the segment is cheap to serve (the cost c_i is low), and has a high elasticity of demand η_i (that is, if a price increase implies a substantial reduction in demand). Thus, regulated prices should be “business oriented”, similar to, but overall lower than those set by an unregulated monopoly.

Yet, regulators used to force regulated firms to set an economically very inefficient price structure. This price tinkering away from Ramsey-Boiteux principles was motivated by the (correct) premise that regulators do not possess the information about cost and demand to fine-tune prices in a business-oriented fashion.

This however ignored the possibility of making use of decentralized information. A global price cap regulation, in which the firm must only comply with some cap on its weighted average price, not only creates powerful incentives by making the firm accountable for its cost, but also lets the firm free to choose a business-oriented price structure.

A special case of this idea arises when one of the “products” supplied by the monopoly is an intermediate input, that is, the provision of access for rivals to



an essential facility. By imposing access prices at marginal cost (assuming they can measure it), regulators de facto bias the price structure and focus markups on those final segments for which the essential facility owner faces no competition. This is bound to be inefficient in general.

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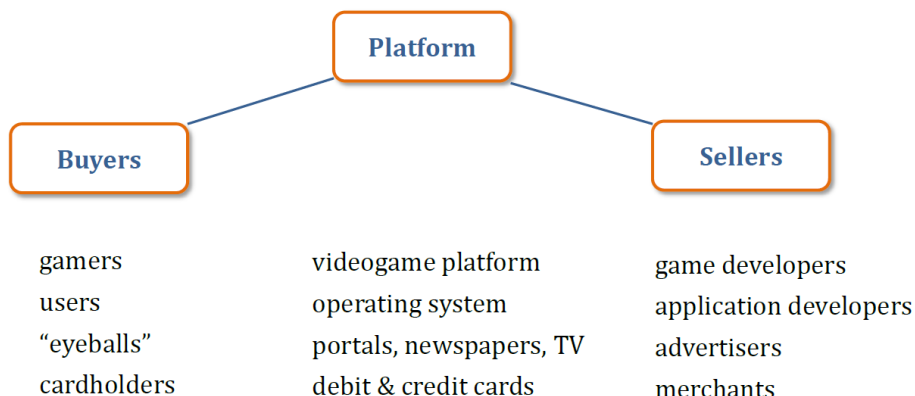
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A particularly interesting choice of price structure arises in so-called two-sided markets.

Two-sided markets





Two-sided “platforms” bring together multiple user-communities that want to interact with each other: gamers and game developers for videogames; users of operating systems and apps developers for operating systems; “eyeballs” and advertisers for search and media platforms; cardholders and merchants for payment card transactions. The challenge for two-sided platforms is to find a viable business model that gets both sides on board.

Pricing

$$\frac{p_i - (c - v_j)}{p_i} = \frac{1}{\eta_i}$$

$c - v_j$: “opportunity cost”

Caillaud-Jullien (2003), Rochet-Tirole (2003, 2006), Armstrong (2006)...

Regardless of their market power, whether they are Google or a free newspaper like Metro,

- they choose to allocate a lower burden to the side (say side i) whose presence benefits most users on the other side. In the equation, v_j represents how much a side- j user values an extra user on side i . This willingness to pay for an interaction with an extra user on side i can be recouped by the platform through a price increase on side j ; the platform’s real, or opportunity cost is therefore the platform’s production cost c per interaction (perhaps equal to 0) minus v_j ,
- like ordinary businesses, they choose a lower burden for the side which has a relatively elastic demand (a high η_i in the formula).



Two-sided platforms' business model

Two-sided platforms account for what each side can bear and for externalities → very skewed pricing patterns

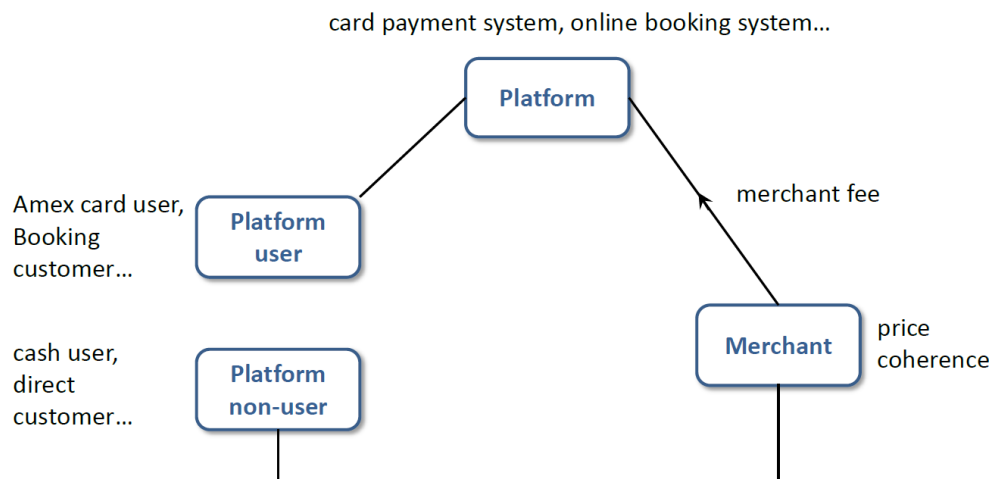
low-price side	high-price side
consumers (search engine, portal, newspaper)	advertisers
cardholders	merchants

This formula very often results in very skewed pricing patterns, with one side paying nothing (free search engine, portal, newspaper) or even being paid to enjoy the service (cardholders receiving cash-back bonuses), while the other side is heavily taxed. A regulator failing to understand the nature of two-sided markets might misleadingly complain about predation on the low-price side or even excessive pricing on the high-price side, despite the fact that such price structures are also selected by small, entering platforms. Regulators should refrain from mechanically applying standard antitrust ideas where they do not belong.



Wither antitrust for two-sided markets?

Optimal regulation of must-take cards, must-join platforms



Rochet-Tirole (2002, 2011), Edelman-Wright (2014)...

This does not mean that they should turn a blind eye when facing two-sided platforms. A case in point is provided by platforms that supply a service to their members, but are not the only route for a purchase. For instance,

- American Express provides the cardholder with a service, but other payment methods such as cash, check, or other card systems are also available.
- A hotel or airline flight can be booked either through an online booking platform, such as Booking.com, or directly.

Such platforms usually charge a merchant fee and demand price coherence (the merchant is not allowed to charge more for a transaction performed through the platform than for a transaction that does not use it). While price coherence has sound justifications (it prevents surcharging hold-ups by the merchant), it also comes with hazards; for, high merchant fees are in part passed through to third parties, namely consumers who do not use the platform. This may result in excessive merchant fees. The market failure in this instance is not the skewed pricing pattern (which is typical of two-sided markets), but the externality on non-contracting parties.

The analysis reveals that the merchant fee should obey the following Pigovian principle: In the case of card payments, the merchant fee should be equal to



the benefit that the merchant derives from a card payment. The consumer, who decides on the payment method, then exerts no externality on the merchant. This principle is now the European Commission's doctrine for regulating open systems Visa and MasterCard.

In this realm as in many others, neither laissez-faire nor a shotgun regulatory approach is warranted. Only sound economic analysis will do.

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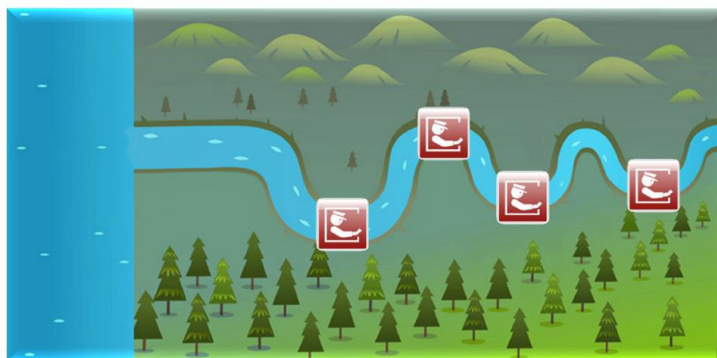
The rule-of-reason approach to competition policy requires some confidence as to which, of efficiency and anticompetitive effects, dominates. In this respect, simple rules can greatly strengthen our confidence in policy choices.



Search for “information-light” rules when available

Example: patent pools (co-marketing of patent licenses by multiple patent owners)

Royalty stacking hinders the diffusion of technologies. Analogy:



Co-marketing is desirable

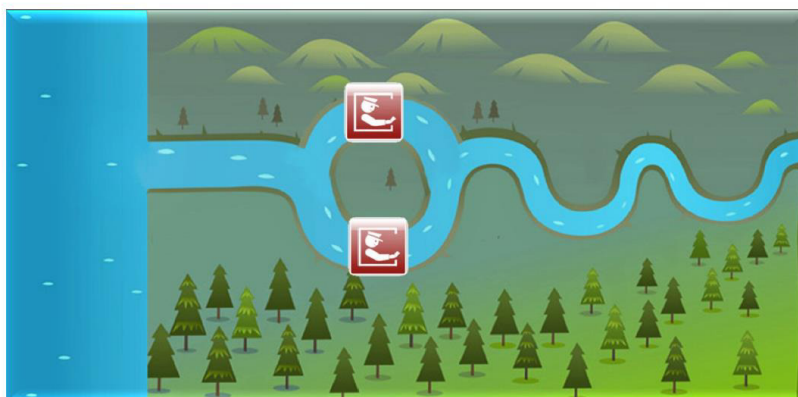
Consider intellectual property, for which the shortage of data can be acute, with technologies not having yet hit the ground. Biotech and software technologies are often covered by a multiplicity of patents of varying importance and owned by different owners. This “patent thicket” is conducive to “royalty stacking” (or “multiple marginalizations” in the parlance of economics).

To understand royalty stacking, which was brilliantly formalized in 1838 by Augustin Cournot and more recently by Carl Shapiro, it may be useful to return to medieval Europe, whose river transit was hampered by a multiplicity of tolls; for instance, there were 64 tolls on the Rhine river in the 14th century. Each toll collector set his toll to maximize his revenue, oblivious of what this meant not only for the users but also for other toll collectors. Europe had to wait until the Congress of Vienna in 1815 and subsequent legislations to see the removal of toll-stacking.

High technologies are currently witnessing an evolution similar to river traffic in the 19th century. New guidelines have been set, so as to encourage co-marketing of intellectual property through patent pools. Patent pools reduce the overall price of licensing complementary patents, benefiting both intellectual property owners and technology users.



Harmful co-marketing

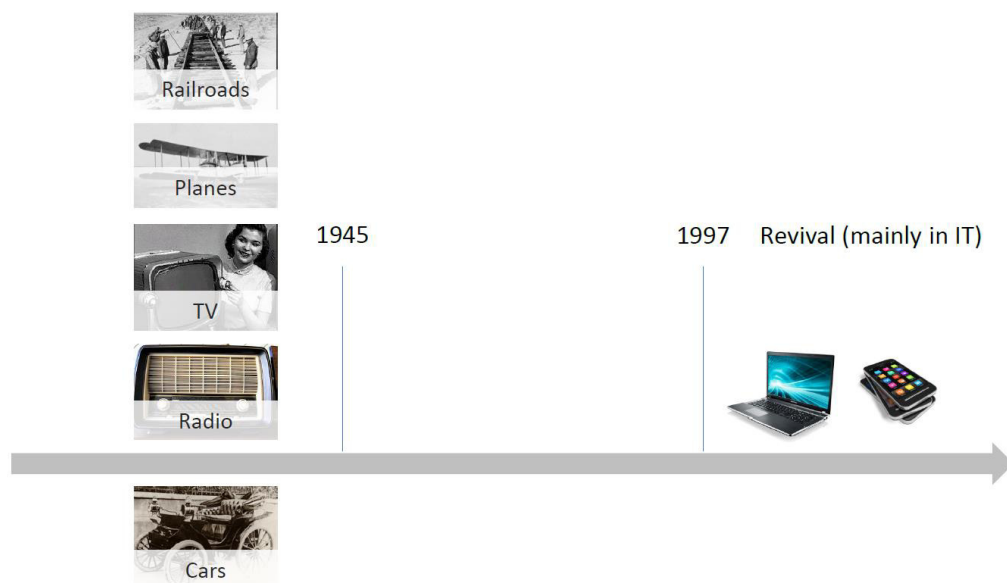


Akin to merger to monopoly

Alas, patent pools and more generally co-marketing arrangements also may allow firms to raise price. For instance, the owners of two substitute patents (like the toll collectors on the two river branches in the figure) can raise licensing price by forming a patent pool (setting a collusive toll for downstream access in the figure), akin to a cartel or a merger to monopoly.



Brief history of patent pools



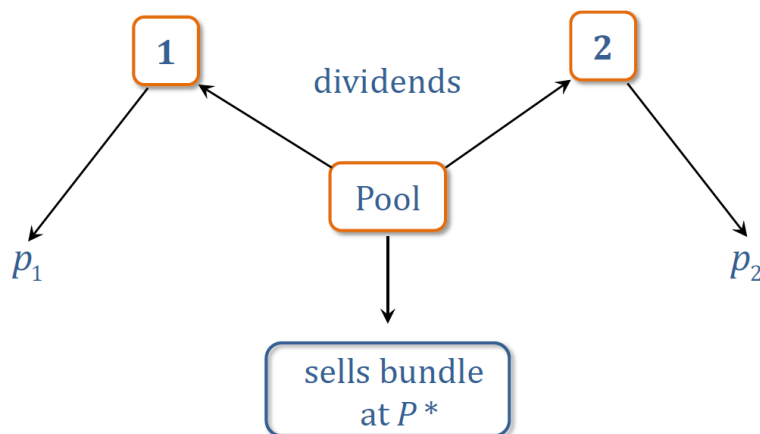
A flashback is useful again. A little known fact is that, prior to 1945, most major industries were run by patent pools. But the worry about cartelization through joint marketing led to a hostile decision of the US Supreme Court in 1945 and the disappearance of pools until the recent revival of interest.

But couldn't competition authorities just ban bad (price-increasing) pools and allow good (price-decreasing) ones? They unfortunately do not possess the relevant information: There is often no long history of licensing, and the pattern of substitutability/complementarity changes with the uses made of the technology.



How do we tell good and bad co-marketing arrangements apart?

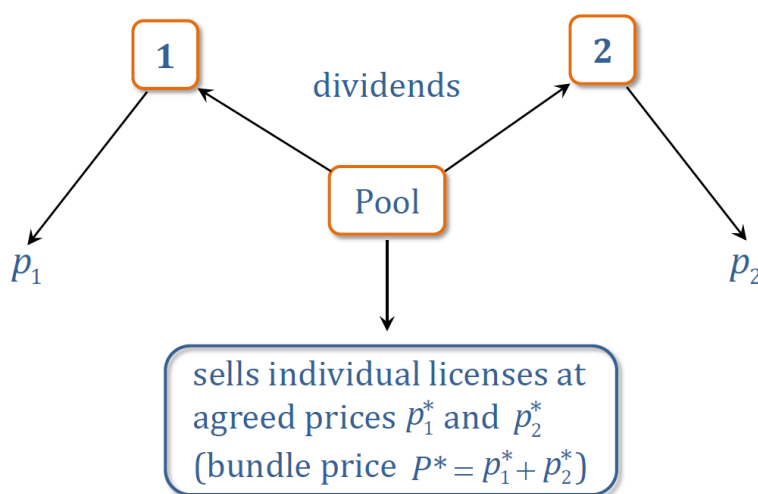
Individual licensing



Lerner-Tirole (2004)

Simple regulations however allow such sorting. First, “individual licensing” (the ability for individual owners to keep licensing their patents outside the pool) recreates competition when patent pools would otherwise have raised price. Patent pools with individual licensing therefore neutralize bad pools while allowing good ones to achieve their price reduction.

Cum unbundling



Boutin (2014), Rey-Tirole (2013)

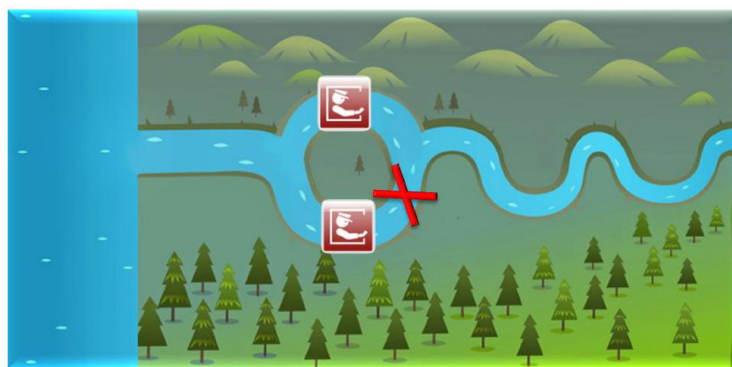


Second, and to counter the threat of tacit collusion, it is wise to append a second, information-free requirement, called “unbundling”: The users can buy individual licenses from the pool, and the pool price for multiple licenses is the sum of the individual prices. Interestingly, both precepts derived from theory have been incorporated in the European guidelines (in 2004 and 2014, respectively).

Standard-essential patents

Multiple routes to solving a technological problem prior to standard.

Standard selects a particular route.



Creating a real commitment (not vague promise of fair, reasonable and non-discriminatory – FRAND – licensing).

Lerner-Tirole (forthcoming)

Another information-free precept for the treatment of intellectual property originating from theoretical work is the suggestion that intellectual property owners commit to a cap on their licensing price before a standard is finalized. When a standard is designed, in many cases there are multiple routes to solving a given technological problem. Each one of these may be equally viable, but often a standard setting body will choose only one avenue (to pursue the analogy, the public authority may have enabled traffic on the upper branch of the river by building a lock on that branch; or the presence of a major city on the upper branch may have made this branch a superior alternative). After the decision has been made, however, the chosen patent becomes a “standard-essential patent (SEP),” and the patent owner can ask for a high royalty even though another patent could have offered comparable value, had the technology been designed differently.



To restrain firms from taking advantage of the fortuitous essentiality of their patents, an essentiality that resulted only from being included in a standard, standard setting bodies commonly require firms to commit in advance to license their patents on fair, reasonable and non-discriminatory (FRAND) terms. The problem with this approach is that FRAND commitments are very ambiguous: What exactly is a fair and reasonable rate? And in fact, large lawsuits regarding the meaning of the commitment proliferate all over the world.

One would not build a house on a piece of land whose price is not known in advance. The same obtains for technologies. We have proposed that intellectual property owners commit to their licensing conditions prior to the final choice of standard and we tried to explain why this commitment requirement is unlikely to result from competition among standard-setting bodies.

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The theory of industrial organization has proved a very useful tool to think about one of the major challenges of our economies. It has fashioned antitrust and regulation. Recognizing that industries are different from each other and so one size does not fit all, it has patiently built a body of knowledge that has helped regulators to better understand market power and the effects of policy interventions, and firms to formulate their strategies.



Industrial organization has gone a long way, but much work remains to be done. An especially gratifying aspect is that the field of industrial organization is currently thriving, with many top young researchers producing exciting work.

Making this world a better world is the economist's first mission. I believe that the entire community of industrial organization researchers has contributed substantially to this mission. On behalf of this community, I am humbled, honored and grateful to be awarded the 2014 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel.



Thank you !