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Market Oversight Games

Market Oversight Games¹

Inaugural lecture

delivered on the appointment to the
chair of Competition Economics and Regulation
at the University of Amsterdam
on Friday, 1 October 2010

by

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*Mevrouw de Rector Magnificus,
Mijne heren Decanen,
Waarde collega's, studenten en
Allen die door uw aanwezigheid van uw belangstelling blijk geeft,
Especially those of you who have travelled from afar to be here today,*

Antitrust Avoidance by IPO

On the 18th of March 2008, VISA – the credit card company – was floated on the New York Stock Exchange in the biggest initial public offering (an IPO) in United States history. Almost half a billion shares were issued. Proceeds were close to 20 billion US dollars.

Prior to the sale, Visa Inc. had been the North-American part of 'Visa International Service Association', owned by its membership of thousands of commercial banks worldwide and used to jointly set the conditions for use of their credit and debit cards.

The launch of Visa Inc. had been postponed several times. It finally happened in what *Fortune* magazine called at the time: 'a sea of troubles for the stock and the IPO markets'.² The subprime mortgage crisis in the US had already erupted in the second half of 2007. Banks were struggling with bad assets and lack of liquidity. In the weekend before VISA went public on Tuesday, JP Morgan and the FED rescued Bear Stearns.

Despite market circumstances, the Visa Inc. class A common stock was massively oversubscribed. It was offered at 44 dollars, whereas analysts had valued it over 70 – about where it is today, despite the financial crisis having hit globally since.

Why was Visa Inc. rushed through cheap in a bear market? Some commentators believed that it was all 'about fees, paydays and desperation'. Indeed, the original member banks maintained ownership through class B and C stock with resale restrictions – that greatly appreciated. Also, some of the largest VISA members – JP Morgan, Goldman Sachs, Bank of America – acted as underwriters, and each made hundreds of millions of dollars in transactions.³

Yet there may have been another reason for the corporate restructuring, which could also have induced MasterCard to incorporate two years earlier.⁴

Both MasterCard and VISA came under heavy antitrust scrutiny in the mid-1990s, first in the US, and later in Europe. The regulators and the card networks – and with them economists and lawyers – have been struggling since to come to grips with what competition should look like in private payment card systems.

In 1996 a group of merchants initiated a successful class action for antitrust damages, claiming to have been overcharged on fees for card transactions as a result of collusion between VISA and MasterCard.⁵ Soon the US Department of Justice followed on and brought a civil antitrust suit for violations of Section 1 of the Sherman Act – which is the main American anti-cartel rule.⁶ MasterCard and VISA were found guilty by the US District Court for the Southern District of New York, and also lost on appeal – right after which, in 2002, they were rumored to be facing liability in further private antitrust cases for damages estimated as high as 40 billion US dollars.

A number of settlements followed for historic sums of money. The Merchants class action and rivals American Express and Discover each received several billion dollars. More claimants were lining up in America and elsewhere.

Meanwhile, European competition authorities had opened their own investigations. Right after the settlement of the Merchants class action, in 2003, the European Commission sent MasterCard a Statement of Objections (an SO) against the way it set its multilateral interchange fees – so-called MIFs – for payment card transactions in the European Economic Area.

The Commission believed that this happened by ‘decision’ of an ‘association of undertakings’ contrary to Article 81 of the EC Treaty, the main European anti-cartel rule – recently, it was renumbered 101, but I’ll stick to the old numbers for this story.⁷ By the beginning of 2008, VISA could expect the same treatment. And the Commission was also encouraging the development of a litigation culture for damages in Europe as well. Sure enough, the antitrust expenses were taxing the member banks.

Could it be that the incorporations of MasterCard and VISA were meant, at least in part, to shield the members from exposure to the international competition laws? They were certainly helpful. After all, MasterCard Inc. and Visa Inc. were now limited liability companies. Their original members no longer took part in a ‘worldwide trust of commercial banks cooperating’, but kept their economic interests as respectable ‘shareholders’ and ‘customers’ of the new corporations. Section 1 and Article 81 seemed no longer even to apply – at least not to the companies individually.

There are a few hints as to this antitrust avoidance motive. Some plaintiff lawyers in the US claimed that the incorporations aimed to close the time window for antitrust damages after the Merchants class action settlement.⁸ And several US scholars argued that MasterCard’s ‘single entity strategy’ was

meant to build a corporate image that should help reduce antitrust exposure by winning sympathy with regulators, juries and judges.⁹

But it seems to be even bigger than that. In Europe, MasterCard the company now had a market share of only about 35%¹⁰ – not enough for even a presumption of dominance.¹¹ Still, in June 2006, hardly a month after MasterCard's IPO, the Commission renewed its allegations of a collusive organization.¹² The decision followed at Christmas the next year: MasterCard's MIFs are a breach of Article 81(1) and so should be prohibited and end within 6 months going forward.¹³

In the accompanying memo, it was stated firmly that: 'No', MasterCard's IPO had not influenced the Commission's principle assessment of the case.¹⁴ But MasterCard felt that it should have: the company appealed to the General Court on three grounds: two on substance – interchange fees are necessary and efficient – and a third one on:

'[T]he Commission's inaccurate conclusion that, despite MasterCard's May 2006 IPO, MasterCard and its customers continue to be "an association of undertakings" [...].'¹⁵

The appeal is pending, so we will have to wait and see. Some of my legal sources predict that the Commission may soon be corrected. Surely the prohibition hinges on this point.

Meanwhile, in the US, VISA's antitrust defense strategy also seems to be working. Visa Inc. deposited much smaller reservations in litigation escrow accounts than the liabilities once estimated. And the DoJ's Antitrust Division is allegedly prepared to accept settlements on rules for card use, rather than litigate.¹⁶

Visa Europe was cut loose. It stayed outside the firm and is still a cooperation between around 4500 European banks. And so, just one week after the US IPO, Visa Europe received an Article 81 SO about its MIFs – which led it last April to offer to cut fees on debit cards – an offer for which the Commission seems glad to settle.¹⁷

So here we see how large international commercial organizations may change their corporate identity in order to circumvent market regulation – prompting public regulators to respond in pursuit of their objectives. To me, this is an illustration of a type of high-stakes games that I call 'market oversight games'.

I want to bring across today how insightful it is to see that these games are being played all around us.

What Are Market Oversight Games?

Definition. Market oversight games are strategic situations in which the success of the choices made by the institutions burdened with the task to oversee markets depends on the choices of the market participants that they are overseeing, and vice versa.

We have market oversight because we believe that competitive market processes – of which mostly good things are expected – cannot always be left on their own: they may need protection. Granted in what form, to what extent, and by whom depend on the market.

There are three basic types of market authorities.

Competition Authorities

First, we have general competition authorities – including our own Netherlands Competition Authority (NMa) – designated to protect competitive processes across the board against anticompetitive behavior, for example, against mergers to monopoly, and firms that are supposed to compete but have instead conspired not to and collude to make cartel profits at the expense of society – think of our infamous ‘Bouwfraude’.¹⁸

Classic Regulators

Second, classic market regulators – including the Dutch telecom regulator OPTA – strictly control specific sectors in which competition has been invited, but there is a natural monopoly in the middle that needs to be kept in check – such as the copper landlines for telecom. The regulator’s task is to guarantee open access to that network at reasonable prices for all who want to compete in it.

Special Supervisors

And third, we have created quite a few special supervisors – such as the health care markets authority NZa and the financial markets authority AFM – the latter in a sometimes difficult tandem with the Dutch Central Bank, DNB – where we fear specific externalities resulting from market imperfections – for example, excessive financial risk-taking by ill-advised consumers.

All these market ‘overseers’ strategically interact with the ‘overseen’ – and occasionally also with each other. I’ve coined the term ‘market oversight games’ for these interactions because they have similarities that make it useful to consider them jointly as a class of games.

The objectives of the overseers and the overseen typically conflict in the following sense: market *participants* have a natural tendency to seek ways to avoid competitive pressures – perfectly fine competitive ones, but also some that violate the competition rules and regulations – because that is where the economic profits are. In contrast, market *authorities* seek to keep competitive pressures up where necessary, applying the rules and regulations.

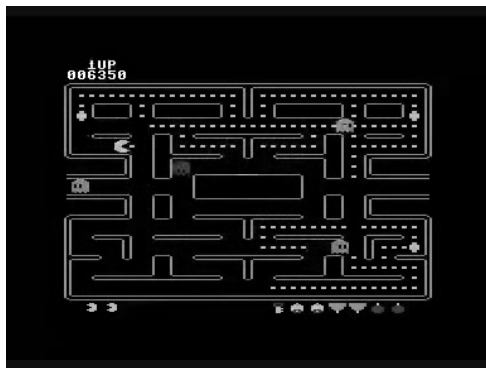
Without good market oversight – with an emphasis on ‘good’: bad oversight can be counterproductive – we cannot reap all the fruits of competition: low prices, efficient production, high quality of goods and services, plenty of variety, lots of innovation and exciting new stuff.

Towards a better understanding of what is good market oversight, this afternoon I will offer two propositions and a theorem with three corollaries.¹⁹

Pac-Man Is a Dominant Firm

Market oversight games are games of pursuit and evasion. To see what these are, consider Pac-Man, the cult-classic arcade video game, which was developed by Namco in Japan, where it was first released in May 1980 – in fact, this year Pac-Man turned thirty. The game is still popular on iPhone. I used to play it on my Commodore 64 in the mid-1980s.

This is a screen capture of a couple of initial levels – not particularly well-played – of the single player version of the original game.



Properly understood, what you see here is a monopolist – Pac-Man – maneuvering a market with the objective to eat away at consumer surplus – the so-called ‘pac-dots’ – and the occasional windfall profit – ‘fruits’. While doing so, the monopolist is being chased by four different competition authorities – referred to as ‘ghosts’ – that try to catch the firm for abuse of dominance. At first, the agencies appear to roam the economy in a somewhat uncoordinated manner, but at higher levels, you soon realize that they employ tracking techniques, and they even seem to hunt for antitrust violations in packs.

If the monopolist chooses to do so, it can take legal action against the authorities – in the form of swallowing a ‘power pellet’, four of which are flashing in the corners of each fresh market – that provide it with the temporary ability to appeal against the agencies – they turn pale and flee when this happens – and send them back into their box.

There they quickly recover however – and resume enforcement. So, for most of the time, Pac-Man is being pursued; he twists and turns to evade the ghosts while snapping up what he can – before ultimately losing his three lives.

I’ll return to Pac-Man later.

Some Examples in Real Time

First, three quick examples of real market oversight games out there.

DNB vs. DSB

Close to home, part of the Dutch share of the global financial crisis: the Dirk Scheringa Beheer Bank, DSB. It was pursued – in ways that were later criticized, but it was – by the Dutch Central Bank (DNB). But DSB had taken steps to evade oversight.

Among other things, DNB ordered DSB to increase its solvency by selling part of its business when profits dried up in 2007.²⁰ The bank sold, as it was told, however not to a third party, but to itself. The part was acquired by a holding that included DSB Bank, financed by a matching loan extended by the bank to the holding. It appeared that DSB had complied – and DNB was satisfied – but really, the bank was weakened. It eventually toppled at the end of last year – whether pushed or not is still an open question.

This and other incidents of creative compliance have led the Central Bank to announce plans this summer for changes in its ‘institutional culture’. The memo is pretty crispy – for a bank. It calls for better expertise, more powers,

and it uses some of the right lingo – ‘enforcement’, ‘strategy’ – but it doesn’t really take the game view.²¹

OPTA vs. The Fiber Guys

Another example: Dutch telecom. After quite successfully enforcing access to copper, OPTA is currently pursuing the local cable TV monopolies – which have just won an evasive appeal.²²

OPTA also faces strategic investors in optical fiber – the next generation infrastructure for high-speed telecom – many of which have close ties with the old incumbent, KPN. OPTA’s pursuit of a fiber regulation has been evaded time and time again – in part with the help of the specialized appellate court of the Netherlands.

Where fiber is rolled out, typically the old copper lines are replaced.²³ Of course, copper prices are high these days. But by taking out the existing network, rather than just laying separate fiber tracks, also a well-regulated competitive alternative is eliminated. Copper might be slower; it is still fine for many, and competing providers may find it too expensive to switch to fiber and exit the market. OPTA toils to find optimal responses to such monopolization strategies.

Playing the Agency

One more case – stylized for confidentiality reasons. An entrant – which shall be named company Y – aspired to start selling in a market thus far dominated by incumbent X. X feared Y, because Y was hip and also seemed to be able to produce at lower costs. Y’s entry prices were indeed lower.

What did incumbent X do? A very clever move: it complained to the competition authority that entrant Y’s prices were predatory – that is, below its costs in an attempt to bankrupt poor X – which would be illegal under the country’s competition laws. The prices really weren’t predatory, but competitive; however, an agency can only know this after it has done what it is supposed to do when it receives a complaint: investigate.

Now, such investigations can be invasive. In this case, they were, and Y’s entry strategy was arguably hindered by the false complaints of X. The incumbent managed to evade new competition by seducing the agency to pursue its rival with nuisance allegations.²⁴ Public authorities should guard against being played like this – and instead try to keep the upper hand.

Points of Departure for Analysis

Central banks fooled; regulators neutralized; competition authorities bamboozled: how can we analyze market oversight games? There are various points of departure.²⁵

Industrial Organization has identified a variety of anticompetitive behaviors, and when they may become a competition concern.²⁶ There it usually stops, leaving it up to the authorities to fix the problem. The authorities' intentions to do so are typically assumed to be pure – maximizing social welfare – although it has been recognized that imperfect information may stand in the way of optimal enforcement, for example, in a paper that Jan Tuinstra and I published on the consequences of Type I and Type II errors in enforcement.²⁷

In the literature on regulation, more generally, the emphasis is on the information problems regulators have, and their incentives to intervene in the public interest are questioned in a Chicago-style, public-choice critique of lobbies, capture and corruption.²⁸

Law & Economics offers insight into incentives to infringe, fine, sue and settle, but it is mostly partial. Legal writing on competition cases and regulatory issues is a rich source of learning, but it is generally descriptive.²⁹ And hands-on manuals present state-of-the-art applied economic techniques, but not the fine strategies of market oversight gaming.³⁰

Matching Pennies

Game theory offers a crucial tool in one of its simplest games: 'matching pennies'.³¹ Maybe you know it – or a variant – as a children's game.

Two players, say you and me, each have a coin, which we must secretly turn to 'heads' or 'tails'. We then reveal our choices simultaneously to each other. We have agreed beforehand that if our coins turn out to match, you will get my coin. If they do not match, I will get yours.

Hence, you must try to pursue my choice, while I am to evade yours. Suppose you choose heads – and I know this – of course the point is that I don't, but suppose – then I will want to choose tails. But if I choose tails, you no longer want to choose heads. A similar loop of pursuit and evasion follows if I start.

Since the choices have to be made simultaneously, what should each of us do? Well, the only thing that makes sense is to play randomly – in fact, to flip the coin. There is no pure strategy equilibrium in this game – that is, always play heads or always play tails – but only a mixed strategy equilibrium in which the players randomize over their pure strategy alternatives.

This is an important result – which I will use later on.

Market Oversight Games Complex

Recall that in the examples of market oversight games I gave earlier, the players do not always move simultaneously. Instead, their interactions often have a dynamic structure: they try to outmaneuver each other after having first observed what the other just did.

Game theory teaches us that to analyze optimal strategies and equilibria in sequential move games, it is essential to specify: the set of players; the order in which they move; the pure strategy space of each player at each move; each player's payoffs; and what each player knows when making its choices.³² Finally, the entire structure of the game is generally supposed to be common knowledge between all players.

But that is easier said than done: in most market oversight games, essential elements for analysis do not seem so clear. Consider again the 'plastic cards game'. This is former Competition Commissioner Kroes, with her stern face.³³



Look at the core of the game: the European Commission versus MasterCard – two players – although the real players, of course, are the strategists that work for them; more about that later.

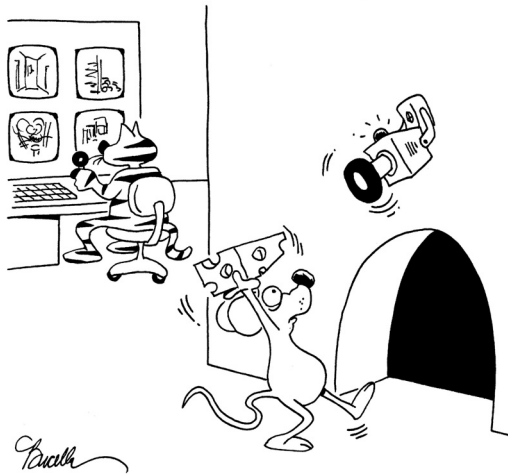
Let us, for now, also agree that the payoffs are clear: the Commission seeks to serve consumer welfare by making card payments cheaper and better for everybody; MasterCard wants to gain market share and profit.

State of play: Commission pursues MasterCard's fees as too high because collusive – 101. MasterCard transforms into a single firm and asks, 'How can I collude with myself?' It tries to evade.

What alternative pure strategies does either player have? The Commission could try 102: MasterCard is dominant and prices excessive. But is it? As said, its market share is just 35%. And what are excessive fees? – particularly in a two-sided market. Such cases have rarely been successful before.³⁴ By bundling the MasterCard and VISA cases, the Commission could argue collective dominance. Maybe the Commission can accept commitments. Or try to stimulate consumers to switch more to increase competition. Or something else.

What did the players know when deciding on their actions? Did the Commission ever take into account that a corporate identity change was part of the game? It appears that the structure of these games is not common knowledge.

In fact, it is inherent to games of pursuit and evasion that the sophistication of play evolves over time when the game unfolds. Just like in cat & mouse, it is all about who is most inventive.

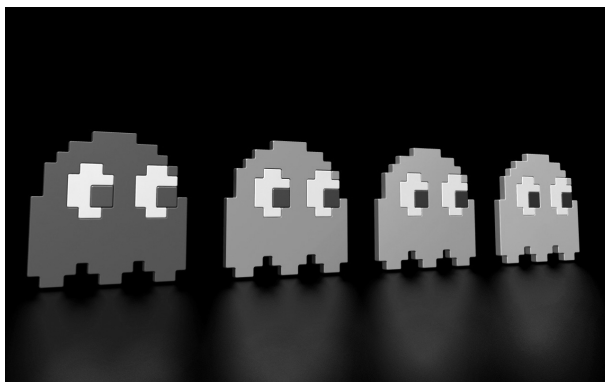


This property means that these games are too complex for standard game theory. Between matching pennies and MasterCard, however, Pac-Man can teach us something.

But first a note. For the remainder of this lecture – also with an eye on the field study that I will present later on – I will restrict myself to mechanisms and terminology in competition law enforcement. All findings apply equally to other forms of regulation, however.

A Lesson from Pac-Man

Within the boundaries of the maze on the screen, the movements of Pac-Man are fully flexible and determined by you, the game player – only speed is exogenous. The behavior of the colorful ghosts, on the contrary, is programmed into the machine. In essence, it is simple. Pac-Man expert Jamey Pittman reverse-engineered it in his chapter ‘Meet the Ghosts’.³⁵



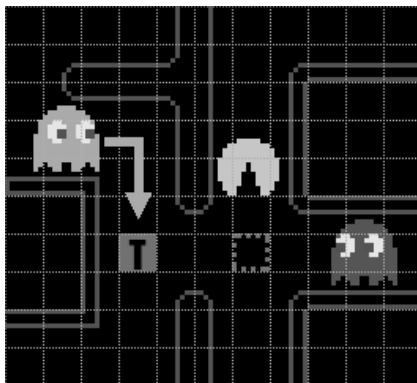
To understand ghost tactics, it is important to know first that the maze in which the game figures can move is subdivided into a discrete number of squares, called ‘tiles’. In each frame, each game figure essentially ‘stands’ on one tile. Moving means going from one tile to the next. A deadly collision occurs when Pac-Man and a ghost happen to stand on one and the same tile.

The ghosts are continuously given new target tiles to go to and get Pac-Man. Their distinct characters come from the unique way each ghost is assigned his target tiles.³⁶

Chaser, the Red ghost, always has Pac-Man’s tile as his target tile. He is difficult to shake off.

The Pink ghost, Ambusher, always aims four tiles ahead of Pac-Man. As a result, Pac-Man can trick Ambusher to turn away when he is close enough by moving a quick one step into her direction – and back.

The Blue ghost, Fickle, uses the most complex targeting scheme of all. He combines Pac-Man's current tile and orientation with Chaser's current tile to calculate his target. In this screenshot you see how Fickle gets his tile, T, which is first two tiles ahead of Pac-Man – here indicated by dashed borders – and then extended – for the viewer – to the left by the distance between the dashed tile and Chaser's tile, mirrored.³⁷



So Fickle and Chaser do indeed hunt together.

Finally, the Orange ghost, Stupid, uses Pac-Man's tile as a target only when he is more than eight tiles away. If Stupid is closer to Pac-Man, he turns away to head for his corner. Stupid is hardly a threat.

Due to a programming bug, Pac-Man is a finite game. The bug makes the level counter scramble the screen at level 256. In the corrupted screen, some of the pac-dots can no longer be reached to be eaten, and so scoring ends. Eating everything everywhere without ever losing a life achieves 'perfect play' and the absolute high score of 3,333,360 points.³⁸

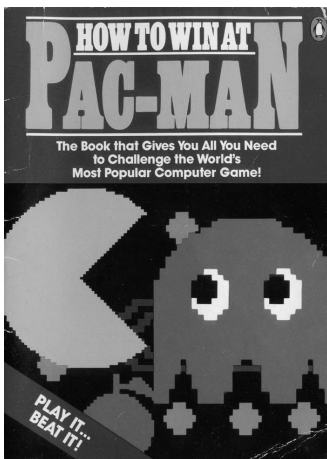
Since July 3, 1999, we know at least one optimal strategy for Pac-Man. That day Bill Mitchell from Florida was the first person to officially complete a perfect play – it took him about 6 hours. The World Champion Pac-Man revealed some of his strategy – I quote:

'I understand the behavior of the ghosts and am able to manipulate the ghosts into any corner of the board I choose.'³⁹

So however sophisticated the moves of the ghosts may appear to the novice player, their behavior is fully deterministic. There is, in other words, legal certainty as to what the competition authorities will do in reaction to the mono-

polist's behavior. Therefore, Pac-Man can in principle always win, simply by using fixed routines.

Consultants have exploited this. An early guide gives ten tips and clues on how to win at Pac-Man, including avoidance patterns called 'the mid-fruit pattern', 'the ninth-key pattern' and 'the lure' – in which all the ghosts are attracted to one power-pellet and then are all eaten at once.⁴⁰



I derive:

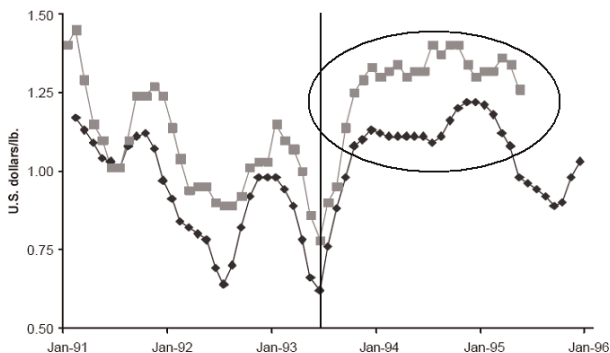
Proposition 1. If competition authorities just follow fully predictable target rules, few antitrust violators will be captured.

Any captures that may happen will essentially be accidental – due to unskilled play on the part of the antitrust violators.

Dodging Cartel Detection

An example from cartel detection shows how this proposition is true. Competition authorities can develop suspicion of the existence of a cartel by critically monitoring what is going on in markets. An obvious thing to look at is prices. We know something about collusive pricing patterns from cartels discovered in the past. A representative example emerges from a big international cartel busted in the mid-1990s in the market for lysine.

Lysine goes into animal food – and so into chickens, pigs and others – that we eat in turn. It is a large industry at the bottom of our food chain. Beginning in the summer of 1993, the world’s main suppliers of lysine, an American company called ADM, two Japanese and two Korean competitors, conspired to hold back their capacities and divide the world market at high prices.⁴¹



Here you see a time-series of the price of lysine per pound before, during and after the cartel – black are prices in the US, grey in Europe.⁴² Notice that after prices were set high when the cartel formed – at the vertical line – price variance went down as well: throughout 1994 the curve is pretty much flat, compared to quite some fluctuations over the preceding period. This typical price-fixing pattern has been used in academia to devise mean-variance tests to discover cartels in other markets.⁴³

I’ve asked several competition authorities in the past few years if they do indeed monitor markets with tests of this kind – and so far they say they do not. This is probably true: they rely on other sources, on which more later. But in case the agencies *are* using these techniques – and this is my point – they shouldn’t tell someone like me who is asking about it. After all, if the details came out, that would surely reduce their effectiveness. Because if cartels know how they are being monitored, they can easily avoid being detected.

How? Well, to pass the variance screen, cartels can simply use overcharge mechanisms that mimic price variance under competition, as they do in a mechanism that Iwan Bos and I describe in a paper.⁴⁴ Nevertheless, there is lots of potential for good forensic tools to detect very clever antitrust violators as

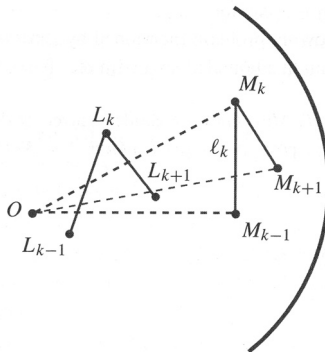
well. If the public authorities don't develop it, I know private antitrust bounty hunters will.⁴⁵

Faced with these threats, how smart do market overseers have to be, relative to the overseen, to be effective? Pac-Man research is not ready to answer this question. The frontier here is in evolving slightly more advanced ghost routines.⁴⁶ Last year, the artificial intelligence society organized a competition for the best team of programmed ghosts that together minimize Pac-Man's score. Results have yet to be published.⁴⁷ I suggest the ICN takes note.⁴⁸

How the Lion Gets the Christian

But we can look at the opposite extreme. Players are equally intelligent and flexible in a classic problem of pursuit and evasion that will appeal also to my Roman law colleagues: 'The Lion and the Christian'.⁴⁹ In this problem, a lion and (let's say) a man are both inside a circular arena, each running at the same constant speed. The question is: can the lion catch the man?

Active research in this area is done on perfections of Abram Besicovitch's solution to the original math version of this problem, posed in the 1920s. Suppose, for now, that lion and man both have no bodily dimensions, but rather are points. Here you see them, L for lion, M for man.⁵⁰ O is the center of the arena.



Initially, it was thought for quite some time that the lion would always catch the man easily. What the lion should do is first get to, and then remain on the

radius that passes from O through the man's position, gradually move towards the man along that radius, then grab him – this is the so-called 'radius rule'.

But some time around 1950, Besicovitch proved that there is a counter-strategy for the man to follow and always escape. What the man should do is make a sequence of zigzag steps, each time stepping away from the direction in which the lion is moving towards him. This way he can make the lion move forever towards where he just *was*, not where he *is going*, and never get caught. Such a path is seen in the picture above.

However, the lion will get arbitrarily close to the man in time. Therefore, if the lion is not a point, but rather has claws to extend, the man is captured as soon as he is within reach.

Since competition authorities certainly can strike out, we obtain:

Proposition 2. If equally smart, fast and flexible, competition authorities will always capture antitrust violators in time.

While reassuring, the assumptions on which this result rests are pretty strong. Consider 'equally flexible'. In reality, competition law enforcement has to happen in a maze of case law – jurisprudence: past authority decisions and rulings by lower, higher and supreme courts that often constrain the agencies and allow antitrust violators to hide behind them. *Illinois Brick* is an example that I have worked on with Jan Tuinstra and Jakob Rueggeberg.⁵¹

In fact, the research frontier in the mathematics of pursuit and evasion lies at introducing obstacles into the arena. In a paper published last year, these turn out to help the man: if he can get to an obstacle faster than the lion can get to him, the man avoids capture forever – by looping around the obstacle at a constant distance from the lion, since they are equally fast.⁵²

So it is essential to know how intelligent, quick, maneuverable and powerful the players are.⁵³ How well are market oversight games really played? To answer this question, it is useful to look inside the players – that is, inside the black boxes of companies violating the antitrust laws and the agencies fighting them – and see how the many decisions of the people who work for them – all with their own individual interests, abilities, actions and strategies – aggregate into corporate and institutional behavior.

In joint work with Martijn Han and Jeroen van de Ven, this principal-agent approach appears to be fruitful in producing theories.⁵⁴ Field research, on the other hand, is not so easy.

A Look inside the Cartel: The Lysine Tapes

The trouble with illegal collusion is that it largely goes on in the dark. Virtually all that we know about it comes from hindsight: from cartels that were convicted. This is problematic, since it is not likely that the ones caught are representative of the entire population. Depressingly, they could just be the slow and dumb cartels.⁵⁵

What we really would like to do is observe active cartels in the wild. We got a glimpse from rare undercover film material that the FBI shot of secret meetings of the Lysine cartel. To get it, the FBI used an informant, Marc Whitacre, who helped plant an undercover camera and microphones in the hotel rooms where the cartel meetings took place – I have no time now to tell you how he got himself into this, but I recommend the entertaining Hollywood movie that Warner Brothers released last year about the story, starring Matt Damon as ‘The Informant’.⁵⁶

The FBI surveillance material was later released by the US Department of Justice as an instruction film. The footage shows how this cartel operated internally, including detailed pricing discussions and compensation schemes. It is great teaching material. Fellow cartel enthusiasts will recognize it. In fact, it is so good – it is almost too good to be true.

I will show you just a short clip – of a meeting on Hawaii. The president of ADM’s corn processing division, Terry Wilson, explains how important it is to stick to the agreed volumes, trust each other, and not give in to the pressure from buyers to deviate. Several of the gentlemen in this scene went to jail for what you will see them doing.⁵⁷



TRANSCRIPT

United States Department of Justice Antitrust Division presents:
The International Lysine Cartel at Work

March 10, 1994

Cartel Meeting in Maui, Hawaii

Co-Conspirator explains how end-of-year compensation scheme eliminates incentive to cheat on cartel

WHITACRE: Yeah

WILSON: Sir, I-I, now, that's gonna be your business. Again, I wanna go back and I wanna say somethin' very simple. If we're gonna trust each other, okay, and if I'm assured that I'm gonna get 67,000 tons by the end of the year's end, we're gonna sell it at the prices we agreed to, and I frankly don't care what you sell it for. But as long as I know I'm gonna get my 67,000 tons because I'll sell it at full market price. If you choose not to do that ...

WHITACRE: It's your loss.

WILSON: you could explain it to your management. I don't have to explain it. But I do have to explain it, or Mark has to explain it, to our management. The only thing we need to talk here because we are gonna get manipulated by these God damn buyers, they're sh..., they can be smarter than us if we let them be smarter.

MIMOTO: (Laughs).

WILSON: Okay?

MIMOTO: (UI).

WILSON: They are not your friends. They are not my friends. And we gotta have 'em. Thank God we gotta have 'em, but they are not my friends. You're my friends. I wanna be closer to you than I am to any customer. 'Cause you can make us, I can make money, I can't make money. At least in this kind of market. And all I wanna ta tell you again is let's-let's put the prices on the board. Let's all agree that's what we're gonna do and then walk out of here and do it. And if you do it, you're gonna win some, you're gonna lose some.

WHITACRE: But we balance it out at the end of the year.

WILSON: And at the end of the year, you're gonna be where we talked that we're gonna be. As long as the market's there.

So we know that collusion certainly involves intelligent strategic play.

A Look inside the Agency: The NMa Tapes

How about the opponents, the antitrust agencies? Here, as researchers, we face similar data problems. What becomes public about the agencies' work has sample selection biases: they are only the success stories amongst suspicions – who knows how many – that were investigated but abandoned early on: because of too little evidence, or because there was nothing really wrong.

What we would like to study is how the agencies work internally when they do not know that they are being watched. But how can academics like me ever get to observe the antitrust authorities in the wild?

In the interest of science, I decided to slightly abuse my warm relationships with the NMa, and smuggle a camera into their offices last July to secretly observe the behavior of the good people that serve the public cause of combating competition law infringements. In the following scene, you will see how the agency officials become suspicious of a rather sophisticated cartel.⁵⁸



TRANSCRIPT

GENTLEMAN IN ELEVATOR: Hey Maarten Pieter, good to see you! – All well? I am “en route”. Hoi!

“Netherlands Competition Authority [NMa]”

July 15, 2010

Agency Officials' Meeting in The Hague, The Netherlands
Officials apply latest cartel theory to develop suspicion

YOUNG CASE HANDLER: I do suspect that these patterns indicate coordinated attempts to raise prices. It seems that [...] collected the necessary information at the three-monthly trade association meetings held in [...] on the coast. The direct purchasers are also always there and ...

SENIOR ANALYST: I have my doubts. This kind of parallel behavior is also consistent with competition. So then what indicates that there may be collusion? Prices in Germany, Denmark and the UK, for example, are not different from the Netherlands. So what is the problem?

YOUNG CASE HANDLER: That's right, but that is exactly how this cartel is so clever: they funnel a large part of the cartel profits vertically to the downstream intermediaries, but those companies are listed on the stock exchange and for almost 100% held by the [...] producers themselves! They profit from the artificial scarcity in the Netherlands and for that reason, for example, hardly import anything.

SENIOR ANALYST: Ok, now that may be interesting: you mean diverting illegal profits by centrally and artificially rationing supplies. This is a mechanism discussed in academia, but is it real? Isn't it relatively easy to enter in particular into the downstream market? If so, it won't work.

LEGAL CLERK: There have been no relevant leniency applications. We did receive a complaint last February through the offices of [...] from a small player, a client in upstream [...]. But we couldn't do much with it; it was rejected.

This discussion may have been a little hard to follow: it is pretty technical. But the young and zealous case handler in the middle believes she has discovered a cartel that actually behaves very much according to a mechanism only recently published in the academic literature! So we can rest assured that these are highly intelligent and driven people, on top of their game.

In the next scene, the two people in the front – both leading NMA officials – have warmed up to the case and start to develop an investigation strategy.

Oh, before I forget, the legal clerk on the left – the one with the bald head – he said something about there not being a leniency application. That's kind of important.

The leniency programs – introduced in the mid-1990s – offer reductions in the fine imposed on cartel members that come forward with information that helps to convict their fellow conspirators. The programs play on the inherent instability of cartels – this is the trust issue discussed in the Lysine clip. Leniency fuels this distrust: might one of us cheat and be talking to the authorities? If so, I could end up with low sales and a huge fine. Maybe I should go first!

My colleague in law, Rein Wesseling, called this setup ‘indecent’ from this spot last spring – ‘not how you would want to raise your children’.⁵⁹ For the agencies, the information so obtained is often crucial to make their case. Watch:



TRANSCRIPT

July 15, 2010

Agency Officials’ Meeting in The Hague, The Netherlands

Officials develop investigation strategy involving soliciting leniency

SENIOR ECONOMIST: This could be an interesting case. This sector has total annual sales of up to 2 billion euro. The Ministry of [...] is a large customer. So this is about public money. This is definitely a case that we want to take on and that we want to give priority to, on the basis of the competition laws. I suggest that we first investigate possible cartel profits in the downstream market. We can subsequently look into their vertical distribution.

SENIOR LAWYER: When you say investigate, you mean active detection and not sending questionnaires? We do not have a leniency application.

SENIOR ECONOMIST: Yes.

SENIOR LAWYER: To prove this case, it would be convenient to have a leniency applicant.

SENIOR ECONOMIST: Maybe we can provoke one.

SENIOR LAWYER: For now keep it quiet ... we’ll have to see what happens ... who knows someone might come forward. I believe that [...] of these companies have been in our leniency program before, or took part in

our seminar. Maybe you can check this. Leniency can make or break this case.

LEGAL CLERK: I will.

I need to pause here for a disclaimer. I have learned in recent years when to take legal advice – and my lawyers have warned me to make sure that you realize that this material *is* too good to be true.

TRANSCRIPT

Disclaimer

The events depicted in this movie are fictitious. Any resemblance to real persons, living or dead, or to real places is purely coincidental.

These tapes were staged: I scripted the actors – all NMA friends playing themselves – to talk about my own paper.⁶⁰ Of course I would never breach NMA confidentiality – and isn't reality better than fiction?

Leniency Games Antitrust Authorities Play

What is real is that competition authorities worldwide lean heavily on leniency. In the past decade, almost all cartel prosecutions involved at least some information given in exchange for fine discounts.⁶¹

At their inception, the leniency programs were a smart strategic move: they changed the rules of the cartel oversight game, which has undoubtedly led to the clean up of cartels that we would never have known about otherwise. But now that these programs have become well-established, it is important to think about the possibility that cartels have incorporated the leniency-defection threat in their agreements – and have made them leniency-proof. In fact, if they haven't, how can new cartels still form? And they do.

Meanwhile, the authorities are busy dealing with the many applications that they get – probably too busy, because it is likely that a large share of the applicants are the less well-organized and ineffective cartels – not the big fish. Or dead cartels, whose skeletons only recently fell out of a closet opened by a prospective merger partner.

The agencies must therefore be careful not to spend too much time and effort. It is attractive for case handlers to pursue leniency cases – after all, the

case is brought to their attention, the production of proof is largely outsourced, and there is little risk of a dead end. And lawyers are keen to file them. But with a given staff and budget, there may be nothing left for active detection, which would serve the better organized cartels.

Now we do not know who is gaming who in leniency currently – it needs more research. Yet, we show in a paper with Marie Goppelsroeder that flying blind on the leniency instruments can be dangerous.⁶² And if, for example, access to evidence for antitrust victims who seek reparation of their damages is restricted when that evidence was submitted as part of a leniency procedure, the fish may steal the bait, as in this cartoon.⁶³



"STAY ALERT, SON. THE FISH HERE ARE REALLY SMART."

Ms. Pac-Man Proves Creativity Theorem

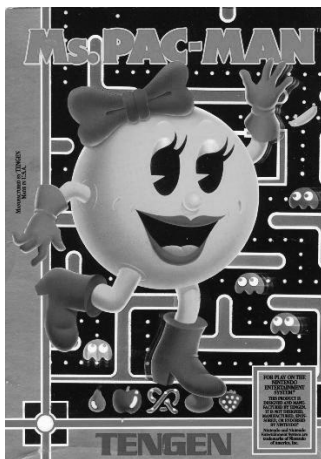
So we find: market overseers are no ghosts, but they are not lions either. How to play?

We are now ready for the main result:

Theorem. Optimal competition law enforcement applies creative pursuit strategies.

The proof is in *Ms. Pac-Man*. *Ms. Pac-Man* is essentially *Pac-Man* enriched with mixed strategies of the matching-pennies type. She was born as a boot-

legged hack at MIT, and illegally released in the United States in 1981. After some litigation, Namco adopted Ms. Pac-Man as an official sequel.⁶⁴



Apart from lip gloss and a red hair bow, the crucial element in Ms. Pac-Man is that three of the ghosts exhibit creativity – albeit at a bare machine level: on rare random occasions they change their tracking paths.⁶⁵ I believe only Stupid remains fully predictable.

As a result of this simple twist, Ms. Pac-Man is fundamentally different: the game is no longer deterministic and cannot be won by pre-set patterns of routines. Despite the fact that the ghost strategies in Ms. Pac-Man are still very far from optimal, there are no known strategies for perfect play.⁶⁶ However well you play this game, the ghosts always win.

Quod erat demonstrandum.

Three Corollaries with an Example Each

To round out this result, I will discuss three implications here, each with an accompanying example.

Corollary 1. Legal certainty cannot be offered beyond the spirit of the competition rules and regulations.

Competition authorities need the space to develop and apply novel theories of harm to pursue continuously changing evasion strategies as potential violations of the competition rules.

To be clear, this may sound more dramatic than it actually is: the formulation of the competition rules is already brief, loose and general – and so their meaning is open to interpretation. In fact, a large community – a significant part of which is present here today – makes a living creating and protecting ‘legitimate expectations’.⁶⁷ But there is a tendency to abuse the principle of legal certainty, and push for formal bright-line rules that are too restrictive for optimal agency play. An example illustrates this.

OFT vs. RBS

Last spring, the UK Office of Fair Trading fined the Royal Bank of Scotland for almost 30 million pounds because some employees at RBS told their colleagues at Barclays on the phone what interest rates they were going to charge to loan applicants.⁶⁸ So RBS calling; Barclays just listening.

The fine was not contested, but the case caused quite some intellectual debate. Defendants’ lawyers already like to argue that exchange of information alone hardly makes a cartel – but in this case, the information exchange had been entirely unilateral – so it hadn’t even been an ‘exchange’, really. Therefore, wasn’t this stretching what can constitute collusion?

Now this is where the theorem applies: suppose we would characterize in detail what ‘a cartel’ is and what evidence is required to prosecute one. Then smart cartels will find ways not to produce that kind of evidence. Is a written agreement a smoking gun? Then we won’t write anything down. Shouldn’t we meet? We can call. Is talking a problem? Then only one of us signals – the others just act. Collusion moves from explicit to tacit, that is.

To avoid being deceived by fake compliance – like DNB was by DSB – requires the discretionary authority to formulate strong counter-play.⁶⁹ Of course, these powers are to be used carefully: independently, on the basis of professional expertise, constrained only by proper commitments and the courts of appeal.⁷⁰ Lawmakers must create the conditions for this, but:

Corollary 2. Market oversight has to be kept independent of politics.

That is, ‘kept’ as in ‘keeping oversight’.

European Commission vs. Microsoft

Consider Microsoft, *the* antitrust case of the end of the last century. Recall: in the mid-1990s, Microsoft aggressively pushed its browser Internet Explorer, built into Windows at no extra charge. The US Department of Justice – after trying some other things first – successfully pursued this business strategy as monopolization. As in other innovative cases, they had to figure it out first – like OPTA had to figure out the fiber guys – but I bet the DoJ eventually saw Microsoft’s predatory-bundling-monopoly-leverage strategy clearer than the company itself initially did.⁷¹

However, when the Bush Junior administration took over from Clinton’s, including a replacement of the DoJ top officials, the US Microsoft case petered out.⁷² The European Commission *did* follow suit for abuse of dominance, with fights and fines, eventually forcing Microsoft to provide consumers with an easy choice in browsers.



Here you see the screen that Microsoft had to program into Windows to comply.⁷³ Whatever you may think about the effectiveness of this remedy, to be creative like this, regulators’ priorities and tactics in applying the law need to be free from politics.⁷⁴

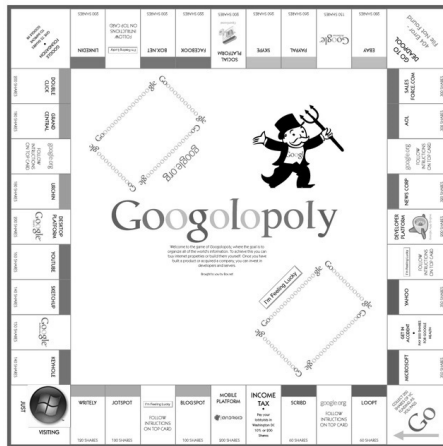
It is worrying therefore that two years ago the Dutch Ministry of Economic Affairs clipped the wings of the maturing NMa by bringing the formulation of guidelines under its control.⁷⁵

Corollary 3. Market overseers must be committed to constantly developing and applying cutting-edge professional expertise.

They must be set up to do the right thing.

Pawns in Googolopoly

A new antitrust storm is gathering over the Atlantic, this time around Google, which is believed to have a near monopoly on the internet search engines market, allowing it to display information and direct traffic at an excessive charge. Microsoft is attempting to break Google’s power – together with Yahoo.



Last February, the Commission received complaints about Google from several small European price-comparison sites, which claim that Google abuses its dominance by making it difficult for them to be found on the internet and so grow popular. The complaining sites are indeed not very well-known. Yet at least one of them has close ties to Microsoft.⁷⁶

The brightest economists and lawyers have been lined up on the corporate side. What should we expect? Perhaps the European Commission will become a pawn in the competitive game between powerful companies – like entrant X tricked its agency with a false complaint. Perhaps Google is the next Microsoft case, and this is just the angle the Commission had been waiting for to produce welfare out of a clash of giants. Formal investigations have yet to start.⁷⁷

Commitment to Do Good

How can we commit market overseers to use rightly the strong discretionary powers that I argue we should give them? Of course, we need excellent public agency officials – so selection, training and revolving doors are essential.

At least as important are proper incentives. Internal careers should be made over novel and important cases – not run-of-the-mill cartels. Leadership should encourage and assist entrepreneurial market oversight in the organization. And it is crucial that the competition authorities are held accountable – and, if needed, are liable under specific conditions – by those affected by their actions, including victims of no-intervention decisions.

The regulators should be judged fairly by courts that know and understand my theorem – so that the risk of appeals does not make them timid and unimaginative, just to be on the safe side – but also strictly enough to keep the regulators sharp and cutting edge.

And all of this, of course, is also what keeps it so interesting to work for and against the market overseers – and to study market oversight games for years to come.⁷⁸

Epilogue: The De-nationalization of Money by Electronic Payment

One final word on the VISA and MasterCard cases that I started out with. I think these are great examples of how the European Commission creatively applies its means to an end.

The competition laws may not be entirely fitting, and the economics not wholly two-sided, but the Commission did fix a problem that the central banks collectively overlooked and allowed to grow – or so it appears to me; and that is the de-nationalization of money by commercial electronic payment, expanding into a worldwide natural monopoly. In private hands, plastic money may not efficiently drive out dirty cash, but instead be abused for skimming transactions.

This should be one for the hot debate on the restructuring of banking.⁷⁹ But more on that maybe some other time.

Dankwoord

Leden van het College van Bestuur, besturen van de Faculteit Economie en Bedrijfskunde en de Faculteit der Rechtsgeleerdheid, in het bijzonder de decanen, hartelijk dank voor het door u gestelde vertrouwen. Ik aanvaard gaarne de dubbele benoeming waarmee u mij hebt vereerd en de daarbij gegeven opdracht om bruggen te bouwen tussen onze faculteiten.

Hooggeleerde heer Boot, beste Arnoud, ik zie je als een marathonloper, op kop, die ik af en toe een sponsje of een bidon mag geven – waartoe ik dan een stukje met je mee ren, tot ik weer even op adem moet komen. Ik ben je dankbaar dat je me naar Amsterdam hebt gehaald en alle ruimte hebt gegeven om te groeien en vorm te helpen geven aan het Amsterdam Center for Law and Economics, het ACLE. Ik blijf mijn best doen om je bij te houden.

Beste collega's – en oud-collega's – in het ACLE, van hooggeleerde fellow tot ambitieuze studentassistent en staf, heel hartelijk dank voor jullie bijdragen aan ons prettige en creatieve werkklimaat.

Beste Jan Tuinstra, je naam is al meermaals gevallen vanmiddag. We hebben veel onderzoek samen gedaan en zijn vol ideeën voor nog veel meer. Onze eerste gezamenlijke liefde was 'disequilibrium'. Je bent een grote vriend. Het voelt wat ongemakkelijk dat ik nu van ons tweeën als eerste een leerstoel mag bekleden. Dat is niet helemaal terecht – 't is ook niet onterecht, maar ertussenin. Gelukkig is het geen stoelendans en ik heb er alle vertrouwen in dat jij binnenkort ook kunt gaan zitten.

Lieve papa en mama, op deze plaats beweerde collega Dirk Sikkel, hoogleraar Ouderenmarketing, onlangs in zijn oratie *De grijze aap* – een variatie natuurlijk op de klassieker van Desmond Morris die jullie mij al jong lieten lezen – dat er geen duidelijke evolutionaire functie meer is voor onvruchtbare pensionados van boven de 60, en dat hun gedrag daardoor lastig te begrijpen valt. Op dat laatste punt geef ik hem helemaal gelijk, maar zonder jullie hadden Carla en ik niet eens een dak boven ons hoofd gehad om Teun en Mik onder te krijgen, en in hen zie ik toch jullie genen doorgegeven. Heel veel dank voor jullie permanente liefde en steun.

Lieve Carla, in het voorwoord bij mijn proefschrift bedankte ik je ervoor dat je het schrijven ervan had aanvaard als reden voor uitstel van een noemenswaardig privéleven tot na de afronding. Je hebt me nooit gehouden aan die impliciete belofte, en ik ben je daarvoor hier nu eeuwig dankbaar. Je bent een schat.

Ten slotte, deze zomer bleek er een hondenleven te zitten tussen dat proefschrift en het aanvaarden van deze leeropdracht. Maar dat was het zeker niet!

Ik heb gezegd.

Notes

1. An abbreviated version of this text I delivered as inaugural lecture on the appointment to the chair of Competition Economics and Regulation at the University of Amsterdam on Friday 1 October 2010. I am grateful to Martijn Han, Charles Kuijpers, Joe McCahery, Francesco Russo, René Smits, Jan Tuinstra and editors of Amsterdam University Press for comments to (parts of) earlier versions of this text. I alone am responsible for its contents. Correspondence address: University of Amsterdam, ACLE, Roetersstraat 11, 1018 WB Amsterdam, The Netherlands. Email: m.p.schinkel@uva.nl.
2. Katie Benner, 'Visa IPO prices at record \$17.9B: Credit card company's initial public offering surpasses estimates at \$44 a share,' *Fortune Magazine*, March 19, 2008.
3. David Weidner, 'If you want to know how Wall Street works, look at Visa's initial public offering,' *The Wall Street Journal*, March 6, 2008.
4. I am indebted to my co-teacher, Pierre Larouche, and the 2010 class of ELEA students at the College of Europe, in particular Silvana Esposito and Álvaro Carlos García-Delgado, for the intellectual development of this possibility.
5. VISA and MasterCard were alleged to have prevented entry of rival (debit) cards by jointly prescribing exclusive contract rules. See Lloyd Constantine, L., *Priceless: The Case that Brought Down the Visa/MasterCard Bank Cartel*, Kaplan Publishing, New York, 2009.
6. See *United States of America vs. Visa U.S.A. Inc., Visa International Corp., and MasterCard International Incorporated*, Civil No. 98-civ.7076; See <http://www.justice.gov/atr/cases/indx57.htm> for an overview of legal documents.
7. The Treaty on the Functioning of the European Union (FEU Treaty) was adopted by the European member states with the Treaty of Lisbon, which entered into force in December 2009. The FEU Treaty replaced the Treaty on the European Community (EC Treaty) and included a comprehensive renumbering of all Treaty articles.
8. Duncan A. MacDonald, 'What MasterCard's IPO Means for Merchant Suits,' *American Banker*, June 9, 2006.
9. Victor Fleischer, 'The MasterCard IPO: Protecting the Priceless Brand,' *Harvard Negotiation Law Review*, 12(1), 2007, 137-156. This issue of the journal contains several other papers discussing strategic motives behind MasterCard's IPO, including Joshua D. Wright, 'MasterCard's Single Entity Strategy', *op. cit.*, 225-232.
10. There are issues in measuring the market shares of credit card brands, but according to www.creditcards.com, an industry-sponsored website, the 2008 US market shares for general purpose credit cards measured in trade volume of MasterCard was 35.33%. Source: Nilson Report, April 2009. MasterCard's 2009 global market shares for general purpose credit cards was lower at 26.5%. Source: Nilson Report, April 2010. For Visa, these values were 47.23% and 64.79%, respectively. The meaning of market share analysis for measuring competition has been questioned by many. In his testimony in the Merchants suit, Franklin M. Fisher argued that VISA and MasterCard credit cards should not be considered as substitutes, since merchants could not afford not to take both credit cards, so that both had signifi-

- cant market power over merchants. The case is discussed as yet another illustration of the limits of market definition analysis in Franklin M. Fisher, 'Economic Analysis and "Bright-Line" Tests,' *Journal of Competition Law & Economics*, 4(1), 2008, 129-153 at pages 140-3.
11. According to the 1981 European Commission's *Tenth Report on Competition* page 103, paragraph 150: 'A dominant position can generally be said to exist once a market share to the order of 40% to 45% is reached.' This threshold value has been applied more or less since for presumption of dominance, recently for example in *Intel*, see Commission of the European Communities, IP/09/745, 'Antitrust: Commission imposes fine of €1.06 bn on Intel for abuse of dominant position; orders Intel to cease illegal practices,' Brussels, May 13, 2009.
 12. Commission of European Communities, MEMO/06/260, 'Competition: Commission sends Statement of Objections to MasterCard,' Brussels, June 30, 2006.
 13. Commission of European Communities, 'Summary of Commission decision of 19 December 2007 relating to a proceeding under Article 81 of the EC Treaty and Article 53 of the EEA Agreement,' *Official Journal of the European Union*, 6.11.2009, C264/8.
 14. Commission of European Communities, MEMO/07/590, 'Antitrust: Commission prohibits MasterCard's intra-EEA Multilateral Interchange Fees – frequently asked questions,' Brussels, December 19, 2009.
 15. Case T-111/08. See MasterCard, News Release, 'MasterCard seeks to annul decision which would harm consumers and undermine European competitiveness and innovation,' Waterloo, Belgium, March 3, 2008.
 16. Note added between the date of the speech and the full text going into press: On Monday 4th of October 2010, the US Department of Justice issued a press release: "Justice Department sues American Express, MasterCard and Visa to eliminate rules restricting price competition; Reaches settlement with Visa and MasterCard". It appears the DOJ will aim its antitrust arrows at American Express now.
 17. Commission of European Communities, MEMO/08/170, 'Antitrust: Commission initiates formal proceedings against Visa Europe Limited,' Brussels, March 26, 2008. *Case Comp/39.398 – Visa Europe: Commitments offered to the European Commission Pursuant to Article 9 of Council Regulation (EC) No 1/2003, 26 April 2010* – as published in the official website of the European Commission; Commission of European Communities, MEMO/10/224, 'Antitrust: Commission market tests Visa Europe's commitments to cut Multilateral Interchange Fees (MIFs) for debit cards transactions – frequently asked questions,' Brussels, May 28, 2010. Visa's credit card issues remain. Note added between the date of the speech and the full text going into press: Commission of the European Communities, MEMO/10/1684, 'Antitrust: Commission makes Visa Europe's commitments to cut interbank fees for debit cards legally binding,' Brussels, 8th December 2010.
 18. Informative and accessible are the documentaries Zembla, 'The Dutch Construction Cartel', VARA/NPS, 2009 and Zembla, 'De prijs van Heineken', VARA/NPS, 2007.
 19. By the way, in the Netherlands we've always known about the intimate relationship between competition and regulation, of course – which together form my teaching commitment: in Dutch, 'regulering' and 'mededingingsbeleid' come un-

- der one term ‘markttoezicht’. There appeared to be no good translation for ‘markttoezicht’ into English. The best I could come up with is ‘market oversight’ – and I like it now.
20. This example was inspired by the column Frank Kalshoven, ‘Houdt Wellink wel toezicht?’, *De Volkskrant*, October 16, 2009.
 21. De Nederlandsche Bank, ‘Van Analyse naar Actie: Plan van aanpak cultuurverandering toezicht DNB’, memo, 16 August, 2010. It refers to an IMF staff position note that interprets good financial markets oversight as learning to say ‘No’ – ‘The Making of Good Supervision: Learning to Say “No”’, May 18, 2010.
 22. ‘College van Beroep voor het bedrijfsleven vernietigt omroepbesluiten van OPTA,’ persbericht College van Beroep voor het bedrijfsleven, August 18, 2010. See <http://www.rechtspraak.nl/Gerechten/CBb>.
 23. See OPTA, ‘Breedband ULL’ at www.opta.nl.
 24. See Dag Morten Dalen and Theon van Dijk, ‘Imperfect Enforcement of Predatory Pricing Law,’ *Working Paper*, Norwegian School of Management, November 2009.
 25. In recent years, a small specialized literature has developed on strategic interactions in competition law and regulatory enforcement processes. At ACLE we organize an annual conference on the topic. See <http://c-rmeetings.acle.nl>. In the European context, see Christopher Decker, *Economics and the Enforcement of European Competition Law*, Edward Elgar, Cheltenham, 2009, in which there are also references to the special issue of the *Journal of Competition Law and Economics* 4(1), 2008, which I edited on forensic economics in competition law enforcement, the topic of the 2006 ACLE conference.
 26. See, e.g., Massimo Motta, *Competition Policy: Theory and Practice*, Cambridge University Press, Cambridge, 2004 and Kip Viscusi, Joseph E. Harrington, Jr. and John M. Vernon, *Economics of Regulation and Antitrust*, MIT Press, Cambridge, Mass., 2005.
 27. Maarten Pieter Schinkel and Jan Tuinstra, ‘Imperfect Competition Law Enforcement,’ *International Journal of Industrial Organization*, 24, 2006, 1267-1297.
 28. See, e.g., Robert Baldwin and Martin Cave, *Understanding Regulation: Theory, Strategy and Practice*, Oxford University Press, Oxford, 1999.
 29. I read and occasionally contribute to the *European Competition Law Review* and *Markt & Mededinging*.
 30. See Peter Davis and Eliana Garces, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press, Princeton, 2010; and Simon Bishop and Mike Walker, *The Economics of EC Competition Law*, third edition, Sweet & Maxwell, London, 2010.
 31. See Drew Fudenberg and Jean Tirole, *Game Theory*, The MIT Press, Cambridge, Mass., 1995, 17. John von Neumann discussed a version of matching pennies with more pure strategies called ‘The Hide and Seek Game’ – see Merrill M. Flood, ‘The Hide and Seek Game of Von Neumann,’ *Managerial Science*, 18(5), 1972, 107-109.
 32. See Fudenberg and Tirole (1995), 77.
 33. Source: Reuters (2009).
 34. See Francesco Russo, Maarten Pieter Schinkel, Andrea Guenster and Martin Carree, *European Commission Decisions on Competition: Economic Perspectives on*

Landmark Antitrust and Merger Cases, Cambridge University Press, Cambridge, 2010.

35. Jamey Pittman, 'The Pac-Man Dossier,' 2009 at <http://home.comcast.net/~jpittman2/pacman/pacmandossier.html>. The ghosts' bright colors do not come across in this publication, so let me introduce (from left to right): Chaser (red), Stupid (orange), Fickle (blue) and Ambusher (pink). Source: www.starkeith.net (2008).
36. There is some debate over the sexes of the ghosts. They seem to be predominantly male. Pinky is revealed to be female in the game Pac-Man World 2, but this is often contradicted in other versions of the game. Pac-man himself is male beyond doubt – see also the proof of the theorem below.
37. Source: Jamey Pittman, 'The Pac-Man Dossier,' 2009 at <http://home.comcast.net/~jpittman2/pacman/pacmandossier.html>.
38. There is a debate in video-game circles whether it is possible to pass the so-called 'split-screen level' – which would potentially make the game endless – but so far no-one seems to have been able to do this – without using a bug-fix, that is, which makes the game go on for ever.
39. Billy Mitchell, cited in Simon M. Lucas, 'Evolving a Neural Network Location Evaluator to Play Ms. Pac-Man,' *IEEE Symposium on Computational Intelligence and Games*, 2005, 203-210.
40. *How to Win at Pac-Man*, Penguin Books, Harmondsworth, 1982, 18.
41. See John M. Connor, *Global Price Fixing*, 2nd edition, Springer-Verlag, Heidelberg, 2008.
42. Source: John M. Connor, 'Forensic Economics: An Introduction with special emphasis on price fixing,' *Journal of Competition Law and Economics*, 4(1), 2008, 31-59.
43. Amongst others, Joe Harrington has written about such mean-variance tests – and the way cartels may respond to their use. See Joseph E. Harrington, Jr., 'Detecting Cartels,' in: Paolo Buccirossi, *Handbook of Antitrust Economics*, MIT Press, Cambridge, Mass., 2008.
44. Iwan Bos and Maarten Pieter Schinkel, 'Tracing the Base: A Topographic Test for Collusive Basing-Point Pricing,' *ACLE Working Paper Series 2008-07*, University of Amsterdam, September 2009.
45. That is, potential victims, plaintiff lawyers looking for a treble-damages class action case to pursue, or investors thinking about buying a company that may have antitrust liabilities.
46. See Lucas (2005). Most Pac-Man research focuses on Ms. Pac-Man – more on this sequel later.
47. This competition was organized by Simon Lucas, see <http://csee.essex.ac.uk/staff/sml/pacman/kit/AgentVersusGhosts.html>.
48. The International Competition Network, see: <http://www.internationalcompetitionnetwork.org>.
49. The following was inspired by Paul Nahin, *Chases and Escapes: The Mathematics of Pursuit and Evasion*, Princeton University Press, 2007. The figure is taken from Bollobas, B., *The Art of Mathematics: Coffee Time in Memphis*, Cambridge University Press, Cambridge, 2006.
50. Source: Bollobas (2009), 47.

51. Maarten Pieter Schinkel, Jan Tuinstra and Jakob Rüggeberg, 'Illinois Walls: How Barring Indirect Purchaser Suits Facilitates Collusion,' *RAND Journal of Economics*, 39(3), Autumn 2008, 683-698. William Kovacic has made this point more generally.
52. Nikhil Karnad and Volkan Isler, 'Lion and Man Game in the Presence of a Circular Obstacle,' *IROS, IEEE*, 2009, 5045-5050.
53. There exists a two-player version of Pac-Man, called PacMan2, produced in 1982 by ENTEX, licensed by Midway, in which player 1 moves Pac-Man and player 2 is a pursuing ghost (there are no other ghosts). The game is not terribly exciting, in part because the controls get stuck a lot. In Anti-PacMan, a freeware game launched in 2007, the player controls the ghosts (one at a time – the player can switch between them – while the others follow routines) and Pac-Man's routine is programmed. See <http://www.sugar-free-games.com/antigames.php>. Most commentators on the game blog say they hate the game because Pac-Man is too clever and the ghosts that follow routines are useless.
54. Charles Angelucci and Martijn A. Han, 'Monitoring Managers through Compliance Programs,' *ACLE Working Paper 2014/14*, University of Amsterdam, December 2010.
55. Also, their reconstruction first and foremost serves the trial and may not necessarily be complete and objective enough for academic purposes.
56. See <http://theinformantmovie.warnerbros.com>.
57. The Lysine Tapes can be viewed on YouTube (search for "lysine cartel"). Copies of the original tape and transcripts are available at no charge from the United States Department of Justice, Antitrust Division, Freedom of Information Act Unit, 325 Seventh Street, NW, Suite 200, Washington, D.C., 20530.
58. The NMa Tapes are available for private viewing upon request from the author.
59. Rein Wesseling, *De Kartelhel*, inaugural lecture, University of Amsterdam, 1 April 2010.
60. I thank the actors, in order of appearance: Pieter Kalbfleisch, Annemieke Karel, Erik Kloosterhuis, Edward Droste, Aad Kleijweg and Monique van Oers, as well as Gerard Bakker, Martijn Han and Toine den Boer for their contributions to making the NMa Tapes.
61. For data on US cartel enforcement, seen Nathan H. Miller, 'Strategic Leniency and Cartel Enforcement,' *American Economic Review*, 99(3), 2009, 750–68. On the European Commission infringement decisions, see Martin Carree, Andrea Günster and Maarten Pieter Schinkel, 'European Antitrust Policy 1957-2004: An Analysis of Commission Decisions,' *Review of Industrial Organization*, 36(2), 2010, 97-13.
62. Marie Goppelsroeder, Jeroen Kingma, Maarten Pieter Schinkel and Jan Tuinstra "Cleaning out the Closet": Corporate Leniency Programs in the Cartel Lifecycle,' *ACLE Working Paper*, University of Amsterdam, October 2010; see also Joseph Harrington and Myong-Hun Chang, 'The Impact of a Corporate Leniency Program on Antitrust Enforcement and Cartelization,' *Working Paper*, Johns Hopkins University, April 2010.
63. See case C-360/09, *Pfleiderer AG v Bundeskartellamt*, Reference for a preliminary ruling from the Amtsgericht Bonn (Germany) lodged on 9 September 2009, pub-

- lished in *the Official Journal of the European Union* 5.12.2009. Oral hearings were held in September 2010.
64. See Ms. Pac-Man at The International Arcade Museum at: http://www.arcade-museum.com/game_detail.php?game_id=8782.
 65. See Lucas (2005).
 66. Actually, there is officially also no known perfect play, since Ms. Pac-Man has various bugs that make it unstable and thus crash unpredictably. There are, however, bug fixes available that make Ms. Pac-Man an infinite game.
 67. For an extensive treatise on legal certainty, see Juha Raitio, *The Principle of Legal Certainty in EC Law*, Springer Verlag, Berlin, 2003. Ofer Raban argues that legal certainty can be served by legal standards that leave room for interpretation in 'The Fallacy of Legal Certainty: Why Vague Legal Standards may be Better for Capitalism and Liberalism,' *Public Interest Law Journal*, 19, 2010, 175-191.
 68. 'RBS agrees to pay GBP28.5 million penalty for disclosing pricing information to competitor,' OFT Press Release, 30 March 2010.
 69. See also Fisher (2008).
 70. We analyze the relationship between the European Commission and the General Court in Martin Carree, Andrea Maria Günster and Maarten Pieter Schinkel, 'European Antitrust Policy 1957-2004: An Analysis of Court of Appeal Rulings,' *ACLE Working Paper*, University of Amsterdam, October 2010.
 71. See David S. Evans, Franklin M. Fisher, Daniel L. Rubinfeld and Richard L. Schmalensee (eds.), *Did Microsoft Harm Consumers? Two opposing views*, AEI-Brookings Joint Center for Regulatory Studies, AEI Press, Washington, DC, 2000.
 72. Of course, one could argue that this example also goes the other way around, and that it was the color of the Clinton administration that made the Microsoft case possible in the first place – see William H. Page and John E. Lopatka, 'The Microsoft Case as a Political Trial,' *University of Florida Legal Studies Research Paper No. 2010-15*, 2010.
 73. Source: Microsoft (2010).
 74. Michal Gal describes political economy obstacles to antitrust typically observed in developing countries with strong vested interests that lobby a weak government in her paper 'The Ecology of Antitrust Preconditions for Competition Law Enforcement in Developing Countries,' published in *Competition, Competitiveness Development*, UNCTAD, June 2004, 20-38.
 75. Relatiestatuu EZ-NMa 2008, offered to the Voorzitter van de Tweede Kamer der Staten-Generaal, 21 October 2008 by Maria J.A. van der Hoeven. In particular, The Ministry of Economic Affairs reserved the right to veto NMa guidelines, and put its own fining and leniency policy in place of the existing fining guidelines and leniency program of the NMa.
 76. Andrew Clark, 'Google faces anti-monopoly probe by European Commission: Preliminary inquiry to focus on whether internet giant penalises competitors in search rankings,' *The Guardian*, February 24, 2010.
 77. Joaquin Almunia, *Competition in Digital Media and the Internet*, UCL Jevons Lecture, London, July 7, 2010. Note added between the date of the speech and the full text going into press: Commission of the European Communities, MEMO/10/1624,

‘Antitrust: Commission probes allegations of antitrust violations by Google,’ Brussels, 30th November 2010.

78. Consistent thinking about the design and implementation of market overseers is offered in literature on establishing competition law enforcement in developing countries, including Gal (2004). I believe this is a promising area for future field research.
79. See, for example, European Central Bank, Tom Kokkola (ed.), *The Payment System: Payments, Securities and Derivatives, and the Role of the Eurosystem*, Frankfurt am Main, 2010.