Markets, Monopoly, and Competition

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Dear Members of the University Board,
Dear colleagues, friends and students,

Introduction

After the work of the late Professor F.Y. Edgeworth one may doubt that anything further can be said on the theory of competition among a small number of entrepreneurs.

This was the opening of Hotelling's classic[1] paper *Stability in competition.* Fortunately, Hotelling was wrong. Nowadays, the field of Industrial Organization is one of the most interesting, exciting, and relevant fields in economics. And Industrial Organization studies exactly what Hotelling describes: "competition among a small number of entrepreneurs".

In this lecture I will explain why the field is so relevant and exciting. Our methodologies for studying competition have greatly improved, allowing us to do much more than in Hotelling's days. At the same time, markets changed as well, giving us many more issues to study. Even today, almost one century after Hotelling, a lot of work still remains to be done. In the next half hour, I will elaborate on how I plan to contribute.

First, I will give some historical background on the economics of markets and on competition policy, the part of government policy where insights from my field are applied. I will make some methodological observations and talk about Monopoly

1 Hotelling (1929)

and abuse of market power. I will argue that markets have changed, and will then focus on the three main pillars of my research agenda: market frictions, behavioral consumers, and platforms.[2]

Setting the Stage

First, let me give some background and sketch how Industrial Organization fits into the intellectual framework of modern-day economics.

Economics provides a powerful framework to study markets. One of the most celebrated results is that, under some strict assumptions, markets work perfectly in the sense that they provide the best possible outcome for society as a whole. For that to hold, however, we need that no firm has any market power, that there are no market frictions, that all market participants are perfectly rational, that everyone knows everything, that there are no public goods or externalities. Of course, this is highly unrealistic. But that's not the point. This general equilibrium framework provides an ideal benchmark to evaluate the real world. It is the economics equivalent of the vacuum in physics.

2 *"No one has the right, and few the ability, to lure economists into reading another article on oligopoly theory without some advance indication of its alleged contribution"*, Stigler (1964).

Things start to get really interesting once we drop some assumptions. Industrial Organization relaxes the assumption that firms lack market power. What if they don't? In other words, what if firms *do* have an influence on market prices, on products that are being offered, perhaps even on the way a market is organized? What if they can advertise or take strategic decisions that affect competitors or potential competitors? What, indeed, if there is "competition between a small number of entrepreneurs"?

And, especially in that context, it is interesting to relax some of those other assumptions as well. What happens to market outcomes if there *are* market frictions, such as search or switching costs? What happens if consumers are not fully rational? Can firms take advantage of that, or will such attempts backfire in a competitive environment?

Methodology

Since the 1980s, we mainly use game-theoretic models to study such issues. Game theory is a branch of mathematics that studies strategic interactions between rational players, and is thus eminently suited to study "competition among a small number of entrepreneurs". Building a game-theoretic model requires one to write down the exact rules of the game (in our case the specifics of the market interaction) and to solve it. That involves finding the Nash equilibrium, essentially a prediction of how

rational players would play that particular game. This concept is named after John Nash (figure 1), who happens to also be the only person in history to have been awarded both a Nobel Prize as well as an Academy Award, the latter for the movie *A Beautiful Mind* portraying his life. But I digress.

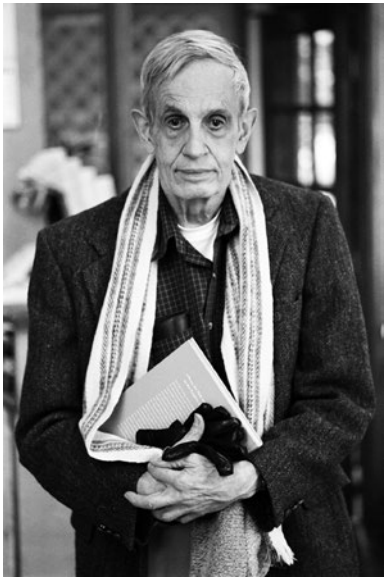

Figure 1 John Nash

Critics argue that using game theory models, you can essentially prove anything. There is some truth to that. The type of models we use are not meant to predict the future. Sometimes, they not even necessarily give a description of the real world. Let me explain.

In many discussions, for example in a competition policy case, both sides use arguments to make their point. Those arguments can be verbal. But verbal arguments are often imprecise, inconsistent, involve hand-waving and implicit under-the-carpet-sweeping. An argument in the form of a game theory model is not like that. Such models force us to be clear, to be precise, to be consistent and transparent, and to think through the logical implications of our assumptions. They also force us to make our assumptions explicit.

Our models allow us to sharpen our intuition, to reveal certain mechanisms that we had not yet thought of. They allow us to do thought experiments, to see what the consequences are when making certain assumptions. Or to see what assumptions we have to make to justify a particular conclusion. They are, indeed, arguments in a debate. But arguments that are by their very nature clear, precise, consistent and transparent.[3]

The Problem with Monopoly

Having settled that, let me move to the issue of market power. A firm that has market power is able to charge a price higher than its marginal cost and hence, to make a profit on its last unit sold. That implies that some consumers will end up not buying the product, although they are willing to pay more than what its

3 Indeed, "Economists use math not because they're smart, but because they're not smart enough".Rodrik (2015), pg. 32.

production would cost. That is clearly undesirable from a welfare perspective.

The most extreme case of a firm having market power is of course a monopoly. When talking about games and monopoly, the first thing likely to spring to mind is:

Figure 2 Monopoly

The popular board game *Monopoly*, published by Parker Brothers in the early 1930s. The game lives up to its name, as the aim is to bankrupt all competitors and establish a monopoly. In this case, in the real estate business.

In the late 19th century, US policy makers decided that such monopolization is probably not a good idea. At the time, many industries in the US formed trusts, groups of firms that worked closely together. The sugar trust dominated the sugar industry, the Standard Oil trust controlled the oil industry, the tobacco trust called the shots in tobacco, etc.

This led to the Sherman Act of 1890. Its goal was to 'bust the trusts'. The Sherman act famously declared that "Every person who shall monopolize [...] any part of [...] commerce [...] shall be

punished by fine [...] or by imprisonment". This is still the basis of much of competition policy worldwide – and the reason that in the US competition policy is referred to as antitrust.

Hence, the Monopoly board game does not exactly teach us the right things about monopoly. Its players willingly violate the Sherman Act. One person concerned about this was Ralph Anspach, a professor at San Francisco State University (figure 3).

Figure 3 Ralph Anspach

Anspach taught his students that unbridled monopoly is undesirable and came up with a particularly creative way to make his point. In 1973, he produced an alternative board game more in line with antitrust practice – and likely the only board game to mention the Sherman Act. He called his game "Anti-Monopoly".

In the original version of the game[4] the object was to break the conglomerates apart, and each player was a "trust-buster". Players earned points by breaking up monopolies.[5] Clearly, even nowadays students can still learn a thing or two from this game.[6]

In a twist of ultimate irony, Parker Brothers sued Anspach for infringing on its Monopoly. Or rather for infringing on its alleged monopoly to use the word Monopoly. A ten-year legal battle followed, going all the way up to the Supreme Court. But ultimately Anspach won, living up to the aim of its game to 'bust the trust'.

During the proceedings, Anspach showed that Charles Darrow, Monopoly's alleged inventor who had sold it to Parker Brothers, effectively stole the game. The original was based on "The Landlord's game", invented and patented by Elizabeth Magie in 1903 (figure 4). The aim of her game was to educate players on

4 Note that this original version differs substantially from the current version of the game that was released in 1984 and is still marketed in e.g. the Netherlands.
5 Pilon (2015).
6 The original version of the game included cards such as "You have successfully resisted political efforts to stop an antitrust investigation of a powerful combination – Collect a Budget Supplement of $200" and "The Supreme Court has ruled that lowering prices in order to destroy competitors is a predatory monopolistic practice. You may bring an indictment any place you wish without payment."

the merits of a single tax on land as proposed by Henry George – and to illustrate the perils of monopolies.

Figure 4 Elizabeth Magie and her Landlord Game

Over the years, Parker Brothers bought all the rights to other games based on the Landlord's game (including Anti-Monopoly!), to stifle any possible competition from those games. Nowadays, we would call that killer acquisitions. But I digress.[7].

The dominant view nowadays is that being or having a monopoly is not necessarily a problem, but that abusing market power is.[8] Such abuse may involve setting unreasonably high prices,

7 For much more on this story, see Pilon (2015).

8 *"There is nothing inherently wrong about being [...] a monopoly and, in fact, in many cases this may reflect efficiencies and benefits for consumers or businesses. But dominant companies have a particular responsibility not to abuse their position by unfairly protecting, extending or exploiting it."* (Furman et al., 2019)

trying to prevent a competitor from doing business, setting unreasonably low prices to try to bankrupt a competitor etc. In other words, we want there to be a level playing field. Just as governments should refrain from interfering in such a level playing field, so should firms active in that market.

In practice, it may in fact be hard to assess when a firm actually has a monopoly. That depends on how we define products and markets, but more on that later. It is even harder to assess when a firm exactly abuses its market power. This is where our game-theoretic models may be helpful, by providing arguments as to which behavior may amount to such abuse. This task has become even more complicated in recent years, as I will argue next.

The markets they are a-changin'

Over the last decades, markets and competition have changed tremendously. Hence, studying these has become more challenging – and more interesting as well. In the late 19th century, when the Sherman act came into effect, life was relatively easy. Firms sold stuff (be it sugar, oil, rubber or what-have-you), markets were easy to define, products largely homogeneous, market shares easy to calculate, and most strategies that firms could use were easy to observe. Life was straightforward.

But since then, times have changed. Products have become more differentiated, making it harder to define markets. In many markets, the relationship between consumers and firms has changed. Many products now come as a subscription: in telecom, energy, insurance, but also software. Rather than just selling stuff, these firms sell long-term contracts to provide stuff. Also, firms know much more about consumers, and hence can more closely tailor products and prices to a particular consumer. And consumers can now use the internet to find the best deal.

Also many successful firms nowadays do not just sell stuff, but rather provide platforms on which other firms can sell or advertise their stuff. But more on that later.

All this raises many questions and new challenges for Industrial Organization. It makes it harder to understand how these markets exactly function, and whether we could or should do something to make them function better. And, of course, it makes it harder to judge whether firms are abusing a dominant position.

Frictions in Markets

Let me move to the first pillar of my research agenda. One assumption in the general equilibrium model is that markets are frictionless: consumers can effortlessly observe all options

and go for the best deal. Of course, the real world does have frictions. I will discuss two: search and switching costs.

Search costs

For consumers it may be hard to find the best deal. They face search costs. Typically, search models assume that for every firm or deal that a consumer considers, they have to pay some search costs to find out the specifics of that deal.

Suppose for example that you want to buy a board game. First, you may consider *Monopoly*. You will probably go online, check the rules, check some reviews, check out the price and see if you like it. This is a costly endeavor, especially in terms of time and effort. We refer to those costs as search costs. After you have checked out Monopoly, you may decide to buy it. You may also decide to check out some other game, for example, *Anti-Monopoly*. You will again incur search costs to do so. At some point, you have seen enough and decide that your current option is good enough and searching more is not worth your while. You may even buy a game you checked out earlier, as that turns out to be your best option after all.

Typically, such models with search costs predict that higher search costs imply higher prices, as firms then have more market power over their visitors. Such models also provide a fruit-

ful framework to study other issues. Let me give some examples.

In work with Jose-Luis Moraga-González[9], we use this framework to study persuasive advertising. We argue that consumers are more likely to visit a firm that advertises more. Of course, consumers may still search. But firms do want to advertise to get consumers to visit them first since, indeed, a bird in the hand is worth two in the bush.

In another paper with Jose-Luis and Vaiva Petrikaitė[10] we show that if prices are observable but consumers have to search for product characteristics, higher search costs imply *lower* prices, contrary to the standard model. Firms are then more eager to lure consumers by setting a low price simply because higher search costs imply that consumers are less likely to walk away. A bird in the hand is now worth even more than two in the bush.

With Mart van Megen[11] I use a similar framework to study haggling. We show that the prices firm post may be *lower* than in a case without this possibility. Lowering their posted price gives

9 Haan and Moraga-González (2011).
10 Haan, Moraga-González, and Petrikaitė (2018).
11 Haan and van Megen (2021).

firms some commitment to not lower their prices too much should consumers refuse their first offer.

Switching Costs

Another market friction is switching costs, that consumers incur when switching brands, suppliers or products. Just as search costs, switching costs can be monetary, but they can also be in terms of effort, or be simply psychological. Just like models with search costs, models with switching costs provide a fruitful framework to study other competition issues.

Switching suppliers may sound simple and straightforward. But switching costs can be important. Just an example. If you have an iPhone, you probably noticed that Google is the default search engine in your Safari browser. If you prefer a different search engine, changing this setting is easy and should take less than 30 seconds.[12] Nevertheless, Google is reported to pay Apple some 15 billion US dollar per year for the privilege of being the default[13] (see Figure 5) counting on consumers not to make the simple effort to switch.

12 See https://www.howtogeek.com/407505/how-to-change-the-default-search-engine-in-safari-on-iphone-or-ipad/. Admittedly, this only changes the default search engine in Safari, not in Siri or Spotlight search.

13 https://www.forbes.com/sites/johanmoreno/2021/08/27/google-estimated-to-be-paying-15-billion-to-remain-default-search-engine-on-safari/?sh=-6b8367ab669b

Figure 5 Switching costs are important

Switching costs affect the performance of markets. One may argue that they raise prices, as locked-in consumers are unlikely to switch. But that also implies that firms are willing to compete hard to get these consumers in the first place. This also explains the low introductory offers that for example energy companies often use.

With Wim Siekman[14], I study retention offers. If you want to cancel an insurance contract for example, the company may offer you a better deal. This is a retention offer. We show that this allows firms to differentiate between consumers with different switching costs. By only offering a better deal to those that initiate a switch, firms can charge a low price if they have to (to fickle consumers) but a high price if they can.

Behavioral consumers

Let me discuss the second pillar of my research agenda. Economic models typically assume that consumers are fully rational. Critics argue that this makes no sense. Consumers are

14 Haan and Siekman (2021).

not the hyper-rational utility-maximizing robots we make them out to be. Such criticism largely misses the point. Economists aim to analyze and understand markets. If mistakes that consumers make do not affect the functioning of markets, there is no problem.

However. Psychology and behavioral economics have documented ways in which consumers *systematically* deviate from rational behavior, in a way that may affect how markets function. Recent advances in behavioral game theory allow us to incorporate such biases into formal models. These are promising developments. They allow us to analyze how behavioral biases affect the functioning of markets.

With Pim Heijnen and Martin Obradovits[15] for example, we find in one specific environment that if consumers are fully rational, they may actually be worse off than if they are not – as this affects competition between firms in an adverse manner.

One behavioral bias is loss aversion; people are more sensitive to losses than to gains. With Wim Siekman[16] I study how this affects consumers in the type of search models I discussed earlier. And, knowing that consumers are loss averse, how that affects the behavior of firms. Surprisingly, we find that loss aver-

15 Haan, Heijnen and Obradovits (2021).
16 Haan and Siekman (2020).

sion may lead to lower prices. Consumers are more inclined to continue search if they are disappointed in the offerings of a particular firm. And if consumers are more inclined to search, firms have less market power, with lower prices as a result.

Another bias is present-biased preferences. Consumers often prefer a smaller reward today to a larger reward tomorrow, but reverse this preference when both rewards are equally delayed.[17] With Dominic Hauck,[18] I develop a framework to study games played between present-biased players. Using our framework, we show that bargaining may break down completely, and that economic agents may have the tendency to deplete natural resources even faster than we already thought.

Experimental Economics

Behavioral economics also provides an alternative methodology to study markets: experiments. Rather than using theoretical models or real-world data, experimental economics puts subjects in a computer lab to let them play the type of games that we cook up. This provides an interesting half-way house between game theory on the one hand, and empirical work on the other. Let me give a few examples.

17 Chakraborty (2021).
18 Haan and Hauck (2022).

With Peter Dijkstra and Bert Schoonbeek,[19] we study leniency programs that offer whistleblowers immunity from fines in cartel investigations. We find that if market participants can communicate with each other, such programs are not particularly successful and merely delay the formation of cartels. With Peter Dijkstra and Machiel Mulder, we study the possible collusive effects of yardstick competition.[20] With Xinyu Li, Sander Onderstal and Jasper Veldman we compare different auction designs for the right to build offshore wind farms.[21]

Experiments can also be used as a direct test of our own theories. I already mentioned work with Moraga-González and Petrikaitė on the effects of price observability in search markets. With Nannette Stoffers, we plan to test this in a laboratory setting.[22]

In the future, I hope to do more such studies. Our own Groningen Experimental Economics Laboratory (GREELab) provides an ideal environment for doing that.

Platforms

Then to the third pillar. I already argued that firms and markets have changed. An excellent illustration of that is the following. The left-hand panel of Table 1 shows the biggest 8 firms world-

19 Dijkstra, Haan and Schoonbeek (2021).
20 Dijkstra, Haan and Mulder (2017,)
21 Li, Onderstal, Haan and Veldman (2022).
22 Haan and Stoffers (2022).

wide in 2008.[23] The list has four energy companies, a consumer electronics firm, a telecom provider, a bank, and a software producer. Life had moved on since the 1890s, but must of these firms still sell stuff.

2008		USD bln	2018		USD bln
1	PetroChina	728	1	Apple	890
2	Exxon	492	2	Alphabet	768
3	General Electric	358	3	Microsoft	680
4	China Mobile	344	4	Amazon	592
5	icbc	336	5	Facebook	545
6	Gazprom	332	6	Tencent	526
7	Microsoft	313	7	Berkshire Hath.	496
8	Shell	266	8	Alibaba	488

Table 1 Biggest firms worldwide by market capitalization, 2008 and 2018.

Only ten years later, in 2018 (the right-hand panel of Table 1), the picture has changed dramatically. The biggest firm then is Apple. Over 20% of its revenue comes from the app store, a marketplace for apps where Apple takes a 30% cut.[24] Google, number 2, gives most of its products away, but generates over 80% of its revenue from advertisements it shows to people using these products.[25] Facebook, number 5, generates 98% of its revenue from ads.[26] Number 4, Amazon, sells stuff to con-

23 Source: https://innovator.news/the-platform-economy-3c09439b56
24 https://www.investopedia.com/how-apple-makes-money-4798689
25 https://www.statista.com/statistics/633651/alphabet-annual-global-revenue-by-segment/
26 https://www.kamilfranek.com/how-facebook-makes-money-business-model-explained/

sumers, but 60% of its sales are made by third-party sellers.[27] Amazon provides them a marketplace to sell their stuff. Also Microsoft now makes money from providing platforms for advertisers, gamers, and professionals (the latter through LinkedIn).

Hence, seven out of the eight top companies in 2018 (including Microsoft, Tencent and Alibaba) in 2018 make some or most of their money from providing a platform; from connecting firms to consumers. Should we worry? Some critics argue that firms like Google, Amazon, Facebook, Apple and Microsoft, (collectively known as GAFAM) are effectively monopolies, though it is not always clear in which market. And if these firms are dominant, do they abuse that position?

The Netherlands is home to some platforms that have also raised eyebrows. Thuisbezorgd and Booking.com have gained a domir nant position as platforms facilitating meal delivery and the booking of hotel rooms respectively. Again, the question is warranted whether these platforms abuse their dominant position.

An interesting aside is the following. In 2005 Booking.com was bought by Priceline.com. That platform was founded in 1997 by Jay Walker. In another twist of ultimate irony, as a student Jay

27 https://blog.aboutamazon.eu/policy/how-amazon-and-third-party-sellers-together-give-customers-more-choice

Walker was an avid Monopoly player, one of the best in the country. He literally wrote the book on Monopoly, publishing *1000 Ways to Win Monopoly Games* with Jeff Lehman in 1975 (Walker and Lehman, 1975). Almost inevitably, Parker Brothers sued Walker for publishing this book. Walker ultimately teamed up with *Anti-Monopoly* to jointly fight Parker Brothers' abuse of its Monopoly. But I digress.

Quite some work is now being done on platforms, trying to understand these markets and finding arguments and models as to whether platforms abuse their dominant position. Competition authorities struggle with how to tackle and police these firms and digital markets in general. Much work remains to be done.

Let me mention some competition issues platforms have raised. First, Rochet and Tirole[28] note that pricing in these two-sided markets is fundamentally different. By charging a low price to one side, a platform attracts many users there. That makes the platform more attractive to the other side, so it can charge higher prices there. This is exactly what Google and Facebook do: they boost the number of users by charging nothing to consumers, so they can earn more from advertisers. Hence, on platforms, it is not socially optimal for prices to equal marginal costs.

28 Rochet and Tirole (2003)

A second issue is most-favored customer clauses.[29] Both Thuisbezorgd and Booking.com have required suppliers to charge the same price on their own website as they do on the platform. Platforms argue that otherwise consumers simply use the platform to comparison shop, only to make their purchase on the suppliers' website. That would make it impossible for them to survive and provide a useful service to consumers. Of course, it may also just serve to increase prices.

A third issue is the following. If I search on Booking.com or on Amazon, I get some recommendations. Of course, these should be influenced by my preferences, but they can also be influenced by whatever recommendation is most profitable for the platform to make. This is known as steering.[30] If a consumer is steered to a product that the platform provides itself, an issue with Amazon, this is known as self-preferencing. With Pim Heijnen, I am working on steering.[31]

A fourth issue is data.[32] Platforms collect a huge amount of data on their users. Should they be forced to share these with competitors? Should consumers have the right to take their data with them if they switch platforms? And what about pricing algorithms that are fed with such data? Some recent

29 See e.g. Wang and Wright (2020).
30 See e.g. Teh and Wright (2022).
31 Haan and Heijnen (2022).
32 See e.g. Jin and Wagman (2021).

research suggests that these may make it easier for firms to collude.[33] Many issues still remain to be studied.

One striking issue is that platforms increasingly resemble each other, all trying to provide a one-stop shop to consumers. For example, Amazon has moved into advertising and streaming, while Facebook has moved into shopping. Almost all of the GAFAM offer cloud computing, home assistants and media distribution platforms. In a paper with Nannette Stoffers and Gijsbert Zwart[34] we try to explain this phenomenon. We argue that by competing head-on for consumers in this way, platforms soften competition on the advertising side of the market, which may ultimately be to their benefit.

Conclusion

Concluding. I tried to convince you that Industrial Organization is relevant and exciting – and more so than ever. I also set out three areas where I hope to contribute: market frictions, behavioral consumers, and platforms. These areas often overlap. To study steering on platforms, we first have to know how consumers search. Consumers that have a status quo bias essentially have substantial switching costs. Etcetera.

33 See e.g. Calvano, Calzolari, Denicolo and Pastorello (2020).
34 Haan, Stoffers and Zwart (2021).

I did not have time to mention many other interesting issues and developments. For example, how firms may form a cartel, and what we may do about that. Or the interaction between competition policy and sustainability – something I am working on with Maarten Pieter Schinkel.[35]

Doing research is not a solitary job. In getting here I had the privilege to work with no less than 35 co-authors. I'm looking forward to continue our collaboration and indeed to find even more collaborators.

Apart from doing research, important elements of my job are also to teach and to supervise. I hope to be able to also make further contributions there. Also, I hope that my research will inspire policy discussions by providing new arguments.

Ik heb gezegd.

35 Haan and Schinkel (2022).

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