

The Microsoft vs. Netscape browser's war: A game theory based analysis

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Abstract

During 1996 the world's attention was captured by the litigation posed by the United States' government against Microsoft, blaming the latter of abusive use of its monopoly power in order to win what was known as the "browser's war".

This paper presents the previous scenario to the web browser's battle carried out by Microsoft and Netscape, analyzing both firm's strategies in a short and also in a long term horizon game. The study provided is based on game theory tools and attempts to give a model that explains the firms' behavior.

Although the presented model is quite simple, it accurately explains the strategic interaction between the firms and its predictions fits with the actual results.

Keywords: Microsoft vs. Netscape - Browser's war - Web systems - Game theory.

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1. Introduction

The Internet has become a personal necessity and also an everyday source of information and advertising for businesses. Web browsers are the essential tools that allow access to the resources that the Internet offers.

According to Microsoft Press, a web browser is defined as “Software that lets a user view HTML documents and access fields and software related to those documents. Originally developed to allow users to view or browse documents on the World Wide Web (WWW), Web browsers can blur the distinction between local and remote resources for the user by also providing access to documents on a network, an Intranet, or the local hard drive...”. In simpler terms, a Web browser is a program that allows a user to view, transfer and display different documents from different places.

Before the release of Windows 95, Microsoft enjoyed a dominant position in the Operating System (OS) market. On the other hand, Netscape was a relatively new (and small) company dedicated to the browser’s market.

Although both firm’s products were complementary and belonged to different markets, in spring 1995 Microsoft identified several key features of the Internet and the browser’s market that threatened an increase in competition on both the OS’s and browser’s markets.

This situation generated a conflict of interests between both firms. Microsoft attempted to reach an agreement with Netscape but it did not succeed. Then both firms entered in a strong competitive attitude that was known as the “browser’s war”.

In this article, we analyze in a short and long term horizon, the strategic interaction between both firms and we provide an explanation to the real outcome of the conflict.

The rest of the paper is organized as follows: in section 2 we describe the features of the market that both firms shared; in section 3 we detail the threats detected by Microsoft and briefly describe its agreement proposal; in section 4 we present an analysis based on game theory of the conflict and in section 5 we outline the conclusions of this work.

2. The Network Effect

In order to describe the type of market in which the conflict took place we will define what is known as a market with network effects.

When scarcity drives prices, it is worth to be different and avoid the crowd: this can improve terms of trade. But it sometimes pays to coordinate and follow the crowd: this creates more opportunities for trade and for beneficial interactions. Thus it is useful to speak English because so many other people do; driving is easier if everyone keeps right (or if everyone keeps left). A market with more traders gives each of them a wider option to trade. These are network effects.

Formally, a market exhibits network effects when the value to a buyer of an extra unit is higher when more units are sold. In a traditional network, network effects arise because a typical subscriber can reach more subscribers in a larger network. In a virtual network, network externalities arise because larger sales of component induce larger availability of complementary components thereby increasing the value of the original component. The increased value of the original component results in further positive feedback.

There are a number of crucial features of markets with network effects that distinguish them from other markets. Markets with strong network effects where firms can choose their own

technical standards are “winner-take-most” markets. That is, in these markets, there is extreme market share and profits inequality (see Economides (2001)).

Indirect network effects, by contrast, arise from complementarities between two kinds of adopters. Each kind values increased adoption by the other kind, but may not value (may even dislike) more adoption by his own kind. Often, one kind of adopter is a user of a good such as computer hardware, and the other kind is a vendor of a complement such as software. More users induce entry by more vendors of the complement, and this makes the computer more attractive to users. This is called the hardware-software paradigm. The leading example puts Microsoft's Windows in the role of hardware, and applications software in the role of software.

Indirectly, then, an Operating System (OS) is more appealing to a user if there are more other users: a network effect. Similarly, popular cars are easier to get serviced; 35mm cameras are popular and so one can easily buy a 35mm film and get it developed, enhancing such cameras' appeal; etc. This kind of indirect network effect seems quite common. Indeed, Rochet and Tirole (2003) argue that network effects predominantly arise through such complementarities between two sides of a market. Other studies on network effects can be found in Katz and Shapiro (1985), Church and Gandal (1992, 1993), Chou and Shy (1990), Gandal (1995) and Katz and Shapiro (1994).

3. Microsoft – Netscape’s Agreement Attempt

The Internet expansion and the role played by Netscape as a browser market leader could pose a threat to its monopolistic position in OS market (see Gates (1996)). There were several aspects that Microsoft took into account to reach this conclusion, we summarize them as follows:

- Internet provided the necessity of new and highly valuable application categories. This is obvious in hindsight, as many people bought a PC to get access to Internet and many other longtime PC users accessed Internet regularly.
- The possibility of the browser as a partial platform for new applications categories. After some technical progress, the browser might offer services to application programs through application programming interfaces (APIs) just as OSs do.
- New application classes were likely to be focused on Internet, thus some application writers might focus on browser APIs not on OS APIs.
- Applications might run on a different computer than the user was sitting at, called a server. The browser might become the mechanism for giving users access to server applications. While the speed in the communications with servers does not increase significantly, applications might run partly on servers and partly on PCs. Thus, the browsers could be the distribution method for a divided-applications technology, like Sun’s Java.

These observations, in turn, provided support to these potential consequences:

- Large scale browser usage would attract application writer’s attention. Just as application writers like popular OSs, they would also like a high volume browser. Applications would be more likely to be written to browser APIs or to Java-like APIs if a browser was widely distributed. Microsoft wanted applications writers to stay with Windows APIs, not to switch.
- Large scale browser usage would leave the browser as a distribution vehicle for the client side of applications-dividing technologies, such as Java.
- If the same browser could be used on both Windows and other OSs, users could switch away from Windows more easily. This would apply most strongly to users focused in Internet. They might view Windows as substantially less differentiated than ordinary PC users do, if the applications they like to run were written in the browser.

Based on the facts mentioned above and taking into account that by that time Microsoft hadn't have shipped its own browser product (but was planning to include shipping IE 1.0 with the windows 95's release) it was evident that Microsoft would have needed a short term agreement for a market division with Netscape.

According to the Microsoft's internal communications report (see Maritz (1996) and Chase (1997)), the key thing Microsoft wished was to prevent a Netscape-controlled browser market which exposed the same APIs on both Windows PCs and other kind of computers.

The following items were the alternative agreement proposals considered by Microsoft:

- Microsoft browsers running in all "new versions" of Windows (starting with Windows 95) and Netscape browsers running on everything else (including older versions of Windows, Macintoshes, UNIX computers, and so on.)
- Netscape's browsers running in all platforms, but not exposing APIs on the new windows (Windows 95), instead relying on Microsoft software that would expose APIs.
- Netscape targeting its applications to the server market with support provided by Microsoft.

Either of these alternatives would have prevented Netscape from using a cross-platform strategy which, as we mentioned above, was Microsoft's greatest fear and, at the same time, one of Netscape's strengths.

The proposals were not satisfactory to Netscape and no agreement was reached. This turned the situation in a strongly competitive one which is modeled in the next section.

4. Modelization of Microsoft-Netscape's Conflict

This competitive stage of the conflict is known as the "Browser's war". A lot of research has been done on this topic. Detailed analysis of the conflict can be found in: Gilbert and Katz (2001), Katz and Shapiro (1999), Werden G. (2001) and Whinston M. (2001). Strategic analysis from vertical product differentiation theory is given by Gilbert and Riordan (2003); see also Farrell and Katz (2000) and Choi and Stefanadis (2001).

We present two non cooperative games that model the conflict in a simplified way. We first consider a short term analysis and then a long term one.

We consider two basic strategies for Microsoft and Netscape: to "share" and to "compete" based on the two main alternatives they faced. We summarize the strategies description for both firms as it follow:

"Share" (not to compete) strategy for Microsoft:

- Not entering in the browser's market. Netscape keeps its dominant position.

"Share" (not to compete) strategy for Netscape:

- Withdrawing its application from Windows OS market. It will maintain its market share for the remaining OSs.

"Compete" strategy for Microsoft:

Action description	Cost
(1) Internet Explorer (IE) development	-100M
(2) Tying IE to Windows, giving the browser by free	0
(3) Strong advertising campaign to IE	-30M

(4) Writing of proprietary tags in order to extend Hypertext Markup Language (HTML). (ref: www.tprc.org/ABSTRACTS99/allenpap.pdf)	-200M
(5) APIs specialization for IE performance improvement (this will also worsen Netscape's performance) (ref: www.ateneonline.it/afuah/casiUS/Microsoft.pdf)	
(6) Consequences of possible loss of monopoly trial	-500M

In addition to (4) and (5), Microsoft tied Microsoft's "Internet Information Server" web server with server versions of Windows, and also offered Microsoft customers work alike clones of Netscape's proxy server, mail server, news server, and other software free or at steep discounts. The idea was to anticipate Netscape's business strategy to give away browser software but sell server applications. Microsoft understood this and attacked Netscape's revenue sources (ref: http://en.wikipedia.org/wiki/Browser_Wars).

The cost justification for (6) is based on a lottery taking into account the four main outcomes of the trial: (a) to divide Microsoft into two companies (one dedicated to the OS development and the other keeping the rest of the applications and Microsoft's products); (b) to force Microsoft to release the Windows' source code (in order to disclose, among other things, its APIs); (c) let Microsoft be found not guilty of any charge; (d) and lastly, an extra judicial agreement between the US government and Microsoft with some sort of commitment from Microsoft's side. The evaluation of each one of the possibilities is summarized in the lottery (2/10, 1/16, 2/10, 1/2) with derived utilities: (-2000M, -1000M, 0M, -50M). It gives an expected cost from the trial of approximately 500M, taking into account that the probabilities of occurrence associated to each possible result are an estimation based on the comments surrounding the trial.

"Compete" strategy for Netscape:

- Zero cost policy (give Navigator/Communicator for free).
- Partial open sourcing of browser's code (mainly to universities and open source foundations).
- To promote the legal suit against Microsoft due to monopolistic actions.

We used the above expected utilities to analyze a short term game. The utilities described in this game were calculated taking into account an estimated profit for Microsoft of 1000M, based on a progression from benefits reported by Microsoft in previous fiscal years from OS market (ref: www.ateneonline.it/afuah/casiUS/Microsoft.pdf). Thus we obtained the following matrix:

		<i>Netscape</i>	
		Share	Compete
<i>Microsoft</i>	Share	1000M, 3M	900M, 10M
	Compete	420M, -1M	170M, 1M

In this game it is a dominant strategy for Microsoft to share the market. It means that no matter what strategy Netscape uses it is always better for Microsoft to take this action. However it is a myopic point of view and it does not take into account future gains that Microsoft could get if Netscape gets out of the market neither the possible loss of a monopolistic position in the Operating System market.

On the other hand, it is a dominant strategy for Netscape to compete. This would have given a good position to Netscape, but it didn't happen. This analysis is compatible with the fact that Netscape refused to make an agreement with Microsoft for sharing the market.

Using these strategies the firms would be in a Nash Equilibrium (Nash (1950)). It means that any unilateral deviation from these actions would be worse for each firm.

Although they do not affect the above conclusions, we also present some remarks and possible alternative considerations to the previous analysis

The previous conclusions still hold if instead of using the ex – ante Microsoft’s expected utilities we consider the real outcome of the trial.

On other hand, Microsoft could have used a weaker competitive strategy by not tying its new browser to Windows. It would have had few chances of success because Netscape already possessed about an 80% of the browser’s market and counted with a more developed and better tested product.

Netscape could also have used a stronger competitive strategy by incorporating OS’s functionalities to its browser, thus competing directly with Microsoft’s core product. This could have improved Netscape’s opportunities but, as a matter of facts, this was neither a goal for Netscape nor a completely feasible strategy due to its implied implementation technical difficulties.

We finally mention that the usage of the “share” – “share” strategies by both firms would have led to a weak position for them because there would have left the browser’s market for windows platform open to any entrant.

Now we present a long term analysis

In this case, we consider the possible outcomes the firms would have faced taking into account a longer period of time. Thus, we have the following situation:

		<i>Netscape</i>	
		Share	Compete
<i>Microsoft</i>	Share	Possible Loss of dominant position in the OS Market Strong Position in the Browser’s Market	Loss of dominant position in the OS Market Strong Position in the Browser’s Market and Possible access to OS Market
	Compete	Preservation of a dominant position in the OS Market with a strong position in the Browser’s market. Significant loss of Browser’s Market Share and possible bankruptcy.	Preservation of a dominant position in the OS Market with a good share of the Browser’s market. Loss of Browser’s Market Share and possible merging.

In the above matrix, the first paragraph of each cell corresponds to Microsoft’s results and the other to Netscape’s final situation.

If both Microsoft and Netscape would have used “Share” strategies then: Netscape would have achieved a strong position in the browser’s market because it would have maintained the original dominant position it had in the browser’s market. On the other hand, Microsoft would have faced a possible loss of its dominant position in the OS market. This is so because the APIs provided by Netscape tends to weaken the “software barrier to entry” that shielded Microsoft’s monopolistic position in the OS market.

If Microsoft would have used “Share” strategy and Netscape would have used “Compete” strategy then: Netscape would have obtained a strong position in the browser’s market and also a possible access to the OS market. This would have improved (or, at least, maintained) its original market share in the browser’s market by not facing a strong competition from Microsoft or other entrant firms. The possible access to the OS market could be the consequence of adding OS features to its browser or the implementation of a web based OS.

In this scenario, Microsoft would have faced a loss of its dominant position in the OS market. It is based on the same above mentioned arguments and also faced a weakening in the “software barrier to entry” that shielded its monopolistic position.

If Microsoft would have used “Compete” strategy and Netscape would have used “Share” strategy then: Netscape would have faced a significant loss of its browser’s market share. This is clearly a weak position for Netscape and the consequences could vary depending on the aggressiveness of Microsoft’s competitive strategy. It could even cause Netscape bankruptcy.

Microsoft competitive strategy could have had different degrees as it was mentioned above. In any case, it preserves its dominant position in the OS market with a strong position in the browser’s market.

Finally, if both Microsoft and Netscape would have used “Compete” strategies then:

Netscape would have lost its browser’s market share. It is so because the strong strategy used by Microsoft limited in a substantial way Netscape’s possible actions. Its weakness could even tempt other companies to take control over Netscape.

On the other hand, Microsoft would have preserved its dominant position in the OS market while getting a good share of the browser’s market.

From the above analysis, we note that the position (and, implicitly the utilities) that Microsoft would have get from using “compete” strategy are better than using “share” strategy. Thus it is a dominant strategy for Microsoft to compete, and the best response to that strategy from Netscape is to compete too. Thus, “Compete” – “Compete” constitutes a Nash Equilibrium of the long term game.

Even though the result was a weak position for Netscape and a strong one for Microsoft, it is just a consequence of the type of game they were playing, and indeed, this was what actually happened.

5. CONCLUSIONS

The type of market that both firms faced was strongly affected by the network effects. Thus the monopolistic position of Microsoft in the OS market gives it a great amount of power.

The agreement proposal made by Microsoft was funded on the opening of new marketplaces as a result of the Internet popularity. It was made in a moment of relative weakness because Microsoft had not released IE yet. However, it appeared as a strategy to gain time and repositioning. Thus the short term analysis shows that it would have been convenient for Netscape not to accept the

agreement. Although this fact, the long term analysis weights Microsoft's strong position and reveals that accepting the agreement was not actually a so bad strategy for Netscape.

The model we presented here, based on simple game theory tools, allows understanding the strategic aspects of the conflict and its prediction (Nash equilibrium) of the long term game matches with what actually happened.

6. BIBLIOGRAPHY

- Chase B. to Jeff Raikes et al. (1997), Pl. Ex. 59, p. MS7 004365;
- Choi J. and Stefanadis C. (2001), "Tying, Investment, and the Dynamic Leverage Theory". *Rand Journal of Economics*, 32(1): 52-74.
- Chou C. and Shy O. (1990), "Network Effects Without Network Externalities". *International Journal of Industrial Organization*, 8(2): 259-270.
- Church, J. and Gandal N. (1992), "Network Effects, Software Provision, and Standardization". *Journal of Industrial Economics*, 40(1): 85-103.
- Church, J. and Gandal N. (1993), "Complementary Network Externalities and Technological Adoption". *International Journal of Industrial Organization*, 11(2): 239-260.
- Economides N. (2001), "The Microsoft Antitrust Case". Forthcoming in *Journal of Industry, Competition and Trade: From Theory to Policy*.
- Farrell J. and Katz M. (2000), "Innovation, Rent Extraction, and Integration in Systems Markets". *Journal of Industrial Economics*, vol. 48, no. 4, pp. 413-432.
- Farrell J. and Klemperer P. (2004), "Coordination and Lock-In: Competition with Switching Costs and Network Effects". Forthcoming *Handbook of Industrial Organization*, Vol 3.
- Gandal, N. (1995), "A Selective Survey of the Indirect Network Externalities: A Discussion". *Research in Law and Economics*, 17(0): 23-31.
- Gates B. (1996), "The Internet PC". Pl. Ex. 336, p. MS7 007443 (from Microsoft internal communications).
- Gilbert, R. and Katz M. (2001), "An Economist's Guide to U.S. v. Microsoft". *Journal of Economic Perspectives*, 15(2): 25-44.
- Gilbert R. and Riordan M. (2003), "Product Improvement and Technological Tying in a Winner-Take-All Market". Columbia University working paper.
- Katz M. and Shapiro C. (1985), "Network Externalities, Competition and Compatibility". *American Economic Review*, 75(3): 424-440.
- Katz M. and Shapiro C. (1994), "System Competition and Network Effects". *Journal of Economic Perspectives*, 8: 93-115.
- Katz M. and Shapiro C. (1999), "Antitrust in Software Markets" in J. Eisenach and T.M. Lenard, eds., "Competition, Innovation and the Microsoft Monopoly: Antitrust in the digital marketplace". Kluwer Academic, Boston: 29-81.
- Maritz P. to Silverberg B. et al, re: "windows & internet issues". Pl. Ex. 42, pp. MS6 6010346-47;
- Nash, J. (1950), "Equilibrium points in n-person games". *Math. Ac. Sci. USA*, 38: 48-49.
- Rochet, J.C. and Tirole, J. (2003), "Platform Competition in Two-Sided Markets". *Journal of the European Economic Association*, 1(4): 990-1029.
- Werden G. (2001), "Network Effects and Conditions of Entry: Lessons from the Microsoft Case". *Antitrust Law Journal*, 69(N1): 87-111.
- Whinston M. (2001), "Exclusivity and Tying in U.S. v. Microsoft: What We Know, and Don't Know". *Journal of Economic Perspectives*, 15(2): 63-80.

www.ateneonline.it/afuah/casiUS/Microsoft.pdf

http://en.wikipedia.org/wiki/Browser_Wars

www.giac.org/practical/Carey_Basala_GSEC.doc

www.tprc.org/ABSTRACTS99/allenpap.pdf