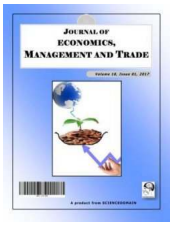

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The Magic Number Seven for Companies in Mature Markets

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

An economy is a dynamic system where new companies are constantly created, divisions and mergers take place and bankruptcies occur. A theoretical question arises if there is some kind of 'optimum' or 'final' steady-state distribution of company sizes or is it all based on random fluctuations? It is shown here that in a closed fixed-size market with only non- diversifying mergers, the stable number of companies is about seven. This is based on simple mathematical relations between clients and product prices. The implication is that when crystallized markets merge into a new common market, as for instance the European Union, many mergers will take place to reach a new equilibrium with seven companies. However, once the new combined market approaches this optimum, all internal incentives for innovation and price lowering are gone from the market.

Keywords: Oligopoly; market shares; modeling.

1. INTRODUCTION

One of the most cited and referenced persons in the field of economy, after Karl Marx, is Adam Smith who is most famous for his two ideas, the Invisible Hand and the Division of Labor [1]. The first idea stating that, if everyone is acting in his own interest, it might turn out to be well for the entire system. The second stating that if everybody specializes in an activity in the

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economy, the total efficiency goes up. These are well known ideas and often discussed in literature.

Adam Smith was vehemently against any form of import barriers, such as trade embargoes, or other forms of protectionism. Hence the name liberalism or *laissez-faire* (let them do, or better: don't interfere). Because the most famous work of Smith, commonly referred to as Wealth of Nations, was published in 1776, just before the time of the creation of the United States, especially that country was influenced by it.

As an example of what Smith criticized, trade embargoes, actions that are meant to hurt a country that is politically misbehaving, always cause an equal damage to the country issuing the embargo. Since both parties in a liberal society were happy with the trade before, both parties are now unhappy the trade does not take place. Free markets are the source of wealth.

A combination of the subjects of the Invisible Hand, the Division of Labor, trade embargoes or control of the market by government in general, is the self-organization of a fully free market. This will be studied here. More specifically, it deals with the organization of companies that all operate in the same segment of the market. In this work we analyze the ideas of (non-diversifying) mergers (those that do not change the product type [2, 3]) and conglomerates in the economy. Many scholars analyze these phenomena with socio-economic reasoning and tools [4]. Such as "mergers are done to increase the prestige of the CEOs". Or for the personal gain of the CEO [5, 6], with a reward of $186 million for Marissa Mayer, CEO of Yahoo, often given as an example [7]. Some analyze the ethics of behavior in business in general [8, 9]. The problem with all these things is that it takes the subject out of the realm of quantifiable hard facts and verifiable logic into political philosophy. While this is not bad *per se*, many things are arguably true, but arguably exactly the opposite opinion can be defended as well, since it does not come with a model, nor with a falsifiable prediction. To show it *ad absurdum*: one might say, "The ethics of company A are 3.78 times better than the ethics of company B". In this work we will try to derive a mathematical reason for mergers and show that if the driving force in a free Smithian and logic market is profit only, the market will wind up with about seven companies, the rule of the Magic Number Seven. Moreover, the implications of this observation will be discussed. It is a purely analytical work. Some sporadic empirical data are given as for decoration and to exemplify what is written.

2. CONCEPTUAL OVERVIEW

While some say the Invisible Hand of Smith does not exist at all [10], or that it fails [11], or that it was not really Smith himself – a 'Smith myth' – but rather Hayek who made it popular [12], the first question that arises when analyzing a Smithian economy is, is the Invisible Hand of Smith (everybody acting in self interest) enough to guarantee the optimal goal of maximization of wealth? This is rather a rhetorical question that has been answered many times. For sure, not always is it the case that if everybody acts in self interest the result will be optimal for the whole. See the work of Schlefer and references therein[10]. Even Smith himself said so. A nice classical example that proves that the optimum is not reached when everybody acts in self interest is the so-called Prisoner's Dilemma, a basic concept of the mathematical area of Game Theory [13].

A system that suffers from the Prisoner's Dilemma effect is one that is not capable to find the optimum because the forces on individual actors steer the system away from it: Imagine there are two criminals, Albert and Barbara, that both have been arrested for a bank robbery. They are kept in two separate cells so that they cannot talk with each other. The police tries to make them both confess. If both refuse to talk, they both go scot-free. To avoid this, the police is making propositions to both of them (independently): "If you confess, and your friend doesn't, we'll give you ten thousand euros where your friend gets 50 years in prison. If you both confess you'll both get 20 years in prison". The decision table for Albert (A) and Barbara (B) thus looks like this:

Confession	**A yes**	**A no**
B yes	A: 20 year prison, B: 20 year prison	A: 50 year prison, B: +10 keuro
B no	A: +10 keuro, B: 50 year prison	A: scot-free, B: scot-free

It is clear that the best option for Albert is to confess, independent of what Barbara decides to do. In the table the decision translates to a move from the right column to the left column. Either his sentence is reduced from fifty to twenty

years, or he goes free and even receives a hefty premium of ten thousand euros. However, the same reasoning applies to Barbara whose decision to cooperate with the authorities and a confession lifts her reward from the bottom row to the top row in the table. They will thus both decide to confess, that while it is obvious that the optimum situation is the one in which they will both not confess; they'd go scot-free (and even keep the loot). Because Barbara and Albert are not allowed to converse with each other, they'll both decide to optimize their personal, local situation, without worrying about the overall situation. This is the Prisoner's Dilemma. A situation that shows that the Invisible Hand of Adam Smith does not always work. The optimization for each individual actor in the system does not always result in an optimization of the whole.

But we can also imagine situations in which exactly the communication between actors leads to a non-optimal result. Or situations in which communication is irrelevant. If somebody has enough power to manipulate prices, this entity will do it. Exactly because it is in its own interest. "Let people of the same trade meet and their conversation turns to some contrivance to raise prices" (Adam Smith, who by the way also noted "Let market competition continue to drive the division of labor, and it produces workers as stupid and ignorant as it is possible for a human creature to become", see Ref. [10]). This kind of system where companies communicate to set prices is called a cartel.

This way we have landed, in the 21st, century into a system of industrial liberalism. Companies are powerful and act purely in their own interest, completely in the spirit of Adam Smith. Note that a company does not have morality in this framework analysis of Smith or Marx. It has a single purpose: satisfy its own interest. It works for profit and not for wealth of the common people. For the same reason, companies will lobby in politics, to get better deals that are not necessarily in the interest of the whole. For example, it has been estimated that the European lobbyist organization, the Round Table of Industrialists (ERT; 50 large companies of Europe [14]) and lobbyist in general write about 75% of all European laws, up to and including the treaties of Maastricht and Lisbon, which were only rubber stamped by politicians without them ever having actually read them, let alone having written parts [15]. These laws are there to optimize profit for the companies).

But, even without the interference of companies into politics, liberalism often leads away from an optimal situation. Liberalism has the underlying tenet that competition will lower prices, which is something praiseworthy. However, as discussed above, monopolies will tend to rise prices instead of lowering them. Formation of monopolies and cartels is thus in the interest of companies, but not in the interest of the whole. That is why in many countries there are laws about how much market share a single company can have. That is in itself a sign that full liberalism does not work; otherwise it would not need laws to avoid these problems. They are non-optimal situations in a liberal market and basically prove Smith wrong. What is good for the individual is not always necessarily good for the whole. (Well, truth be told, he only wrote that it might be good for the whole).

Laws were thus made to limit the market share of individual companies. Yet, now we get a side effect that companies that are on the edge of this magic market-share limit – anyway, how is the exact maximum share determined? – no longer have any incentive to lower the prices. So much for competition in a free market lowering prices. The Microsoft effect, named after the company with the largest effective monopoly that no longer did any significant product-innovation for lack of incentive. They basically never invent anything; Every time someone still manages to invent something, they – MS – buy the patent or whole company, and monopolize the market of this new product.

A good example is mobile telephony that could have been introduced nearly a century earlier, but wasn't. "According to internal memos, American Telephone & Telegraph discussed developing a wireless phone in 1915, but were afraid that deployment of the technology could undermine its monopoly on wired service in the U.S." [16]. Basically it had to wait until non-libertarian Scandinavian countries through state companies introduced it anyway.

As mentioned above, instead of a single company, the power can also be concentrated at a small number of companies, the oligarchs that do price fixing in so-called cartels. They do this in self interest and through communication between them. However, 'communication' is a vague and unquantifiable aspect and it'd undermine any solid mathematical reasoning. As we will show now, communication is not needed to effectively form cartels. In what then will be reasoned and

concluded, no vague concepts are needed. It is purely based on the methodology of mathematical equations that will be presented following. Important to note that this is thus not an empirical work, analyzing specific markets and drawing conclusions from them – although some examples will be given to illustrate the ideas – but it is a fully analytical work.

2.1 Non-communicative Communication

The important message of this subsection is to argue that there is factually no need to exist agreements between companies in order to come to intrinsic price settling. Every company looks at the market and optimizes its own profit, without ever communicating with the others. This is nicely exemplified in the next riddle. It has many variants but this one is the most adequate:

Riddle: On an island lives a king with 100 citizens. All citizens, although they are very smart, are deaf mute and cannot communicate with each other in any form. They all wear a hat, either a blue one or a red one. They see the hats of all the others but do not see their own. The men assemble every evening at the town square, watching the sunset. One day an edict of the king was found at the center of the square. ”Fellow countrymen, I am dying and it is time to find a successor. From the people that first guess the color of their own hat, I will choose one. (Guessing wrong will be punished by public execution on the town square). I give the following information: There is at least one blue hat and one red hat”. Every evening they meet to silently see the sunset and go home. Suddenly, after 23 days, a large set of people walks to the king. How is that possible? How many blue and red hats were there and how many walked to the king?

Solution: Everybody, by the way, thinks exactly like I do; we all came up with the exact same algorithm, namely the following: Let’s say I am one of these people. Imagine I see only red hats, then I know that I must myself have a blue one (considering the information given by the king who said there is at least one of each). I immediately walk to the king. The other people, those with the red hats, see one blue hat and thus do not know enough. Each one of them does not know if there are 1 or 2 blue hats. A pity for them. Good for me. I will be the new king.

Now imagine that I see 1 blue hat. In that case there can be either one or two people with a blue hat, depending on if I have one myself or not. Thus I do not know if I have a red or a blue hat. The other people also do not know. They see either 1 or 2 blue hats, depending on if I wear a blue hat or not. Except the man with the blue hat. He sees none or one. He possibly sees my blue hat, or no blue hat whatsoever. He possibly does know his own color. If he sees no blue hats he is in the same situation I was above. In this case, he goes to the king. Next day he will not be back. In case he does not come back everybody knows he had seen no blue hat the night before and thus we all know our (red) color. In case he does come back next day, it means he did not know his hat the day before and thus I conclude that he must have seen a blue hat, namely mine! I know my color and go to the king. Mr. Bluehat concludes exactly the same and together we go to the king.

This gets a little more complicated, but by now you’ll probably get the drift. Imagine that I had seen 2 blue hats the first day. Then there are two possibilities, there are either two or three blue hats, depending on me having one or not. I do not know my color, so I go home and come back next day. Next day everybody still shows up, of course, because there are at least two blue hats and that situation is not resolved the first night (as we have seen above); they would have seen at least one blue hat and nobody would have known his own color. After sunset we all go home again. Next day we gather again. If now two people are missing, those two with the blue hats, then they apparently knew their color yesterday and I know now that I have a red hat. I now know the color of my hat, just like all the other red-hatters, but we are all exactly one day too late, all blue-hatters are nicely at the king’s palace. If, on the other hand, everybody was still there, I also know my color. Using the knowledge that the two blue-hatters yesterday did not know, now I know, together with them, that our hats are blue. The three of us walk to the king laughing, knowing that tomorrow everybody will know, but will know it too late!

In other words, with n blue hats the wearers of them know on day n that they wear a blue hat and march to the king. The reasoning can also be done with red hats if they are in the minority.

This shows how information can be exchanged without communication, by simple observation of each other’s behavior. In the case of formation of cartels it is exactly the same. Cartels form naturally when companies keep a good watch on each other. We see here a classical case of the

Invisible Hand of Smith not working in practice. Companies act purely in self interest that does not result in optimizing the interests of the whole.

From this it is also clear that fighting cartels is useless, because it is a natural process that does not need agreements between companies. Moreover, it is rather contradictory to be in favor of free markets and then not tolerate free market agreements. That is rather schizophrenic. That is basically admitting that the free market system does not work and still being in favor of it. Those who are against cartels are against the free market of Adam Smith. While that is a less relevant political side mark to this work, what is important here is to understand that communication is not an essential element in analyzing market behavior and we can thus continue analyzing the market without the concept of communication.

3. METHODS AND METHODOLOGY

Even if no monopoly exists and also no agreements are made between companies in the form of cartels, even then, naturally cartels can form. The idea that competition will naturally lead to lowering prices is an illusion. The idea is that a company will lower the price of its products to attract more clients. But no company, whatsoever, as argued above, has a goal of getting as many clients as possible. The only goal a company has is making as much profit as possible. That means that a company will only lower prices if the gain of number of clients (in terms of percentage) is larger than the loss of profit per client (in terms of percentage). Fig. 1 illustrates this. Important to note, in all this, we assume a constant demand for that product. If one company loses a client, the other wins it. We also assume that clients and companies are rational actors. That is, clients want to optimize their wealth (thus low prices for products) and companies want to maximize their profit.

The profit per client (w) and the total number of clients (K) are both a function of price (p) charged for the product. This defines the relative effects – 'elasticity' – of raising prices on the profit per client (β, how many percent more profit is made if the price is raised 1%) and the number of clients (α, how many percent clients are lost at a 1% price increase). These are proportional to the slopes of the curves of Fig. 1. If the price is raised, then the total effect on the profit is the difference between the two elasticities, β − α. This is easy to understand:

Imagine that at a certain moment there is a certain price p_0, at which the producer makes w_0 profit per client and has K_0 clients (see Fig. 1). The producer can raise the price, or lower it. For price reductions the amount of clients will in first order increase linearly (especially for small changes in price) and the profit per client will drop linearly. The total profit W is the number of clients multiplied by the profit per client. The thing thus boils down to the question whether the number of clients grows relatively faster than the profit per client drops. The total profit W as a function of price p and slope of this profit (W') are easily calculated:

$$\begin{aligned} K(p) &= K_0\left[1-\alpha\frac{(p-p_0)}{p_0}\right], \\ w(p) &= w_0\left[1+\beta\frac{(p-p_0)}{p_0}\right], \\ \alpha = \frac{\mathrm{d}K(p)/K_0}{\mathrm{d}p/p_0}, &\qquad \beta = \frac{\mathrm{d}w(p)/w_0}{\mathrm{d}p/p_0}, \\ W(p) &= K(p)\times w(p), \\ W'(p)\equiv\frac{\mathrm{d}W(p)}{\mathrm{d}p} &\approx \frac{K_0 w_0}{p_0}(\beta-\alpha). \end{aligned} \tag{1}$$

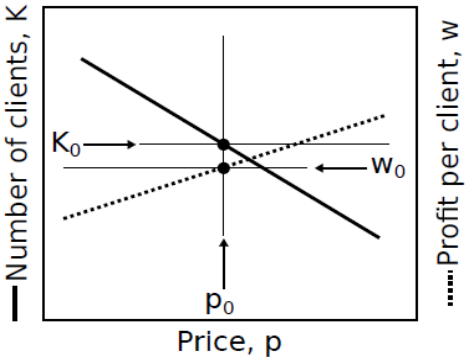

Fig. 1. Number of clients K and profit per client w as a function of price of the product p

This defines the relative effects of price increments on profit per client (β) and number of clients (α) relative to a situation before, K_0 and w_0 at a price of p_0. The derivative (slope) of the total profit is proportional to the difference between client drop and profit rise. If the derivative is positive, the producer is well served by raising the price. If, on the other hand, it is negative, it would be better to lower the price of the product. Just to the point that the derivative is zero $W' = 0$, when $\beta = \alpha$.

In spite of the simplicity of the above system, some remarkable conclusions can be drawn, as will be shown. First of all, it is easy to see that if the price is increased and the profit per client rises faster than the number of clients decreases, $\beta > \alpha$, then more profit is made. In this case the company is well served by price increments. Even in the presence of full and fair competition.

As an example, in the extreme of a monopoly the number of clients is independent of price (to a certain extent, but for sure for small variations of p) and α is equal to zero. This means that profit will always increase when the price is raised, because the slope of the profit function is always positive. Generally speaking, the price will be raised when $\beta > \alpha$ and lowered if $\beta < \alpha$, until $\beta = \alpha$. Note that both α and β are considered constants here but will vary over time and depend on price.

4. RESULTS AND DISCUSSION

The above also implies that in a fully crystallized market there is only place for a certain number of companies. We have seen that integration of the common markets has led to mergers of companies and that is the direct result of the above rule. In every market some seven companies will remain. We can call this the Magic Number Seven.

Here is a numerical example. The absolute numbers can be different (although the order of magnitude is probably correct). The total number of clients is constant and they are distributed over n companies. Assume the profit is about 20% per client. For example, the cost of the product is 1 euro and it is sold for 1.20 euros. Thus, a raising of the price by 17% (20 cent) has an effect of doubling of the profit (+100%), a profit elasticity of $\beta = 6$ in Eq. (1). To estimate the effect on the number of clients we assume that 10% lowering of price steals 10% of the clients from the competition – we can call this client elasticity – and thus adds $(n - 1) \times 10\%$ clients to the company, $\alpha = (n - 1)$. The price is stable (profit optimization) if the slope of the total profit as a function of price is zero. That slope was proportional to the difference between client and profit elasticities, that thus should be zero: $(\beta - \alpha) = 0$. If we substitute the values for α and β we get

$$6 - (n - 1) = 0. \quad (2)$$

We see that the price is stable if $n = 7$, the Magic Number Seven, a phenomenon we see in practice. The globalization of the world economy has caused for instance that only about seven car makers remained (see Table 1 for a list of car manufacturers and their market share), that while in earlier days countries like France each had seven of their own. Lost companies: Simca, Talbot, Citroën (all part of PSA) and some hundred more that existed before the French market crystallized. In other words, in a market there is place for about seven companies. This because seven is the optimal number in a crystallized market. Note that the car market is not fully crystallized yet, the globalization in this sector still too fresh, as can be witnessed from the recent merger of Mitsubishi into the Renault-Nissan alliance and the incorporation of Opel and Vauxhall into the PSA group.

This can also be put in a simple equation. How many companies will survive given a certain profit margin and client elasticity? That can easily be calculated. Imagine, in the end the companies make a factor x profit. (In the previous calculation x was 20%). Profit elasticity is then equal to $\beta = (1 + x)/x$ (in the above example $\beta = 6$). Imagine that the effect of 1% price lowering $y \times 1\%$ client stealing from other companies, or $(n - 1) \times y \times 1\%$ extra clients to the company, then $\alpha = (n - 1) \times y$. Then, if $\alpha = \beta$, eventually

$$n = 1 + \frac{1 + x}{x \times y} \quad (3)$$

companies remain. In the above example, $x = 0.2$ and $y = 10\%/10\% = 1$, which resulted in seven companies. Note that if more profit needs to be made or can be made, there is place for less companies. A profitable sector of economy is thus for instance telecom. This sector just recently started a globalization trend, which has not fully crystallized yet. Most telecom operators only operate in isolated markets. (See Table 2). With globalization, mergers are to be expected. Yet, we can see for instance that in the market of the fully crystallized market of the United States only three to six companies have carved it up (AT&T, Verizon and Comcast and some smaller ones). In Europe basically the same happens. Vodafone, T-mobile, Telefónica and Orange and some smaller ones.

In this respect, the sector of car makers is worse (see Table 1); it makes less profit. To compare it with the market of telecom: The ratio of the tenth ranked to the first ranked is 3.6 while for telecom it is only 2.8. We can expect still a few mergers in the future. The latest one is Mitsubishi joining the

Table 1. Top car manufacturers and their 2016 market share (Source: Drivespark)

Rank	Brand (also includes/merger name)	Market share
1	Volkswagen (Audi, Bentley, Bugatti, Lamborghini, Porsche, SEAT, Škoda)	11.1%
2	Toyota	10.9%
3	Renault-Nissan alliance (Mitsubishi^{o})	9.4%
4	Hyundai-Kia	9.0%
5	General Motors (Opel*, Vauxhall*, Buick, GMC, Cadillac, Chevrolet)	8.8%
6	Ford	6.9%
7	Honda	5.4%
8	Fiat-Chrysler (FCA)	5.4%
9	Peugeot-Citroen (PSA)	3.6%
10	Suzuki	3.1%

**: Opel and Vauxhall were bought by PSA in 2017*
^{o}: Mitsubishi joined the alliance in 2016

Table 2. Telecommunication operators and their revenue (in millions of euros) (Source: Statista [17])

Rank	Company	Revenue	Rank	Company	Revenue
1	AT&T (USA)	132.4	14	KDDI (J)	34.1
2	Verizon (USA)	118.7	15	British Telecom (GB)	24.6
3	China Mobile (CHN)	96.8	16	Time Warner Cable (USA)	21.4
4	NTT (J)	82.6	17	Telecom Italia (I)	19.7
5	Deutsche Telecom (D)	69.2	18	Telstra (AUS)	18.0
6	Comcast (USA)	67.2	19	KT (ROK)	17.8
7	Softbank (J)	64.6	20	Liberty Global (USA)	16.5
8	Vodafone (GB)	58.2	21	Century Link (USA)	16.1
9	América Movil (MEX)	50.9	22	BCE (CA)	14.7
10	China Telecom	48.0	23	Telenor (N)	14.3
11	Telefónica (E)	47.2	24	SK Telecom (ROK)	13.7
12	Orange (F)	40.2	25	Bharti Airtel (IND)	12.9
13	China Unicom (CHN)	40.1			

Table 3. Mobile telephone producers according to market share (Source: Statista [19])

Rank	2009/Q4	2013/Q3	2016/Q4
1	Nokia (38.6%)	Samsung (32.5%)	Apple (18.3%)
2	RIM (19.9%)	Apple (12.9%)	Samsung (18.1%)
3	Apple (16.1%)	Huawei (4.8%)	Huawei (10.6%)
4	HTC (4.5%)	Lenovo (4.7%)	OPPO (7.3%)
5	Samsung (3.3%)	LG (4.6%)	vivo (5.8%)
Other	17.6%	40.5%	40.0%

Renault-Nissan alliance. But it does not compare to the telecom market when that will globalize; a lot of mergers are to be expected to reach again the Magic Number Seven.

Likewise, in a market with less than seven companies, it is to be expected that new companies form, given the huge amount of profit available. A monopoly is not an optimal situation in a truly free market (where companies do not have political clout to manipulate legislation). A good example is probably the smartphone market. While Apple did not invent the product [18] they initially fully dominated the market together with Research in Motion (BlackBerry). In the end of 2009, only three companies – Apple, RIM and Nokia – had a market share of 75%, which can be considered the full market [19]. This is below the optimum and it offers space for new companies to be created or insignificant players to start seriously entering the market by heavily investing in order to get a market share.

The most notable is Samsung, originally mainly supplying components for Apple, when it seriously entered the market with its own brand, it managed to grow to a market share of 32.5% in 2013 and reached first place, a ranking it still holds in 2017 (even in Apple's home market, the US [20]). Similarly, HTC and Huawei entered the market and more recently Vivo, OPPO and Xiaomi did so too. Remarkable is only the demise of BlackBerry and Nokia and the fact that Microsoft did not manage to get a foothold in the market, considering their financial power. Yet, the market seems to be mature now. Compare it to the well-crystallized market of car manufacturers; about 5 companies having between 50% and 60% of the market.

The question how much profit is (or can be) made in a market with n companies can also be put in a formula. First we have to realize that the idea that n companies will remain in a market, can also be reasoned the other way around. Above, the calculation was about how many companies will remain given a certain profit margin (x) and client elasticity (y). We can also ask ourselves what would be the profit of a fixed number of companies (n) and client elasticity. Solving Equation (3) for profit x gives

$$x = \frac{1}{(n-1) \times y - 1}. \tag{4}$$

Imagine the seven-company situation from above in which x = 20% profit is made (β = 1/6) and the client elasticity is 1. If now one company is removed, the profit according to the above equation goes to 25%. In fact, all remaining companies benefit from the merger! We would like to see a study being done about the profitability of the competitors after a merger. Eq. (4) predicts they go up as well.

We see that if by take-overs, mergers or bankruptcies, companies disappear the profit margin increases. Remember this when they talk about 'synergy' and 'cost saving'. Magic words of any company report, they are factually only interested in skimming more money from their clients because they can increase the price for lack of competition. And if they can raise the price and there is also a clear incentive, they will do it. It is the result of the Invisible Hand of Smith that results in a situation that is beneficial for some, but clearly not for the whole, that is, the others. The agreements that need to be made can be done by non-communicative communication as discussed above. This way they can also not be legally prosecuted for forming cartels.

The result of this market optimization to seven companies is that, in an optimal market, there will indeed be seven, yet it is not energetically efficient for all types of economical activity. Imagine seven electrical power lines, side by side. Seven grids of telecom antennas. Seven railway tracks, one next to the other. Seven water pipelines. Seven highways, each at least 4 lanes, making two cities be connected by at least 28 lanes. It is obvious that, especially for infrastructures, the centralized (state) monopoly is the way to go in some cases. (The alternative is less than seven commercial companies that have effective monopoly, a fatal combination; they'd promise not to steal your money, while they have the means, opportunity and the motivation to do so). The banking system should maybe be considered such a case, which is run by a single, commercial bank, the Central Bank that has lobbied the legal monopoly on the activity of creating money, n = 1.

4. CONCLUSIONS

We have shown here how, through the effects of client and profit elasticity, the number of remaining companies or alliances in a crystallized market and the profitability of the industry are directly linked. An example was given in an industry where 20% profit is made and the client elasticity is 1 (1% client loss for 1% price raise); the total number of companies is then 7. We call this the Magic Number Seven. Conversely, if there are less companies, the profit margin can (and will) go up. This can be achieved through a pseudo-cartel, by non-communicative communication between the companies. Once the profit goes up, it is likely it opens the possibility for new companies to be created. That is, if it is truly a free market and companies do not use non-free-market tools, such as wielding political weight in lobbying specific laws beneficial for that company, to eliminate competition. (Such effects have not been included in the current analysis). Likewise, if there are more than seven companies, then there is a driving force for mergers and alliances because they give grounds for increasing profit. When you read in the newspaper a company spokesperson talking about "increased synergy caused by the merger", rest assured, it simply means "increased profit" by eliminating competition.

The conclusion is that a free market with seemingly full competition does not necessarily lead to price reduction. It rather leads to a situation with seven companies, at which point there is no incentive in the market for competition and price lowering. This debunks a myth of capitalism.

Once the Magic Number Seven is reached, innovation and economy will stagnate. (Note that lack of incentive for innovation, offering more value for same money to clients, is the same as lack of incentive to lower the price for the same product). It goes against the idea that mergers maximize growth [21,8]. Mergers maximize profit, which is the only incentive in an efficient market.

When the Magic Number Seven is reached in a market, (non-diversifying) mergers are no longer profitable and when CEOs and stockholder want to use their leverage to increase their capital by making their company grow, an alternative to same-sector mergers is the formation of different-sector conglomerates. Take for example the Time Warner - AOL conglomerate, which is comprised of diverse companies such as Time (news), Warner Bros. (movies), HBO (television), Turner (television), American Online (internet service provider), CNN (news), The CW (CBS and Time, news). While all in info-tainment, they were not (all) direct competitors of each other before the merger. In 2017, a merger with AT&T (telecommunications) is in the making.

Finally, we remark that the values of α and β are given here somewhat arbitrarily – basically they are based on looking at the market and counting the number of companies in a sector and guessing the profit margin – and these values are thus highly questionable. The values may even be different from market to market and can change over time. However, this takes nothing from the fact that there is a tendency of a market to saturate – crystallize – in a certain number of companies, and once this magic number is reached, all drive for innovation and competition is taken out of the market.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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