



Mergers and Acquisitions as a Consequence of Declining Innovation Productivity in Pharmaceuticals: Evidence from Croatia

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Abstract: Declining productivity of pharmaceutical innovation resulted in an increased number of mergers & acquisitions in the pharmaceutical industry. Increased investments into research & development lack the resulting increases in patentable new substances. As a result, the once market leaders are not buying their followers, but the generics producers are buying unsuccessful innovators. We show the case of Pliva: once regional pharma leader that declined into a generics producer's subsidiary. The Pliva sought new ideas by acquiring several research centres. After these acquisitions produced no visible results, the company itself was a target, first by another unsuccessful R&D based company and lastly, by a successful generics producer.

Keywords: mergers and acquisitions; pharmaceutical industry; research and development

JEL classification: L25, N84

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Združitve in prevzemi kot posledica upadajoče inovacijske produktivnosti v farmaciji: dokazi s Hrvaške

Povzetek: Zmanjševanje produktivnosti farmacevtskih inovacij je povzročilo povečanje števila združitvev in prevzemov v farmacevtski industriji. Posledica povečanih vlaganj v raziskave in razvoj je pomanjkanje novih patentiranih snovi. Posledično nekoč vodilni na trgu ne kupujejo svojih sledilcev, temveč proizvajalci generičnih izdelkov kupujejo neuspešne inovatorje. Prikazujemo primer Plive, nekoč regionalnega vodje farmacevtskih izdelkov, ki je postala podružnica proizvajalca generike. Pliva je nove ideje iskala z nakupom več raziskovalnih središč. Potem ko te pridobitve niso prinesle vidnih rezultatov, je podjetje samo postalo tarča, najprej drugega neuspešnega podjetja s področja raziskav in razvoja ter nazadnje uspešnega proizvajalca generičnih izdelkov.

Ključne besede: združitve in prevzemi; farmacija; raziskave in razvoj.

JEL klasifikacija: L25, N84

Introduction

Organizational theory generally divides mergers and acquisitions into three groups according to the underlying motives behind the concentration: the strategic or market motivated ones, the synergic or cost motivated, and finally, the managerial motivated ones. The analysis shows the acquiring company goals may be achieved even if financial analysis foresees failure.

Competition spurs innovation, and mergers and acquisitions (M&As) may decrease the competition in innovation. A lack of competition in innovation markets ultimately leads to a decreasing of variety in innovative products. Research and development (R&D) are the key driver of competitive advantages. A lack of innovative ideas spurs a “kicking away the ladder” policy between the companies. The corporations having an advantage in post R&D clinical trial, patenting, and marketing capability, will seize this competitive advantage by horizontally and vertically integrating those firms with the lack thereof. As the productivity of innovation markets decline, and as the number of generic pharmaceuticals rises with expiring patent rights, the share of generic pharmaceuticals on the market rises too compared to innovative new drugs. Subsequently, the market share of generics producers follows suit, and the share of innovative pharmaceuticals producers declines, spurring some cannibalistic behaviour in M&As. The declining rate of innovation is thus, at the same time, the cause and the effect of M&As.

Because of decreased productivity in innovation, companies tend to achieve R&D synergies by creating new innovative ideas in a classic evolutionary environment by idea combination, recombination, and trial and error. This approach requires exponentially increasing resources to achieve required returns. There are several internal and external pressures contributing to the declining efficiency of R&D pharmaceutical industry: ever-increasing costs of R&D, regulatory pressure to minimise health costs in a third-party payer system, increasing costs and approval times of clinical trials.

Overview of empirical studies of mergers & acquisitions

Mergers & Acquisitions (M&A) attract a lot of scientific interest as they are the predominant form of foreign direct investment and are known for their high failure rates (World Investment Report, 2000). Nevertheless, M&A is still a relentlessly ongoing process. There are numerous studies on the effect of M&A's, and we structure them into three groups. The first group shows studies analysing success of M&A's according to value creation for the purchasing firms' shareholders. We assume the capital markets are without significant informational asymmetries, well behaved, and with good control mechanisms, in so far as they reward and punish strategic choices, including takeovers. Therefore, successful M&A's should result with gains in market prices, and unsuccessful ones should result in market price losses. There are two subgroups of value creation according to the time perspective: the short-termed and the long-termed one. The former examines the change in the share price within just few days to a one-year period following the takeover or the takeover announcement (Table 1).

Table 1: The overview of empirical studies on short-term M&As effect on value creation

Author(s)	Sample	Analysed period
Firth (1980)	642	Within 1 month from announcement
Franks and Harris (1989)	1898	From 4 months prior, to 1 month after the announcement
Higson and Elliot (1998)	1660	Within 3 months from announcement
Fuller et al. (2002)	3135	From 2 days prior until 2 days after the announcement
Moeller et al. (2003)	12023	From 3 days prior until 3 days after the announcement
Liodakis and Pang (2007)	4866	From 10 days prior until 10 days after the announcement
Antoniou et al. (2007)	4173	From 2 days prior until 2 days after the announcement
Martynova and Renneboog (2009)	2419	From 60 days prior until 60 days after the announcement

Source: The overview is the result of own research.

The next overview examines the effect of M&A's on the market value within the time span greater than one year: often between 2 and 5 years (Table 2).

Table 2: The overview of empirical studies on long-term M&A effect on value creation

Author(s)	Sample	Analyzed period
Firth (1980)	642	From 4 years prior until 3 years after the announcement
Franks and Harris (1989)	1898	Within 2 years from announcement
Limmack (1991)	529	Within 2 years from announcement
Agrawal et al. (1992)	937	Within 5 years from announcement
Gregory (1997)	420	Within 2 years from announcement
Loughran and Vijh (1997)	434	Within 5 years from announcement
Gregory and Matoko (2005)	486	Within 2 years from takeover offer
Francoeur (2006)	847	Within 2 years from announcement
Liodakis and Pang (2007)	4070	Within 3 years from takeover
Antoniou et al. (2007)	4173	Within 3 years from takeover

Source: The overview is the result of own research.

This second group of studies consists of those analysing the effects of M&A's on target firm's share price (DePamphilis, 2003). The empirical studies in the third group analyse post M&A operating performance change for involved firms (Table 3).

Table 3: The overview of empirical studies on M&A effect on operating performance

Author(s)	Sample	Analyzed period
Carline, Linn and Yadav (2009)	81	From 5 year prior, to 5 years following the takeover
Singh and Zollo (2001)	47	From one year prior, to 5 years following the takeover
Kruse et al. (2002)	46	From 5 years prior, to 5 years following the takeover
Rahmanand and Limmack (2004)	113	From 5 years prior until 5 years following the takeover
Martynova, Oosting, Renneboog (2007)	144	From 1-year prior until 5 years following the takeover for most of the sample, and from 3 years prior until 3 years following the takeover for the rest
Kastelan-Mrak, Sokolic, Vretenar (2007)	53	Five-year period
Vretenar (2013)	40	From 1-year prior until 5 years following the takeover

Source: The overview is the result of own research.

Motives for mergers and acquisitions

There are two major motives for a firm to engage in M&As on the buyer's side. The first motive is to increase the market share. However, firms driven into this horizontal M&A face a *merger paradox* (Huck, 2005), i.e. where the combined market share after the merger is very quickly downsized to be smaller than the shares of previously independent firms. This is probably due to the necessity to cancel any overlapping and inefficient production after the M&A in a horizontal merger. Therefore, the expected decline in the average production costs with an increasing production volume necessitates the achievement of higher levels of economies of scale and scope. Better economies of scale are achieved by a mere market expansion, and the economies of scope are achieved by better knowledge recombination possibilities. The increase in productivity is thus due to better division of labour, better utilization of human resources and machines, savings in material, but no significant comparative advantages may be achieved without investment into R&D. Reducing costs and thus achieving lower prices is an important source of competitive advantage. Moreover, investment into new technologies, improved manufacturing processes, and research and development could make a far longer leap (Motis, 2007). But R&D is highly risky and necessitates a large number of parallel projects to be able to diversify them adequately. These projects also need to communicate to be able to create new ideas and to prevent overlaps. So, it is normal to expect that the majority of M&A's are in the innovative (R&D) part of the pharmaceutical sector, with only a minority of coming from the generic sector.

One of the reasons for such a behaviour might be that only adverse informational asymmetry in form of intellectual property has any market value, as everything else can be reproduced at known technological cost. According to this viewpoint, only successful perspective (past) irreversible, i.e. "sunk" costs in form of incurred R&D costs has any value. An additional motivation for M&A's, has subsequently arisen: R&D cost diversification as a result of increasing costs and risks of R&D prospective (future) irreversibly "sunk" costs (Mance, Vretenar & Katunar, 2015).

The perspective "sunk costs" address the known past irreversibly incurred costs of R&D, and the prospective "sunk costs" address the future risks of irreversibly incurring the costs of R&D investment of not marketable products (Mance, Mance & Vitezic, 2016). The value of the M&A of the former consists of a net present value of the difference between estimated future cash flows resulting from perspective (past) "sunk costs" of R&D. The value of the M&A of the latter consists of a net present value of the difference between estimated future cash flows resulting from the prospective (future) "sunk costs" of R&D. The latter transaction consists mostly of a risky gamble for the acquirer, purchasing prospective innovation lemons, whereas it is a secure exit for the seller. There is an increasing pressure to merge and to diversify the risks of R&D in the pharmaceutical industry. Decreasing efficiency of R&D investments require ever-increasing pools for optimal diversification. We argue, that one of the principal additional M&A reasons in the pharmaceutical R&D is due to diversification needs. The minimal size of a well-diversified portfolio of R&D project is getting larger as the knowledge base as a network good requires exponentially growing number of recombinations to produce new patentable knowledge and commercially viable products.

One of the reasons most of the M&As were not a success for the purchasing party is the lemon characteristic of the traded asset and the underlying informational asymmetry in favour of the seller. This is even more exacerbated in the case of prospective (future) irreversibilities of R&D investment.

Some authors are pointing that empirical evidences about motives for M&As are inconclusive because it is hard to clearly distinguish between different motives (Kiymaz & Baker, 2008). However, besides expected motives like synergies and gains in market power, various authors from organization theory are mentioning agency issues and managerial hubris among influential factors that are leading firms into M&As (Berkovitch & Narayanan, 2003; Vretenar et al., 2017). A look back to theoretical insight from Resource Dependence Theory shows that Pfeffer (1976) gave a plausible explanation long time ago: "First, to reduce competition by absorbing an important competitor [sic] organization; second, to manage interdependence with either sources of input or purchasers of output by absorbing them; and third, to diversify operations and thereby lessen dependence on the present organizations with which it exchanges." Few decades later, explanation that firms' behaviour is influenced by external factors and managers try to act to reduce environmental uncertainty and dependence (Hillman et al., 2009).

An overview of mergers and acquisitions in pharmaceuticals

By the late 80's and early 90's, we witness the first significant integration processes of companies in the pharmaceutical industry. It all started in 1989, when Bristol-Myers and Squibb, today the global pharmaceutical company, merged with SmithKline and Beecham. The announced motive was simply the long-term increase in the market share. The merger, assessed by the announced motives, was not a success. The second wave of mergers and takeovers lasted from 1993 to 1997. The announced motives were cost reductions and new market entries. In 1995, there were at least three significant mergers: Burroughs Wellcome Fund, Hoechst and Marion Roussel, Pharmacia and Upjohn, and in 1996, we saw the creation of a pharmaceutical giant, Swiss Novartis by merging Ciba-Geigy and Sandoz. The third wave lasted from 1998 to 2001 and was the biggest merger and take-over in the pharmaceutical industry so far. In 1998, Aventis merged with Hoechst Marion Roussel and Rhone Poulenc Rorera, and in 2000, the largest ever take-over in the pharmaceutical industry took place when Pfizer bought Warner-Lambert. The same year, Glaxo Wellcome merged with SmithKline Beecham, creating GlaxoSmithKline, and Monsanto took over Pharmacia & Upjohn, resulting in the Pharmacia retaining the Monsanto's Pharmaceutical division Searle. From 2002 to 2005, the fourth wave of mergers and takeovers resulted in Pfizer taking over Pharmacia in 2003, and in 2004, Sanofi-Synthelabo and Aventis merged into Sanofi-Aventis. This wave saw the first major takeovers in the biochemistry and in the generic industry. In 2002, Biogen took over Idex and Amgen Immunex, making it the largest biopharma company in the world.

In 2005, Teva became the leader in the generic pharmaceutical industry after taking over Ivax. In 2008, the fifth wave began, and in 2009 Merck took over Schering-Plow, Roche purchased Genentech, and Pfizer took over Wyeth's, a 68-billion-dollar strong competing company, thereby further strengthening the position of the largest pharmaceutical company in the world. As for motives, Pfizer announced an increase in its product diversity.

Competition spurs innovation. Lack of competition enables incumbent producers to increase prices without being contested by new entrants. We shall now analyse the takeover of Pliva by Barr Pharmaceuticals and subsequently by Teva and their alleged motives behind these takeovers.

Discussion

The acquisition of Pliva by Barr Pharmaceuticals was allegedly not motivated by reasons of elimination of competition, as these firms had no overlapping markets. The primary motive for this acquisition was the fact that Pliva would allow to Barr the access to the growing pharmaceutical markets of Central and Eastern Europe, Russia as well as Western Europe. As for economies of scale arguments, Barr expected some short-term savings from immediate production optimisation within the group and some long-term cost advantages from improved production efficiency and lower costs of production, product development as well as tax savings due to multinational operation. As for this announced savings, none resulted in any profitability increase for either Pliva or Barr, and consequently for their consolidated financial statements.

As shown in Fig. 1, only Teva was successful in achieving any synergies from the acquisition of Pliva and Barr. It is likely that this information was available to the management of all three parties concerned even before the acquisitions took place. In Fig. 2 we calculated the average of the profits for all three corporations resulting in only Teva having a clearly positive trend.

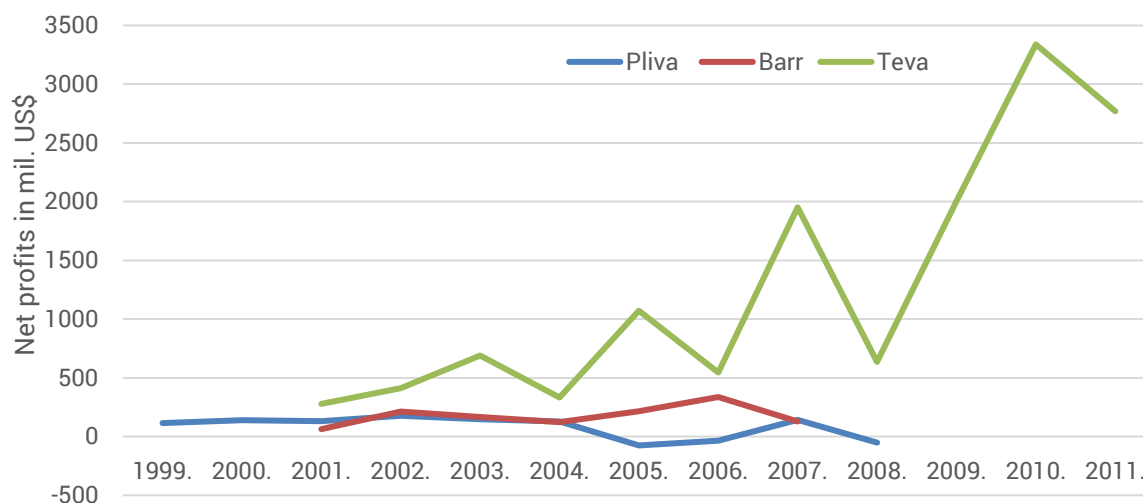


Figure 1: Net profits of Pliva, Barr, and Teva Pharmaceuticals before and after acquisition

Source: Pliva, Barr, and Teva financial statements.

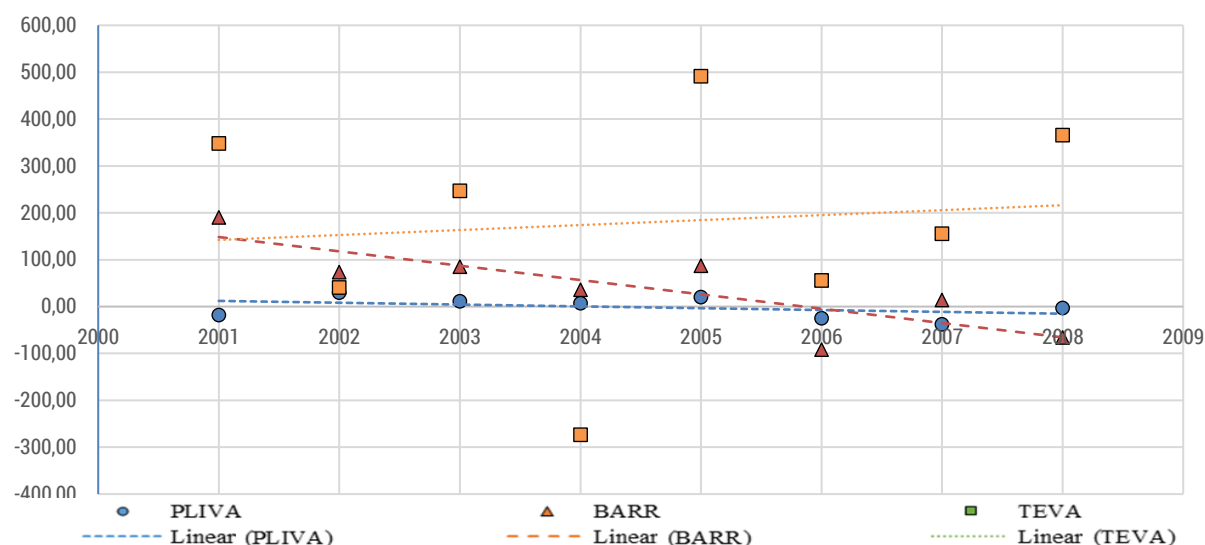


Figure 2: Profit and loss trend lines for Pliva, Barr, and Teva in mil. US\$

Source: Pliva, Barr, and Teva financial statements.

Barr clearly looked at potential acquisitions to expand on other markets in the future, but as shown in the chart above, it did not help the average profit rates. Although highly volatile, only the Teva profit rates were positive in the long run. Both Barr and Pliva, although the public sentiment would tell us otherwise, was a marriage between two market losers and inefficient researchers, unable to commercialise a single R&D bestseller. On the other hand, Teva was not gambling on the expensive and risky R&D, and by acquiring Barr and Pliva, without any illusions about their capability of creating new pharmaceutical products cut into their costs and consolidated their business. The policy paid off as Teva found no place for Barr and Pliva research programmes and devoted all resources to generics, resulting in significant layoffs within Barr and Pliva. The acquisition of the German generics giant Ratiopharm further strengthened the Teva's position as a generics leader and avoided any cannibalistic behaviour on the markets of central and Eastern Europe.

Conclusion

Let us briefly conclude with a remark that larger companies have the financial means and clinical expertise to carry out the burdensome processes of clinical trial, patent pending, and marketing. Generics producers are low-risk revenue machines. Nevertheless, generics producers, to stay competitive, are subject to same economic laws as their R&D counterparts, so a product diversification is a necessity for them, too. Teva's acquisition of Barr and Pliva, is a successful example of how an unsuccessful R&D based pharmacological company may be turned into a successful generics' producer.

Analysis based on financial data is needed to conclude if a certain takeover was a success. Considering popularity of M&As as a mean to achieve growth together with high failure rate, it is understandable that determining success of the M&As is interesting to so many researchers. However, we find that financial data is not sufficient, and that better understanding of motives is crucial for better understanding as in many cases those motives might be beyond profitability. In future research we will try to connect some M&As that might not look successful with findings from resource dependence theory and population-ecology model and try to conclude if some of them have achieved the aimed results after all.

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