ARTICLE DIGGING

R&D cooperation or competition?

By Paul Belleflamme 17 September 2010 77

R&D cooperation across firms is often celebrated as it allows firms to better manage the R&D process by pooling risks, sharing costs, eliminating useless duplication of efforts, pooling complementary skills, or exploiting economies of scale. However, a recent publication by Bernard T. Ferrari and Jessica Goethals from McKinsey&Company advocates instead the use of rivalry to spur innovation: according to the authors,

> *"Productive rivalry stimulated artistic innovation during the Renaissance, and according to the director of General Electric's Global Research Group, it also has helped his company develop better products and services."*

Where is the truth? As usual with economic phenomena, there is no clear-cut answer: the best way to spur innovation is R&D competition or cooperation depending on the circumstances. One key variable is the degree of R&D spillovers (i.e., the extent to which the R&D performed by one firm freely benefits other firms). This argument is beautifully developed in a neat and elegant way by Claude d'Aspremont and Alexis Jacquemin in their classic paper: "Cooperative and Noncooperative R&D in Duopoly with Spillovers" (*American Economic Review* 78: 1133-1137; quoted 1883 times according to Google Scholar consulted on November 8, 2012). The main lesson to be drawn from their analysis is the following:

> *When firms behave strategically, R&D cooperation leads to more R&D than R&D competition when spillovers are large but to less R&D when spillovers are small.*

The intuition behind this result goes as follows: if spillovers are large enough, the competitive advantage motivation to invest in R&D is weak, whereas the temptation to free-ride on the other firm's effort is high; as a result, cooperation leads to larger investments in R&D, which benefits society as a whole.

Bernard T. Ferrari and Jessica Goethals nicely extend this theoretical intuition to inform managerial practice. There may be, however, other factors affecting the choice between cooperation and competition in R&D. I'd be happy to hear your views about this issue.

About Paul Belleflamme

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77 Responses to *R&D cooperation or competition?*

Lotty Njuguna 22 November 2012 at 10:09 #

A lot of what I had in mind has been said in the previous comments so I will attempt to point out areas that I either agree or disagree with.

I agree with one comment that mention the importance to differentiate between R&D and innovation and the fact that R&D does not always result in innovation. I think a good example is R&D in the pharmaceutical industry where it has been proven that not every R&D investment results in a new or even improved product. Such a consideration would support R&D co-operation, especially for product parts that are required across all competitors.

At the end of the day, one has to evaluate the true cost of co-operation. The article does show that co-operation does result to lower

development costs since this would be shared between the co-operating firms. But, what about the end product? How similar or differentiated is it as a result of the co-operation? By this I mean that I would presume that, higher the level of co-operation, the more homogeneous a product will be and in the end, would result in higher competition in the finished product markets. With this in mind, I think that it is not a question of whether to co-operate, but rather, to what extent to co-operate.
This article plus the recommended once however did leave me with one question? Is R&D co-operation just between competing firms (horizontal) or d we have cases of vertical co-operation?

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 10:12 #

In the d'Aspremont/Jacquemin article, firms are supposed to be horizontal competitors. One could think, as well, of vertically linked firms (which do not compete with one another) cooperating in R&D. There exists a literature on that topic too.

REPLY

Adwait Karanjkar 22 November 2012 at 09:51 #

The result obtained by Claude d'Aspremont and Alexis Jacquemin´s study is quite intuitive in the sense that it represents a basic game theoretic problem. The interesting part however is to take their result and see how it plays itself out across industries.

The most R&D focused industries are Auto, Healthcare and Electronics. Let`s see this issue in each of these industries:

1. Automobiles – BMW and Mercedes decided to collaborate on developing hybrid engines in year 2005. (http://blogs.cars.com/kickingtires/2007/03/bmw_hybrids.html)
This provides an interesting example of why two long term rivals would join hands. The reason is not only cost savings but cost savings to develop a technology which the future of the industry itself, in this case it is hybrid engines.
2. Healthcare – R&D is the critical component in healthcare industry which includes pharmaceuticals, diagnostics nd medical devices. With its highly protected patent regime, one can expect more cooperation in R&D as the spillover effect is negated by the patent protection. However, in practice there are very few firms involved in &D cooperation. There is a new phenomenon developing which is basically outsourcing your research to a research focused firm. However it is rarely seen that two big pharma companies decide to do a collaborative R&D.
3. Electronics – A similar exaple of R&D in industry changing scenario can be seen here. The 3-d tv technology was developed together by samsung, sony, panasonic and expand 3D. (http://www.samsung.com/hk_en/news/corporatenews/2011/samsung-panasonic-sony-and-xpand-3d-join-forces)
One interesting thing here is that companies collaborated in the R&D part, however took the product to the market separately. This leads to the question that the collaborators must figure out before starting off the cooperation: how much of the profits obtained by the innovation can our company appropriate? If the answer is not uch, then such a company would be better off offering its R&D services for a price rather than co-developing the product. This is a similar predicament that the last blog post (about delaying off patented drugs for a price) was about.

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 10:02 #

Instructive examples, thanks.

REPLY

Aviral Shrivastava 22 November 2012 at 09:39 #

Knowledge spillover is a ubiquitous phenomenon in the industrial world. It has long been recognized that firms are often able to appropriate the gains from R&D activities undertaken by their rivals through technological spillover. Spillover can arise from numerous sources. For instance, a firm could derive useful, although limited, insights from scientific publications by scientists in rival firms. Alternatively, it could obtain significant technical know-how by conducting reverse engineering, or simply by hiring experienced staff from its competitors.
Firms' ability to realize beneficial information flow can depend crucially on many environmental factors that are exogenous to their own autonomous actions, such as the strength of the intellectual property (IP) regime, the characteristics of the market environment, etc.

The results of a microeconometric analysis, based on firm data on innovation, let in general presume that with intensified competition also the influence of spillovers on R&D-cooperation increases. However, competition seems to induce firms to search for effective firm-specific appropriation facilities first. Spillovers that are sufficiently high such that the internalisation effect from R&D cooperation more than outweighs the competitive effect from research only arise whenever firms are not able to protect their research results through any appropriation facility. Additionally, there is some evidence that spillover effects may even hinder firms from cooperating in R&D when there is intensive competition on the research stage.
According to the basic line of theoretical results the incentive for cooperations in R&D exists whenever spillover-effects are sufficiently high such that the positive internalisation effect of cooperation more than outweighs the negative competitive effect from investment into research.
By and large, the incentive to cooperate depends on the structure of the market where the firms are operating. On the one hand, the type and the intensity of competition on the product market and during the innovation process determine the extent of the competitive effect from research. Additionally, spillover effects themselves may intensify (potential) competition. As a consequence, the threat of potential competition induces firms to invest heavily into R&D; there may be a high incentive to internalise spillover effects within R&D-cooperations. R&D cooperation does not typically occur between big, high tech firms which operate in global markets but occurs at least equally frequently between smaller firms in medium and low tech sectors. On the other hand, there are some doubts whether firms, especially those that have been successful in building up high market power, actually have an incentive to cooperate in R&D. One reason is that high market power reflects efficient research and production. Therefore, this firm is not easily affected. Or, it may even fear to increase the probability of their competitors winning the race by passing on its internal research results via co-ordination
According to a study by Alfred Kleinknecht and Jeroen O.N. Reijnen, it turns out that R&D cooperation is a much more widespread phenomenon than is generally thought. In contrast to large parts of the literature, we find that firm size, market structure, R&D intensity, and high shares of product-related R&D have little impact on R&D cooperation between firms.
Cooperation and competition both have their pros and cons. And as has been mentioned in the comments above, it is difficult to reach a particular solution. In many industries like automobiles, semiconductor and pharmaceuticals, both competition and cooperation have existed and companies have prospered together. However for the companies owned by Government, it is important for collaboration and cooperation to take place. The spillovers will help and double work done as R&D will only waste taxpayer's money. Many times governments of two different countries jointly undertake a project for the larger interests. This can be seen in the space programs where different countries seek help of each other based on others' expertise (e.g. NASA and ESA etc.)
Sources & References
http://deepblue.lib.umich.edu/bitstream/2027.42/36069/2/b1425067.0001.001.pdf
http://www.sfbtr15.de/uploads/media/35.pdf
http://www.jstor.org/discover/10.2307/1807173?uid=3737592&uid=2&uid=4&sid=21101466951697
http://www.brookings.edu/~/media/projects/bpea/1990%20micro/1990_bpeamicro_katz.pdf
http://bschool.nus.edu/staff/bizsd/DeyFu08.pdf
http://bschool.nus.edu/staff/bizsd/DeyFu08.pdf
http://www.iwh-halle.de/d/publik/disc/122.pdf
http://www2.druid.dk/conferences/viewpaper.php?id=501116&cf=43

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:43 #

Good research, thanks.

REPLY

Jones Arunraj 22 November 2012 at 09:27 #

I would like to point out an interesting example of how R and D collusion was used in real life by a tech firm to gain competitive edge over what then seemed to be a nearly unshakeable rival. When Google wanted to enter the smart phones markets, Apple was a giant in the market. With a lion's share of the market and millions of dollars into R and D already poured in, Apple's technology was so advanced that it simply looked unbeatable. If Google wanted to take on Apple alone, it would have taken a huge amount of investment a few years to catch up with the technology. Google simply solved the problem by making its platform Android an open technology which could be used for free by anyone. What followed is history. With hundreds of app developers around the world coming up with new and innovative apps for Android and Samsung evolving cheaper smart phones using the platform , sales skyrocketed. Not only that, as Android was used across multiple players and hence ended up in the hands of more customers , bugs were quickly identified and quickly fixed and Android just got better and better. And it finally reached its pinnacle in April 2012 when Samsung overtook apple as market leader in smart phones. http://www.telegraph.co.uk/finance/newsbysector/mediatechnologyandtelecoms/9665371/Apple-overtaken-by-Samsung-for-first-time-in-smartphone-market.html
Today , 3 out of every 4 smart phones use Android.
http://www.dailymail.co.uk/sciencetech/article-2234053/Three-smartphones-run-Android-Apple-fans-hold-upgrading-anticipation-iPhone-5.html
Hence in conclusion, R and D collusion, not only reduces risk and costs , but can also be effectively used to bring down an unassailable rival.

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:40 #

This is an example of "voluntary sharing", as we will define it in this afternoon's lecture.

REPLY

Andres Chamba 22 November 2012 at 09:25 #

The amount of R&D in either a cooperative or competitive setting primarily depends on the structures of each industry. As we have seen, the General Electric case for competition is appealing. However, this brings us to a second setting where R&D in either a cooperative or competitive setting depends on firms' size as well. General Electric is a giant firm that can afford rivalry between teams within the same company. This is a luxury not many can afford. Especially when companies are small or profits are competed out. In the case of General Electric, creating competition within the firm will create more innovation. But the argument that teams of different areas contribute to other areas seems not too robust. It is only in the case where the big firm can afford to have to teams, doing the same thing, that such contribution could be achieved.

On the other side, cooperation could achieve efficiency and effectiveness in many areas, when the market structure is competitive. In this case profits are competed out and investment in R&D is arguably weak. Nevertheless cooperation has a wide range of benefits, especially sharing costs. R&D is costly, and the risk of a potential failure should be shared as in a strategy to diversify investments. This could be a positive thing for SME from a same origin but that will benefit from different markets.

Lastly, when we look at big firms, cooperation can be a good thing if the right things are in place to assure such cooperation. In this last analysis, clearly one of the biggest benefits that a big firm can obtain is incorporating the expertise of other firms, whether small or big. The key enforcement here would be for the big firm to coerce cooperation through a contract. Such contract should affect both parties with fines or penalties while letting benefits of cooperating firms still enticing. If the big firm fails to enforce its power or sending the right signals of cooperation, other firms will end up defecting and cooperation will not be the equilibrium outcome.

Sources:

Ferrari, B. "Using Rivalry to Spur Innovation". Mackinsey Quarterly, 2010.

Campion, M. Relations between Work Team Characteristics and effectiveness: A replication and Extention. Pardue University.

http://www.krannert.purdue.edu/faculty/campionm/Relations_Work_Teams.pdf

Like: 0

REPLY

Prasoon Mishra 22 November 2012 at 08:53 #

I would make the argument of the R&D cooperation or competition in the context of the defence sector. Generally, the defence sector of the countries is very tightly controlled by the government. In many countries e.g. in India, the defence sector's R&D is mainly in the hands of the Defence Research and Development Organization, which is a monopoly. But in cases like the U.S., the R&D is done by many firms like the Lockheed Martin and the BAE systems.

The US government encourages the cooperative R&D among the firms. Proponents of joint ventures argue that they permit work to be done that is too expensive for one company to support and allow for R&D that crosses traditional boundaries of expertise and experience. Such arrangements make use of existing, and support the development of new, resources, facilities, knowledge, and skills. [1] But the Opponents argue that these endeavours dampen competition necessary for innovation.

So the most government support is for basic research which is often long-term and highly risky for individual Cooperative R&D – for the research that can be the foundation for breakthrough achievements which can revolutionize the marketplace. Right Now, The Technology Innovation Program (TIP) has the intent of promoting high-risk R&D that would be of broad-based economic benefit to the Nation. Hence, the government regulation promotes R&D among the firms if they believe that the societal benefits of that research is greater than those that can be captured by the firm performing the work.

Reference:
1. Cooperative R&D: Federal Efforts to Promote Industrial Competitiveness, Wendy H. Schacht, 2012

Like: 0

REPLY

Franziska Grumbach 22 November 2012 at 08:43 #

In the following comment I would like to point out the positive as well as the negative aspects of each cooperation and competition in R&D.

To start with the cooperation, especially for small companies, it is extremely profitable. When entering into a new market small businesses often have new and good ideas but not enough money to develop them by R&D researches. For that, they can cooperate with large companies, which benefit from the development of new ideas. For the small business cooperation is a good way to realize their ideas as for a large company, the costs in R & D are a good investment to strengthen their dominant position in the market.

Cooperation can also lead to an unfair behaviour of the other firms in the market. The big companies could use their market advantage and absorb the small firms and their idea or cooperative companies are waiting for the ideas of others to be developed and realize them themselves.

Competition in R & D may also be beneficial. Each company in a competitive market is fighting for the largest market share, and therefore has an interest on innovation to compete with the other firms. This has a great advantage for the consumer, as it usually results in a large variety of products.

To summarize, the R&D competition and cooperation can both be successful in boosting innovation. But of course they both have their advantages and disadvantages that influence firms on making their decision regarding research and development. Other factors as firm size or the kind of sectors also play an important role in taking this decision.
In my opinion generalization is very difficult. The decision depends on the individual circumstances and the kind of sector and market the firms are competing in.

Like: 0

REPLY

Navet Alexandre 22 November 2012 at 08:39 #

I would like to write about the topic “R&D cooperation or competition”.

In my opinion, both of them are useful and can lead to benefit (economic or other advantages) is the road-map of the firm is well established and if the risk of the chosen practice is well understood.

The R&D cooperation is certainly the best economical choice for the firm. The R&D costs (which are not negligible) will be most efficiently split between the two centers (or more) which are develop in cooperation an innovation. The most important thing when this kind of practice is chosen is for me that it has to be well settled. What I mean is that the cooperation is a difficult kind of work to establish The firms which are collaborating are often different goals (or culture). Before beginning the cooperation, the road-map has to be settled and the goals of each company have to be understood by the others. A juridic form should also be made to avoid that the cooperation turns into nightmare or to competition. Trusting people or firms with who we are working with is important but when a lot of money is invested, to be protected juridically is clearly a evidence. As I said so, cooperation can be powerful and economic, but a lot of questions have to be answered before starting it (what are the goals, what is the strategy when the innovation is found (roles after the discovery, part of the profit, part of the R&D costs, long term cooperation or not? who will patented the discovery (or merged patent?), what is the road-map of the cooperation (how to merge discoveries, merge knowledge,…) and so on).

The R&D competition will increase the economic cost for the first runner. The second can spend less money to get the same innovation but will not have the advantage to be the first. R&D competition is maybe less economic but has of course some advantages. Having the first the innovation allows to patent it and to enjoy after the economic benefit (monopoly for example).

Choosing between this two kind of R&D possibilities is a part of the strategy of the firm. It has to discuss on the executive board and the pros and cons have to be counted. Being open-minded is important and all the possibilities have to be discussed and the most important thing for me is not to take in count only the economic point of view. Of course, the goal of a commercial firm is to make money, but having the head down and not analyzing the environment or the long term possibilities is a suicide.

A.N

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:33 #

You’re perfectly right: organizational issues are extremely important for the success (or failure) of Research joint ventures. We won’t consider this aspect in our analysis (which focuses on the industrial organization aspects) but it shouldn’t be neglected.

REPLY

Daniel Stöhlker 22 November 2012 at 02:30 #

In the context of the discussion “R&D cooperation or competition”, I’d like to add two more factors that are of particular importance. The question whether competition or cooperation is more appropriate could depend on the ‘type’ of competitor or the given market structure.

Elaborating the latter aspect in greater detail we should distinguish between two different market situations, namely perfect competition and collusive agreements. From the firm’s perspective R&D cooperation in the cartel case seems more desirable because – as discussed in introductory courses on industrial organisation – a higher degree of transparency among involved companies increases the cartel’s stability. Having an insight into the other firm’s research department decreases mistrust to a certain extent and reduces the incentive to deviate from agreements. Supposed the case firms are facing a competitive market, the only desirable outcome could be a R&D competition between firms. The incentive to ensure the own competitiveness is high enough to force the companies to make research of high quality. Sharing own findings with others through cooperation could become a serious obstacle to set yourself apart from other competitors in terms of product quality or price.

The second aspect concerns the ‘type’ of possible R&D-partner. Cooperating with or compete against academic institutions, for example, means a substantial difference. To the best of my knowledge, I would state that for research institutes academic research takes top priority instead of making profits (although not unimportant at all). Therefore, R&D cooperation between an academic research institute and a market company would be the desirable outcome for two reasons. First, the firm benefits from a theoretical input by current research and, secondly, after implementing theoretical findings into practice, research institutes receive a useful feedback. This can be described as a classical win-win-situation for both of them: The firm is up to date in terms of the latest discoveries at the very research frontiers to innovate vertically and horizontally and academic institutes are aware of changes in customer’s desires to allocate available resources (funding, time, knowledge etc.) more effectively to add the biggest possible public value. Of course, a similar way of reasoning holds for R&D cooperation between two research institutes. Facilitating cooperation between several researchers means a bundling of knowledge in order to increase the quantity and quality of research output. (By the way, while writing these lines, I’m wondering to what extent rivalry between research institutes is given? A quick online search made no satisfying reply but if fierce competition is the case, cooperation appears easier said than done …)

To sum it up, the answer to the original question “R&D cooperation or competition” is closely linked to questions concerning the cooperation partner and the structure of the market. Furthermore, the aspect of the market structure is ambiguous: On the one hand side R&D cooperation is beneficial in the cartel case for involved companies but, on the other hand side, society suffers from it because the anti-competitive market structure will be maintained.

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:27 #

Good points.

REPLY

Diégo van der Wielen 22 November 2012 at 02:16 #

From my point of view, huge companies competing in the same big market won’t cooperate. I really don’t see, for instance Apple and Microsoft, cooperating in R&D to develop a new product. How can they help their “rival” develop a new technology?
In order to engage a cooperation, the companies have to prove they can bring something the other one wants and doesn’t have (a technology, a know-how,…). How can they reveal their secrets and what does their success?
You will tell me that the company will learn from the other one, sure, but they also have more to lose than to win. And once they are in a partnership, they have lost their advantage towards their competitors.
In this case, they have also confused their clients: are they going to rely on the competitors? Will they change their habits and start buying from the competitor?

In an other hand, if those big companies doesn’t come from the same market, the innovation could benefit both of them and bring them in a new market. An example in this case is the technology born from the cooperation between Nike and Apple. They succeed mixing their technologies to produce the “Nike +” product, it oversees the runner’s performance via a small chip in the shoe that is linked to an iPod. This pushed consumers to buy and use the device, but also accustom them with a new brand. In term they become regular users of both the companies.

To sum up, I don’t think that there will be good things happening from a partnership between competitive firms of the same market. They will be better off by staying in a competitive state. Instead, firms from different markets could reach higher spillover by cooperating.

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:25 #

You've got a point. Yet, cooperation among car manufacturers to develop common platforms is a counterexample to what you claim (see, e.g., http://en.wikipedia.org/wiki/Automobile_platform).

REPLY

Jan Scheirs 22 November 2012 at 01:53 #

This question is one of the many examples why economics should not be considered as an exact science. Indeed, in my opinion, the decision between R&D cooperation vs. competition has no right answer. As many of the comments before mine pointed out, there are many advantages as well as drawbacks for both.

Firstly I would like to point out one important factors that affect R&D cooperation: Geography.
Various authors pointed out that an important factor in the measure of spillovers is the location of the firm (in the paper by S. Lychagin et al., a difference is even made between a firm's headquarters and inventors which may not necessarily be in the same building or even in the same city/country), compared to others in the sector.
Spillovers may occur on a collaborative basis, with R&D cooperation. For firms that are geographically speaking near one to the other it is easier to communicate and coordinate their research activities. Many research have provided evidence that investing in a research facility in a certain region has positive effect on other facilities in this region.
This is a topic where much research is going on lately and authors are unanimously saying that much research has to be done in order to further analyze this relationship between space and innovation.

Another interesting point is given by the paper of Bercovitz and Feldman (2011) which investigates the composition of research teams. They found out that teams that are composed
of researchers from more than one institutions (no matter if University, Research institution or industry) are generally more prolific in generating patents, licenses and royalties.
This suggests that cooperation may be more beneficial than every institution doing their own research without collaboration.

I would like to finish and recall the first paragraph of my comment: In my opinion there is no winner in the question between R&D cooperation vs. competition, even if I here stated that cooperation may be beneficial. There are several (good) arguments on both sides, with many different perspectives (managerial, economic, psychological,…).

SOURCES:
Lychagin, S., Pinkse, J. and Slade, M.E., Spillovers in Space: Does Geography Matter?, CEP Discussion Paper No 991.
http://cep.lse.ac.uk/pubs/download/dp0991.pdf

Audretsch, D. and M.P. Feldman. (2003). "Knowledge Spillovers and the Geography of Innovation" in J. Vernon Henderson and Jacque Thisse, editors. Handbook of Urban and Regional Economics: Cities and Geography, Volume 4. Amsterdam: North Holland Publishing. pp. 2713-2739.

Bercovitz, J., and M. Feldman. (2011) The mechanisms of collaboration in inventive teams: Composition, social networks, and geography Research Policy, 40,1: 81-93.

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:20 #

The geographical dimension is certainly very important when it comes to spillovers.

REPLY

Marie Waeg 22 November 2012 at 00:32 #

R&D : Cooperation vs competition

We quite easily understand that there is no such thing as one good answer to the question. Each of those strategies have their pros and cons, and their results depend of the conjecture (type of market, number of competitors, firm symmetry, etc.).

The advantages of cooperation itself are generally well-known and quite intuitive.
What is so called "collision and diversity" (of people and ideas) in the B. T. Ferrari and J. Goethals paper refers to the benefit of having people coming together across disciplines, which allows then to learn from each other, exchange ideas and techniques, go deeper in their researches (towards accomplishment). Something we all have surely experienced.
The focus is thus on the incentive to innovate.

On another hand, Claude d'Aspremont and Alexis Jacquemin explain the link existing between the amount of spillovers and the incentive to coordinate R&D.
"When firms behave strategically, R&D cooperation leads to more R&D than R&D competition when spillovers are large but to less when spillovers are small."

But they actually tend to demonstrate which strategy leads to a better way of R&D spending. Taking into account social welfare, governmental measures such as subsidy and taxes could balance R&D investment.

In the end, it seems to me like in both cases – whether firms decide to compete one with another or collaborate – rivalry, as described in the "Using rivalry to spur innovation" paper, would be beneficial (micro-perspective). I think this notion can thus be seen as complementary to the strategic choice made by firms concerning R&D.
Indeed, if rivalry takes place in an collective culture, trying to produce results together (within or between firms), it may certainly spur innovation.
"A friendly and healthy degree of rivalry will spur teams to think deeper and harder about a given problem, leading to new levels of creativity". The issue here would be around rivalry management; things must be kept under control in order for the effects to remain strictly positive.

Like: 0

REPLY

Edoardo Gili 22 November 2012 at 00:14 #

Conclusions brought by d'Aspremont and Jacquemins have been widely used over the years. Large spillovers should encourage firms to coordinate their research capabilities in order to provide society with the biggest technological advances possible. But is it that simple? Should governments encourage firms to cooperate on an R&D level as soon as they caracterize an industry to be having large spillovers?

A recent paper (june 2012) written by Lopez, Vives and Faulli-Oller hinted the importance of antitrust issues that might be linked to coordinated R&D efforts. In fact, Research Joint Ventures are positively correlated with collusion in the products market. Several evidence indicate that R&D mergers can lead to anticompetitive behaviours in which antitrust authorities should act upon. A path that stands out would be joint R&D efforts leading to patent cross-licensing, which will eventually lead to price-fixing schemes (as the Monsanto case). How can R&D joint ventures can help collusion? Simply by the Multi-Market Contact theory, which states that if firms interact in more than one market together, sustaining collusion is more likely, due to the high gains of not deviating of the agreement.

It is therefore useful to understand that spillovers should not be the only focus on whether we should encourage firms to coordinate their R&D efforts. Abuse of dominant power, as well as collusion should be monitored when firms coordinate themselves.

I also think that R&D cooperation and competition depends extensively on education, since it determines knowledge spillovers. As the level of education is converging across the globe, we can gladly observe cooperation among countries, bringing their different efforts to the table in order spur innovation on several different levels. The European Commission joined forces with Singapore in 2007 on the electrical, chemical, and physics level in order to reach scientific excellence. R&D cooperation is positive, but in order to make it realistic, coordination on the education level should also be of paramount importance.

References: http://ec.europa.eu/research/iscp/pdf/singapore_eu_en.pdf

http://www.cresse.info/uploadfiles/2012_PAR5_3_PAP.pdf

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:15 #

You're right to point that R&D joint ventures may facilitate collusion on the product market. We will examine this issue during the lecture.

REPLY

Nathalie Dano 21 November 2012 at 21:46 #

As usual there is no unique solution to the question of R&D competition or cooperation. Both have their own advantages and disadvantages.

According to M.L. Petit and B. Tolwinski, we can assume that a firm's potential for innovation does not really depend on the level of current investment but on the accumulated capital invested in R&D over time.

According to L. Wiethaus, non-cooperative behavior induces more imitation but also more innovation investments while the cooperative behavior ensures that R&D investments are allocated efficiently to innovation and to imitation (…).

The European Industry is not really developed on the R&D, its R&D investment in 2005 was around 1,9% of GDP and the government wanted to raise it to 3% by 2010. This is the reason why the willingness from the European Commission allows cooperative R&D among competitors and encourages the formation of joint ventures. The main advantages of cooperation are of course to reduce risks, sharing costs, making some economies of scale, etc… Whatever if firms cooperate or not in R&D, it stimulates in both cases the incentive to invest. According to D'Aspremont and Jaquemin (1989) and Kamien et. al. (1992), "cooperative R&D induces more investments if

knowledge spillovers are substantial: firms agree on high R&D investments that maximize their joint profits instead of trying to free-ride on each other's efforts". Thus, the stimulation to invest in R&D cooperation depends on the spillover-rate. On the contrary, if the spillover-rate is low, the government should encourage the R&D competition because the production cost will be higher in the case of R&D cooperation.

Furthermore, with some specific costs of imitation, cooperation induces higher technological progress and consumer surplus than the non-cooperative way.

To sum up my point of view, I have to say that there's no good solution but I think that the R&D Cooperative way would be a better solution than the R&D Competitive way because it's more efficient.

Main sources:
L. Wiethaus, (2005), Cooperation or Competition in R&D when innovation and absorption are costly, pp1-5: available on: http://www.tagung05.uni-bonn.de/Papers/Wiethaus.pdf
M. L. Petit and B. Tolwinski, (1999), R&D cooperation or competition?, European Economic Review 43, pp185-208: available on: ftp://libgen.org/!upload/silverware/journals/EER/1182.pdf

Like: 0

REPLY

Milad Avaz 21 November 2012 at 21:40 #

The Enemy of My Enemy is My Friend

"There is nothing worse for an enterprise that wants to exist long-term, and remain progressive, than not have competitors." – Robert Bosch

There should be no doubt that competition strongly aids the innovation process, this point I feel was made clear in last weeks blog post on The Innovators Dilemma. Collaboration is just as well an aid for the innovative process, especially in cross-disciplinary collaborations where established and legitimized knowledge can find new utility.

"Research on alliances documents that investments in mutual learning and a portfolio of diverse collaborations are associated with increased patenting". (2)

However, why don't we ask ourselves what happens to innovation when we have both inter-organizational competition and collaboration?

On October 1st in 1958, American scientists, NGOs and governmental organizations all came together to produce something extraordinary all in the spirit of competition with the other side of the planet Earth. Eleven years later, we put a man on the moon (1). In February 2001, two rival consortia, both existing of multiple organizations collaborating, released the human genome (3).

I believe it to be nothing short of strategic incompetence to take on an innovative project completely isolated from collaboration. Now, more than ever, we live in an economy of networks and stakeholders that will be resolved to try solving the same challenges as you are more abundant opportunities than acquiring 100 % of resources alone. Combining the strengths of collaboration with the incentive creation of competition may ultimately create unique results as well as help build sustaining strategic alliances.

Sources:
(1) http://history.nasa.gov
(2) Network of Innovators – Powell & Grodal (2001)
(3) Network of Innovators – Powell & Grodal (2001)

Like: 0

REPLY

Paul Belleflamme 22 November 2012 at 09:00 #

Good point! As we will study it in the coming lectures, innovation is increasingly of a cumulative nature, which makes collaboration unavoidable.

REPLY

Lucia Caballero 21 November 2012 at 21:10 #

To start with my comment about "R&D cooperation or competition" I would say that although there are circumstances that make firms choose between cooperate or compete, the existance of both shows that there is more than one option for achieving the goal. The job is to identify and choose when is the best moment to cooperate or to compete.

When deciding to cooperate the will to learn from others and from own experiences is an important factor, on the other hand cooperating could have brought backgrounds of oportunism or unfare trades. I totally agree with the fact that spillovers play an important role when deciding to cooperate but also that is the best way to reduce costs and eliminate extra efforts.

An incentive for firms to choose competition (as written in the Bernard T. Ferrari and Jessica Goethals publication) is the stimulation that arises in firms when competing in innovation. It is true that from the moment a firm has to compete in order to survive in the market, strategies become sharper and R&D increases. However I do not believe this is the best way for a company to improve its innovation area. There are many other ways to stimulate workers, ideas and therefore development of the firm increasing investment in R&D. A good leader should know how to make his firm be in the vanguard of innovation and to continue growing without the necessity of competition. The best way to achieve innovation is, from my point of view, finding the equilibrium between stimulation and cooperation.

When there exists full cooperation with other firms, cartels appeared. The cartel phenomenon is the evidence that trough cooperation firms are able to maximize benefits. This could also be applied to imitation between members of the cooperation which is a common practice that arises from investment in innovation. Imitation is translated into some reduction of productions costs. (two stage duopoly model).

To conclude with my comment I just want to emphasize the importance of cooperation to earn knowledge, to learn from others' experiences and therefore to develop innovation in the most efficient way.

Sources:
http://www.finance.uts.edu.au/staff/johnwooders/stablescan.pdf "Cooperation vs. Competition in R&D:the Role of Stability of Equilibrium. Rabah Amir and John Wooders"

http://www.tagung05.uni-bonn.de/Papers/Wiethaus.pdf "Cooperation or competition in R&D when innovation and absorption are costly. Lars Wiethaus"

http://www.utm.mx/edi_anteriores/temas40/1ENSAYO%2040_1.pdf "La experiencia de la competencia y la cooperación en algunas MIPyME ambientales"

Like: 0

REPLY

Xuning Zhang 21 November 2012 at 20:12 #

The R&D research is well-known to be public characterized, as the cost for the production is expensive but with very low margin cost. The return rate for R&D is approximately 30% if we only taking the benefit within the industry, however, if we take other industries' benefit into account in the same time (with high spillovers), the return rate would be 100%. Though the contribution of spillovers to the society development and forward innovation is obvious, from organizations point of view, the motivation for spillovers is still lack in reasons of the high cost for R&D activities.

As the market cannot lead to the best interest for the society by itself, government should take measures on subsidy. Nowadays government would usually adapt two kinds of subsidies: pre-tax expenditure deduction and tax breaks. Those two aspects mainly focusing on the preferential measures on the input side, however, we can suggest for measures on the output also, after the innovation has done.

When the degree of spillover is high, organizations would prefer cooperation according to B. T. Ferrari and J. Goethals, and then the government should subsidy not only on R&D input to stimulate organizations to innovate, but also subsidy on output, which would encourages large scale of production with more profits for future R&D development. When spillover is small and companies tend to compete, the government should still subsidy on the output in order to encourage more productions, but establishes R&D input tax to prevent too much investment on R&D.

To sum up, the choice for organizations whether to cooperate or to compete in R&D activities is depended on the degree of spillover. But the market economy system could not balance the R&D investment itself (not too much or too little), which could lead to loss of social welfare. Thus, according to different degree of spillovers, different government measures for subsidy and tax policies on both input and output side could be adapted, and solve the problem on theory.

1. Lach, S., "Do R&D Subsidies Stimulate or Displace Private R&D, Evidence from Israel [J], The Journal of Industrial Economics, Vol, L (4): 369-390, 2002.
2. Tax and Subsidy and R&D with Spillovers, Liu Jian Ping; Zheng Xu Tao; Yu Meici; Journal of quantity economic and technical economic research, pp.121,2005.

Like: 0

REPLY

Morgane Haid 21 November 2012 at 18:34 #

Once again, as it comes to economic analysis, there won't be a unique solution to the question at stake. Cooperation in R&D is one option among many to process R&D. In a working document form Lille Economie et Management (2007), some experts show, after their investigation of R&D in French firms, different ways to process R&D:

1. Internal R&D via a department in the firm dedicated to it,
2. Licenses and patents: to be obtained from an innovator in exchange for money

3. Subcontracting: make R&D contracts with external organizations (research centers, study centers, consultancy groups, universities)
4. Cooperation: partnership or joint-ventures

Regarding the cooperation, it appears that in France around 42% of the firms doing product innovation have at least once innovated by cooperating with other firms or organizations.

I agree with the views of this paper, that claims that the choice of the R&D process depends on the activity of the firm, the type of project/innovation needed, and its environment. They focus on 4 features suggested by Kay (1997): Non-specificity of the innovation, delays, uncertainty and costs. Cooperation is very attractive for long term innovation projects, as it allows large economies of scales, new market, cost reduction, complementary research skills benefits. However, uncertainty is very high as one cannot be sure of the results of the cooperation. Besides, risk of losing firm's unique knowledge is high and those leakages can be very costly if firms lose their bargaining power.

An opposite method would be subcontracting. It results from the interviews that the experts had with firms using subcontracting to get R&D that this method is mostly used in order to benefit from very high-skilled experts. Besides that method is safe and there is no uncertainty or risk.

There isn't a one size fits all solution of R&D method for firms; each one of them has specific needs and requirement. Some can offer to take risk of losing their innovation "secrets" to get economies of scales, while some other firms will prefer to pay more and to get efficient innovation immediately; for some it's worth it to create a R&D department while some firms just need to buy few patterns. Thinking about firm activity, type of innovation, time range, risk at stake and uncertainty will already help to choose whether cooperation is the right option.

References : De la sous-traitance a la coopération : la gestion de la R&D dans les entreprises
Francaises, Lille Economie et Management, working paper, 2007-14 http://lem.cnrs.fr/Portals/2/actus/DP_200714.pdf

Like: 0

REPLY

Sriram Vasireddi 21 November 2012 at 18:15 #

In my opinion both competition and co-operation have their own benefits when it comes to R&D
As discussed by many co-operation may be useful for non-competitive innovation in a larger way like non competing firms in a market place would co-operate to bring about technology as in how INTEL revolutionized the PC MARKET…
The market forces and competition are the ones that bring about the larger changes and the more intensive ones in some cases,

For example in automobile sector although some companies have similar engines from a common manufacturer its a stagnated engine market that has brought about the major change although that wouldn't have been possible without some co-operation across the value chain

Further the differentiating factors of these automobiles for their sales are not their engines and some other attributes which are major innovations which arise from competition

The market stagnated after a famous innovation after sometime and the next growth i feel is with competition and although co-operation is more in a short term way

Like: 0

REPLY

Gaurav Sushil 21 November 2012 at 18:03 #

I would like to use the paper "R&D Competition or cooperation" by Petit and Tolwinski (1998) as a reference here. There is no blanket answer here: R&D cooperation and competition both have their pros and cons, and each is better suited to maximising social welfare in industries where their upsides will overrule their downsides. This is primarily related to the spillover effect and the effect it has on incentive to innovate, as the post mentions.

For instance, in industries with limited spillover effects, R&D cooperation will lead to less R&D and therefore higher production costs, and thus society wont benefit as much as society would in case of competition. It must still be pointed out that the firms might extract higher profits through cooperation (or cartel formation), hence the government must step in to ensure that this does not happen. Similarly, in industries with high spillover effects, the government should encourage R&D cooperation. Otherwise, duplication of R&D efforts will lead to a lot of wasted expenditure and drive up production costs (expenditure is wasted because since firm A and B might both be conducting research in the same area incurring a lot of expenses, but B might discover it first, resulting in A also gaining knowledge of it due to spillover and A's R&D expenditure becoming wasted). Thus to increase social welfare in such cases, the government should encourage R&D cooperation. However, it should also take care to ensure that the cooperation does not lead to a monopoly, that stretches beyond just cooperating on R&D and extends to fixing prices as well.

However, this only concerns the incentive to innovate and is mainly applicable to established firms competing in a market. In the case of a new player, the incentive to innovate is proportional to the ability to commercialize (leading to the second blog post), and this will be better for those established firms. Hence, to ensure such innovations come to the market, the government should encourage R&D

cooperation between an established firm, which has the capability to commercialize innovations, and the new player.

Hence to sum it all up (and linking the two blog posts), 1) If it is a high spillover industry, the government should encourage R&D cooperation while taking care not to encourage formation of a monopoly, and 2) If it is a low spillover industry, the government should encourage R&D competition. However, even in this case, the government should encourage big established firms (established in that particular industry) to cooperate with the new startups, so that their incentive to innovate is not destroyed by their incapability to commercialize. They must also ensure that the rights of the new players must be protected, so that imitation and usurpment by the big firms do not happen.

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 18:53 #

Nice way to link the two posts.

REPLY

Karan Kumar 21 November 2012 at 17:56 #

When we talk about R&D, we think about innovation as a new product, process etc. Another very important thing is that a huge amount of money is spent in R&D. So, with R&D, basically companies are investing huge sums of money to come up with a breakthrough innovation that will earn them a lot more. The money being invested in R&D can vary depending upon the industry. Like, the amount of money invested in a Pharma company is much more than a Furniture company. So, accordingly the risks also increase. A pharma company is running at higher risks and thus charges premium for the patented products. One very key factor to be pointed out here is about the patents. Patents play a very important role in R&D decisions. Which country should you work in, where is it more secure to apply patents, what are the patent laws in different industries. Hence, the competitive and cooperative R&D are very complex strategic decisions which may depend on a lot of other factors. I will discuss few such factors.

1. Stability of strategic partnerships – Pooling of companies' resources by various firms so as to develop or upgrade products or services that companies would not be able to develop or upgrade on a stand-alone basis or at the same accelerated pace gives rise to the cooperative R&D. Such alliances can lead to breakthrough innovations as can been seen in the high-tech industry. However, there are numerous instances where unstable relationships among firms have led to the failure of alliances, thus competitive R&D is preferable in such cases.

2. Sharing of Intellectual Property rights – The success of a cooperative R&D relies greatly on the partners' ability to overcome their reluctance to share their know-how and intellectual property rights with one another. The ineffective management of intellectual property rights may lead to last minute collapse of the deals among firms and can impede the growth and achievements of the alliance.

3. Laws governing alliance formation – Cooperative R&D can be more successful in those countries that have liberal laws for the formation of alliances among competitors. For example, Under US law and according to the US Supreme Court10, the famous Article 1 of the Sherman Act11, which prohibits agreements in restraint of trade, should be applied under the "rule of reason", according to which an agreement among competitors, whose effects are beneficial to the economy, is not prohibited by antitrust law. The countries which do not provide such relaxations favour competitive R&D.

4. Jurisdictions controlling alliances – Jurisdictions under which the alliance will fall plays an important part in the decision of forming a cooperative/competitive R&D. If the alliance falls under the jurisdiction of two such countries whose laws can't be complied with simultaneously, like US and EU, then the cooperative R&D may not be prove a healthy decision.

5. Economic Benefits – As mentioned earlier as well, finances play an important role in R&D. Every firm needs capital to carry out its R&D operations. Thus, the cooperative R&D among firms depends greatly on the economic gains a firms might have by collaboration.

Thus, it can be concluded that the cooperation is not possible in each sector and in every country. Hence, striking a balance between cooperation and competition can help in pacing up the R&D and at the same time reducing the costs of the same.

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 18:56 #

You are right to point that economic benefits are not the only factors that influence the choice between R&D competition and R&D cooperation.

REPLY

Pablo Illán Tejedor 21 November 2012 at 17:46 #

R&D cooperation or competition?
It is common the statement in which it is said that cooperation is better than competition. Not only in the case of firms but in many other fields as real life for example.

In Spain we have a famous phrase that suits perfect for this affirmation: “two hands do more than only one”. Recognizing that the common effort would facilitate any work.
But referring to this phrase, I would do a rhetoric question: what would happen if only one hand is powerful enough to get better R&D than the other two hands?
So that, I think there are little details which condition whether choosing as best choice cooperation or competition. Little details as for example: the size of the firm, their economic power or the market in which you participate.

For me the two key words in this argument are risk and success. When firms are developing their activity, they always look for the most safety way to reach their aims and get success. The safety way means avoiding risks that implies not doing big investments with future high costs. This is why they look for cooperation of firms that are in the same situation and if they come to use their “hands” at same time they would reduce the risk and will obtain a certain success. Maybe they get less profit than if they would have followed another way but they avoid the risk of having losses.

On the other hand, there are big firms which think that avoid the cooperation is the best way to success in R&D because they trust in the market power they have. They prefer to compete against other firms and then have the biggest profit possible without caring about the risk they would take than having an alliance with other firms and develop a safer activity.

Like: 0

REPLY

Vandersteen Nicolas 21 November 2012 at 17:37 #

First, I would say that I agree that there is a lot of possibilities, but I’ll give you here my point of view mostly regarding highly technological discoveries. To help me with that, I’ll give you the example of the whole automotive industry since its beginnings until now.

The first real supply chains of the automotive industry appeared at the end of the nineteenth century. At the time, the researchers were helping each other because there was a lot to improve in this new discovery. Time passed and hundred years later, we found a “standard of construction” for the cars that is used by every single brand. When we reached this point, brands began to search small details that could bring them a plus value and that’s about the time when cooperative R&D became competitive R&D. Now every brand has its own R&D center and for instance Toyota forbids people to come and take pictures, notes, …

What I think is that for highly technological discoveries such as cars, space shuttles, … the cooperation is at first essential given all the constraints but when companies have found the “standard prototype”, they cut off cooperation and try to find a plus value on their own and maybe have a competitive advantage.
If we keep thinking of R&D in the automotive market nowadays, we can also think about the current researches on electronic cars that aren’t finished yet at all. This is an example of cooperative R&D which will, in my opinion, turn into a competitive one once the first “standard” usable by the customers will appear on the market.

I think that this way of working is really good for our society given that the companies are now forced to surpass the standard model of any product (found with a cooperative R&D or not) and then forced to bring new ideas that the customer will enjoy. The only negative thing for the whole society is the use of patent which gives a comparative advantage to a company for years, but on the other hand it may encourage them to invest in R&D even more (which is then good).

Of course, this is a very specific point of view and there are a lot of aspects that have to be considered (other than patents) given the case.

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 17:42 #

I agree to some extent with your historical view. But cooperation still exists among car manufacturers; for instance, they may agree to use a common platform to develop different models (as was indicated in a previous comment).

REPLY

Christian Ramirez Ledezma 21 November 2012 at 17:15 #

It is clear and evident when it comes to cooperation between companies that the main goal they are looking for is the economic

when business relationships are established to promote a product or a service where both parties benefited from it. But the question here is, when it comes to R&D, which is the benefit and to what extent they decide to cooperate.

The choice of each company whether collaborating with another firm or work will individually depend on the information available to the firm and especially the confidence in the knowledge and experience that has its R&D team. If a firm believes it has the ideal team, I think they won't want to benefit the competitor sharing such knowledge. Conversely, if I am a firm that needs the information and knowledge of another company to excel in the market or to grow at a faster rate, I need to acquire this resource from external sources; the key is to convince the external source that both will benefit from such cooperation.

Personally I believe that competition can take you to excel more individually and in a shorter period of time, but to the extent that cooperation takes place, you are merely ensuring long-term results, of course within cooperation agreements and scope clearly established.

Mark and Graversen (2004) consider that a motivating factor for cooperation is to decrease the risk, because when R&D stars, there is money invested and certainly the outcome is uncertain, so in this way, by partnering with more companies that risk (of failure) is diversified. Of course in the case of large companies that have a lot of power, this could not happen due the large amounts of capital they have to invest in R&D and especially due the fear of being copied by a competitor.

Other factors considered relevant for companies to decide for cooperation is that there is an economic benefit in either the short or long term. For example, the accumulation of knowledge can lead to economic growth in the long run. Everything leads to have additional resources to create and maintain certain level of competence. The faster and easier the access to knowledge and technology, the lower the costs to firms.

One factor that is not mentioned in the article by Mark and Graversen, and other papers I researched of companies who decide to develop partnerships, is the common good, or wellbeing of society. I would like to find that one of the factors that encourage companies to cooperate is because they seek a greater benefit to society. This does not happen in private companies. But in public institution is much more likely to happen, even among different countries because they are not looking for profit.

Reference

Mark, M.; Graversen, E. (2004): Determinants of Danish Firms' choice of R&D-cooperation partners. Retrieved 20.11.2012 http://www.cfa.au.dk/fileadmin/site_files/filer_forskningsanalyse/dokumenter/Working_papers/WP2004_6.pdf

Like: 0

REPLY

Simon Tremmel 21 November 2012 at 16:24 #

I would like to comment on spillover effects and their impact on cooperation decisions. As mentioned in the article, there is presumably no "clear-cut answer" to this issue. After a R&D project is completed, rivals can benefit of a leakage of information and adapt the information to reduce their own costs. This effect is called "output spillover". In case informations leak at an earlier stage of the R&D process, rivals can benefit of "input spillovers".(1) The existing of spillover effects certainly reduces an innovative company's incentive to invest in R&D due to profit losses. That raises the question if R&C cooperation with rivals may be profitable, hence R&D cooperation among companies is a way to counteract some of those profit losses. According to a paper by Silipo and Weiss, companies conducting R&D cooperation can achieve three benefits. A "fully inclusive cooperative agreement" optimally makes the question which company brings up the innovation redundant, because terms of cost and profit sharing are settled in the agreement. Also to mention is the fact that a close communication during the cooperation enables both companies to exploit synergies and avoid efforts, so it can therefore lead to a faster R&D process. Finally external effects, such as the ones caused by spillovers, can be internalized.

In general, companies have a variety of approaches to conduct R&D cooperation: they can e.g. agree to share R&D costs, share research informations in terms of an information sharing agreement or establish research joint ventures. In the first case, cost sharing leads to higher investments, because the costs for each company are lower. As a consequence, the profits often also rise. The problem of cost sharing without joint venture is the transparency of costs incurred, so it would be necessary to control the partner's expenditures, which leads to problems concerning privacy. The second option, the information sharing agreement, is difficult for both companies, since after disocvering the innovation, the innovator has a strong incentive to keep the innovation for himself and the cooperating firm is likely to start sueing the innovator, which results in costs for both parties. At last research joint ventures provide all advantages mentioned above and are commonly considered to be a viable solution, although at the cooperation's beginning some firms are concerned about the risk of know-how drain.

From society's point of view, it is important to have a clear agreement between the companies, regardless whether form of cooperation they enter into, because successfull cooperation in R&D does not guarantee a smothly production of the innovation.(2) Without an aggrement regarding the production stage, each company faces higher competition and has therefore degreased incentives to invest in R&D, so benefits of the cooperation like internalizing external effects would be reduced.
By distinguishing between the existence of symmetric and asymmetric duopolies, the conclusions for society may vary. In the first case, total competition in research and production is optimally for society, provided spillover effects are minor. The presence of major spillovers makes research joint ventures preferable, in particular since joint ventures offer companies the most efficient way to protect themselves against spillover effects and keep up their incentives to invest in R&D, from which society benefits. The analysis of the second case concludes that governmental regulation of intelectual property can encourage monopolization, thus spillover effects are necessary for other companies to remain competitive. Furthermore research joint ventures seem to be preferable for society again.(3)
To sum up, in both cases a monopoly is not desirable for society, while cooperation or competition can be prefered, depending on the

circumstances.

Sources:

(1) Radhika Lahiri: "Cooperation v/s Non-cooperation in R&D Competition with Spillovers"
http://EconPapers.repec.org/RePEc:qut:dpaper:166

(2) Damiano Bruno Silipo, Avi Weiss: "Cooperation and competition in an R&D market with spillovers"
http://www.ecostat.unical.it/silipo/Pubblicazioni/SILIPO-WEISS%202005.pdf

(3) Maria Luisa Petit, Boleslaw Tolwinski: "R&D cooperation or competition?"
http://www.sciencedirect.com/science/article/pii/S0014292197001116

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 17:19 #

Useful references; thanks.

REPLY

Castin Georges 21 November 2012 at 16:00 #

I would like to focus on the R&D cooperation vs competition.
Cooperation is probably not possible in each sector but surely offers the possibility to reduce some costs. I see different limits to that:

Firstly there is no evidence that companies are using R&D spendings on the same topics. When the innovation comes out from the first firm (and succeed), the second firm will probably copy the innovation and level but will it pay the same price than the first one originally payed? If the first one had payed 100 maybe the second one will only have to pay 40. Of course the second company will face different problems since it arrived second but what I want to say is that the total price is never two times the initial price of the first company. It is less.

The second limit I see is that I believe innovation si mainly made to have an advantage to be better than its rivals. If everyone manages to get an innovation that make your product cheaper the prices will lower on medium term and no one will have won anything. Of course this is just a caricature but the point still makes sense.

My third concern is linked to the second one since already some firms make R&D to make R&D, in a passive way. To say "look at us we do R&D by investing xxx dollars..". This technique of cooperation gives me even more this feeling.

These three concern bring me to an observation: it is well know that R&D spendings are not necessary correlated to innovation. Some companies will be very innovative with few R&D spendings and other will be poorly innovative with huge R&D spendings. Innovation is in my opinion much more of a state of mind and a organizational identity. It is a strategy as a whole that does not only implies money but also strategy and will. It is therefore difficult to imagine how cooperating between competitors can have a true impact on innovation.

I will conclude on a metaphor that characterize innovation for me. It is a runner that has to go for 100 meters. Will he beat the world record if he is alone? Will he even run? I'm really not sure about this.

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 17:15 #

Food for thoughts!

REPLY

Antoine Wouters 21 November 2012 at 15:05 #

I think as it is said in the article, there is no right or wrong answer. In some cases, cooperation will be conducive to market, while in others, the competition will be more beneficial. To illustrate my point, I'll first take an example in the automotive market, and secondly, the market for smartphones. Then I would conclude with an example in the pharmaceutical sector.

In the case of the automotive industry, there are many cooperation agreements between the different brands. In fact, they pooled their knowledge to create such a great engine for some models. For example, we have the same engine in a Mercedes-Benz and in an Infiniti. There is also the same engine in a Smart or a Twingo*. In this case, I do not think it's harming innovation, but it requires a certain rigor

and it is essential to know how to work together. By working this way, it is possible to learn from others and thus go further in innovation.

In the case of smartphones sector, we can count three major players on the market (although there are others such as Symbian, BlackBerry, …). On the one hand, there was Apple and iOS. They first arrived on the market and invented the system that we all know today, with small square icons, the pages of applications, … Then Google came to market with Android by almost copying/pasting iOS. Thus, for years, they have stagnated. Indeed, both having very similar operating systems , none could learn from each other and innovations were minor. It was like that until this year when Windows came with its own operating system (Windows 8) with a totally innovative interface. From there, the innovation in this sector is restarted.

On the other hand, competition can also hinder innovation. I am personally convinced that if all medical research on AIDS vaccine worked together, we would already have found a solution. But hope to find it first in order to file a patent to enjoy for many years the monopoly of this one is greater than hope of finally cure the millions of people suffering from this disease. In this case, I do not agree with the proposition that "if spillovers are wide enough, the competitive advantage motivation to invest in R & D is weak, whereas the temptation to free-ride on the other firm's stress is high, as a result, cooperation leads to larger Investments in R & D, Which benefits society as a whole."

In conclusion, cooperation and competition in their own way can be beneficial and harmful to innovation. I think a mix of both would be ideal. I had the opportunity to interview the director of human resources of Xerox Belgium for an earlier work. According to him it was important to have people with different personalities and opinions and the meeting of these differences leads to an optimal solutions. Here we could associate the differences of personalities and opinions with the competition, and confrontation of these differences with cooperation. Thus, if in a first time, each develops his idea in his corner, regardless of what others are doing. So we would have very different solutions. Then the comparison of these different ideas and the development of a common solution, taking into account the benefits of each alternative, would provide an optimal solution that nobody would have found if they were directly associated with each other, or if they were never associated.

* http://www.lexpress.fr/actualites/1/economie/cooperation-entre-daimler-et-renault-nissan-dans-les-moteurs-aux-etats-unis_1069329.html

Like: 0

REPLY

Sophie d'Orjo 21 November 2012 at 14:30 #

R&D is crucial for the survival of a company or even a country. This is why the investment in time and in money is very important.
It is therefore important that the government promotes what is the most profitable between cooperation and competition whether for the country, for companies and for individuals.

Begin by defining the competitive process. It could be described as a simultaneous search for two or more persons or firms with the same benefits, the same result.
While, cooperative process consists to gather people or firms. In this case no one can act alone and each member help each other.

What should be chosen between cooperation and competition? For this, I will quote some advantages and disadvantages.
On one hand, I think that it is true that competition increases the desire to find a business innovation better than its competitors. So, firms are perhaps more willing to invest in R&D and increase their chances of being more innovative. Therefore, the company cannot fail otherwise it would lose a lot of money and lose credibility to their investors.

On the other hand, I think it would be more effective to promote cooperation in R & D. As we can read in « The myths of innovation » of Berkun or in « The Cultural Dimension of Technology Management » respectively written by Berkun and Hard, the process of innovation is a process of accretion. In other words, it's a growth by gradual addition, so any big idea can be divided into an infinite series of smaller, previously known ideas. Thus we can say that each innovation is the result of collaborations gradually as time passes. Furthermore, the cooperation could have positive impacts on people, given that companies prefer to work together to move forward rather than confront and risk not going ahead. Indeed, Marcel Crahay demonstrated, with some studies that cooperation is more effective: people are more effective by working together rather than separately. Then why would this not the case for companies, whether in the field of R & D or other?
Another benefit for companies is that they will reduce their costs if they collaborate on the same project innovation: one of them may specialize in one matter, another in another one, for instance.

So I think that it would be more effective than government promotes cooperation rather than competition.

Like: 0

REPLY

François Nicaise 21 November 2012 at 14:05 #

I don't totally agree with Bernard T. Ferrari and Jessica Goethals who claim that the best way to spur innovation is R&D competition. For me it depends on which scale you see the issue. On a micro perspective, being in competition it's maybe the best way

to spur innovation because it create a need to do better than the competitors (Pressure spurs innovation but puts in trouble the creativity part in groups). But in a macro perspective, for a country or the whole society, sharing is the best way to progress for the reasons mentioned (sharing costs, ..).

Moreover, to speak about the other factors affecting the choice between cooperation and competition in R&D, perhaps one of those factors can be the degree of specificity of the society. Indeed, the level of knowledge present in the whole society on the company's activities may put some pressure to the firms and force them to collaborate easily. If the available knowledge is very big, then firms don't have to collaborate to be able to innovate.

I'd like to take open innovation as example. Societies can't only count on their own resources to spur innovation. Indeed, universities and academics, for instance, are a big source of knowledge and surely can help lots of firms. Letting the others have the access to their knowledge is positive for the whole society. The idea here is more the knowledge sharing in a win-win perspective. So when you work on some very new and high-technology in your society, the knowledge available may be more difficult to find, and then the collaboration with your competitors may be more relevant for you to improve and innovate in your society.

To conclude, it is clear that competition could be a good driver of innovation, but there may be several factors that can induce that a partnership is more efficient.

West, M. (2002), Sparkling Fountains or Stagnant Ponds: An Integrative Model of Creativity and Innovation Implementation in Work Groups

http://design.org.br/artigos_cientificos/j.1467_9310.2006.00428.x.pdf

Like: 0

REPLY

Ramya George 21 November 2012 at 00:31 #

R&D cooperation or competition – we have seen how this can vary depending on market condition, product nature, level of investment needed for R&D and so on. Here I would like to bring attention to government regulation and specifically to government regulation to encourage R&D cooperation. R&D cooperation leads to increased social welfare. For customers, it translates to lower prices while for firms the risk surrounding uncertainty of a successful innovation is reduced, costs and also often complementary expertise is shared and helps firms to overcome spillover effects. In such a situation, government intervention to create a conducive situation seems only natural.

So what is it that the government can do to increase R&D cooperation? We would look at two scenarios here;
1. Government support through joint ventures: Government regulations supporting R&D coalition between firms though minimizes risks and costs for participating firms but also encourages free riding effects. There is also a possibility of anti-competitive conduct by firms such as reducing R&D effort, pricing etc.
2. Government support through R&D subsidies: Subsidies have worked out better to avoid anti-competitive actions and free riding effects. An environment of subsidy funded research by individual firms however, limits cooperation and hence access to complementary skills among firms.

As we observe today, R&D cooperation is prevalent more for highly technological intensive products. In this field, an interesting third scenario of co-operation with universities has evolved. This not only helps minimize anti-competitive actions between firms but also gives a firm access to complementary skills which its competitor firm may lack. This model of R&D can be further stretched to universities incubating start-ups – a practice already prevalent and also quite successful in some countries.

Reference:
1. "A primer on R&D cooperation among firms" – http://www.bancaditalia.it/pubblicazioni/econo/quest_ecofin_2/QF_130/QEF_130.pdf

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 11:09 #

Excellent reference (Marco Marinucci is my former PhD student)!

REPLY

Delphine Wauty 20 November 2012 at 23:28 #

R&D cooperation and R&D competition are both useful to boost innovation, but each one of them has its own advantages and drawbacks, which can already influence firms in their choice as regards research and development. Other factors, such as firm size, the kind of sectors or governmental fundings for instance, also play a role in firms' decisions, which makes generalization very difficult, even impossible.

However, I would like to start by sharing a paper by the Banca d'Italia on R&D cooperation among firms *(1). This paper summarizes the

already existing literature on the subject, exposes firms'rationale to opt for R&D cooperation – especially in the high- and mid-tech sectors – as well as the limits of such cooperation. First, high R&D spillovers and the imperfect appropriability of R&D may reduce a firm's incentives to innovate as its competitors would benefit from the firm's investments and use R&D results without financing them, especially if costs of transmission are low. In such case, R&D cooperation could then solve this problem and encourage bussinesses to innovate. Secondly, R&D cooperation can help firms to share information, which may reduce uncertainty related to the technology feasibility and its commercial success. Some studies also revealed that firms with a certain level of complementary skills are more likely to cooperate successfully, however, this level of complementarity should not be too high.

Nevertheless, R&D cooperation may cause some problems. First of all, such cooperation implies that a firm needs to find a partner with useful complementary skills in order to achieve its goals. However, it only knows a part of its partner's expertise and objectives, which can lead their cooperation to a failure. Afterwards, there is also a risk of moral hazard. Indeed, one firm may benefit from its partners'investments and provide them with low quality R&D.

Among the other factors, I would like to add that public funding may also play a role in R&D cooperation. Indeed, in a study comparing Finland and Austria as regards firms'incentives to cooperate in R&D*(2), results revealed that providing firms with a European Union funding (FUNEU) increases the number of R&D cooperations. Furthermore, governmental funding for R&D cooperation was developed earlier in Finland than in other European countries, which may explain why there is more R&D cooperations in Finland than in Austria. However, other factors have to be taken into account to understand differences between both countries even if governmental funding already has a positive and very significant impact in Finland.

As for the R&D competition, I think it may help to spur innovation in large companies, like General Electrics in Ferrari and Goethals'paper. Indeed, if we consider that this kind of enterprises have the resources but less incentives to innovate, then introducing competition in the research domain may increase the motivation to innovate.

Therefore, R&D competition may be useful to boost innovation in large companies, even if my point of view is very simplistic as other factors are at stake in R&D decisions. However, this type of research can be too expensive for small enterprises as they already lack means to invest in R&D. Cooperation in innovation on the other hand could help these small firms or startups to make their innovative ideas become real. For instance, Silicon Valley gathers numerous startups among which several of them have grown huge thanks to R&D cooperation. Obviously, this collaboration success was also due to the presence of Stanford University and a facilitated access to ventrue capital, which confirms that firms'decision in R&D and their probability to succeed rely on several interlinked factors.

References :

(1) Marco Marinucci, Questioni di Economia e Finanza – A primer on R&D cooperation among firms. Banca d'Italia, Occasional Papers Nr.130, September 2012. Retrieved online on November 19th 2012 :
http://www.bancaditalia.it/pubblicazioni/econo/quest_ecofin_2/QF_130/QEF_130.pdf

(2) Bernhard Dachs, Bernd Ebersberger and Andreas Pyka, Why do firms cooperate for innovation ? A comparison of Austrian and Finnish CIS3 results. Int. J. of Foresight and Innovation Policy, 2008 Vol.4, No.3/4, pp.200 – 229. Retrieved online on November 19th 2012 :
http://www.berndebersberger.com/wp-content/uploads/2009/10/DachsEbersbergerPyka_08_IJFIP.pdf

(3) Bernard Ferrari and Jessica Goethals. Using rivalry to spur innovation. Retrieved online on November 19th 2012 :
https://www.mckinseyquarterly.com/By_Invitation/Using_rivalry_to_spur_innovation_2599?pagenum=3

Like: 0

REPLY

Alexander Himbert 20 November 2012 at 21:33 #

In order to not simply rephrase the arguments of the previous comments, I try to take a slightly new perspective on the problem. Taking a step back to the historical overview of the Renaissance provided by Ferrari and Goethals, especially the example of Raphael and Michelangelo working on the Sistine Chapel deserves a closer look in the context of competition as an instrument to spur R&D. The striking point to me is that they were both employed by the same "firm" (=The Pope), so there is no competition between rivaling firms, but competition of rivaling "departments" of on firm. This intra-firm competition becomes a growing concern especially in the context of multinational enterprises in the globalized economy. The first question for the company is not whether or not to cooperate with rivaling firms, but whether or not to centralize the R&D efforts within the company or to allow decentralized competition across different subsidiaries of the firm.

Sanna-Randaccio and Veugelers (2007) develop a model that analyzes this question under several differing assumptions on the nature of spillovers both within the firm as well as from the firm to other firms on the local and international market. Another interesting article in this context that can be used complementary is Atallah (2005) who analyzes the existence and determinant of asymmetries of spillovers.

First of all, in the question of allowing for inner-firm competition or not, one key element of the analysis of intra-firm competition slightly changes. While the risk of competition when competing with other firms is to lose the patent race and therefore incur profit losses due to a deterring market position, this risk is not present when competition is seen from an inner-firm perspective. In this scenario, the firm benefits from what was described of "paragon" in the Renaissance. But the risk for the losing team within the firm is not to lose a patent race and due to this not have access to the innovation at all. As long as just the firm is concerned, inner-firm competition is a way to allow for different approaches to one problem and might by this increase the probability to innovate. In a further step, multinational firms also benefit in two more ways: Firstly, decentralized research skips the step of adapting research that is done on a central level to local needs. Secondly, it is possible to profit from existing knowledge in the local market.

However, Sanna-Randaccio and Veugelers (2007) show, that nature of the local market and the symmetry of spillovers determines the final decision of the company. If the firm faces no production competition in the local market, the firm will be more likely to decentralize when the knowledge in the local market is very high. This means that the firm can benefit from local knowledge to a larger extent while external spillovers of own research cannot be used against the firm as it faces no serious production. However, if the firm faces strong competition or the spillovers are asymmetric in disfavor of the company (cfr. Atallah 2005), a centralization of research is advisable. In this case, spillovers to the local market will decrease the position of the firm. But spillovers are not only important to external firms, but also from the local subsidiary to the main company: the better the transmission of knowledge works, the better it is to decentralize.

"Putting together" this loose chain of arguments, what fascinates me are the chances that competition within one firm can offer to the firm. In my opinion, even if competition between rivaling firms would be seen as mainly negative (not saying that I agree with that), allowing for decentralized research at local levels that competes for the best overall solution and at the same time can address local needs is a powerful tool for multinational enterprises. However, as can be seen from the model of Sanna-Randaccio and Veugelers, the decision for the firm becomes rather complex taking into account all possible sources of spillovers and their nature.

References:
Sanna-Randaccio, F. and Veugelers, R. (2007): "Multinational Knowledge Spillovers with Decentralised R&D: A Game-Theoretic Approach", Journal of International Business Studies, Vol. 38, No. 1 (Jan., 2007), pp. 47-63
Atallah, G. (2005): "R&D Cooperation with Asymmetric Spillovers", The Canadian Journal of Economics / Revue canadienne d'Economique, Vol. 38, No. 3(Aug., 2005), pp. 919-936

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 11:14 #

Very instructive comment; thanks!

REPLY

Maneesha Negi 20 November 2012 at 19:40 #

In relation to the topic R&D cooperation or competition I would like to present my views on R&D cooperation based on a paper (R&D Cooperation, Asymmetric Technological Capabilities and Rationale for Technology Parks by: VIVEKANANDA MUKHERJEE SHYAMA V. RAMANI) I recently read.
I would like to write on the aspect that if we were to start from the premise that firms are indeed distinct in terms of their capacity to produce radical innovations, and hence cooperation is not the most preferred form of alliance, so then what incentives should the government provide to ensure social welfare.
The four most examined organizational modes for R&D investment are:
(i)) R&D cartel, when firms coordinate to share costs and information so that the profit of the group is maximized
(ii) RJV or research joint venture i.e. when firms share information but decide on R&D investment independently
(iii) R&D cost coordination or cost sharing, when firms coordinate or/and share the costs of R&D investment and
(iv.R&D competition i.e. when firms decide on independent R&D investment

According to the existing literature on R&D alliances: all the above three forms of alliances yield greater social welfare than R&D competition between firms and the R&D cartel is the best form of alliance for society.
However in the case of asymmetric firms, differences in technological capabilities can lead to several contradictions between private and public rationality when it comes to choice of type of R&D alliance and hence the above might not hold. Therefore in this case, the government should intervene and provide them with incentives to engage in cooperation. Else otherwise there is a possibility that no alliance may be formed, which is not in the interests of society.
For instance,
a) the government can promote pure information research consortiums to generate innovations for important problems likes life saving medicines for HIV/AIDS and market it in the name of corporate social responsibility, which otherwise would not be initiated.
b) The government can also start publicly funded R&D programs that require a joint research proposal drafted by a set of asymmetric collaborating organizations as a pre-requisite to obtaining funds.
c) Moreover subventions could be provided for the creation of science and technology parks, which often facilitate the sharing of fixed costs of R&D investment necessary for innovation creation.
If the firms were sufficiently symmetric then they would form cost sharing alliance on their own. But, as we consider a premise where firms are asymmetric it will be in the interest of society that the government ensures information sharing along with cost sharing. It can implement policies like tax benefits or access to infrastructural facilities to organizations in private technology parks in return for regularly sharing information among themselves.
Refrence : http://www.econstor.eu/dspace/bitstream/10419/36487/1/590261517.pdf

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 11:18 #

Good! It is important to show that private and public interests may differ, and how public intervention can try and remedy this.

REPLY

An Vu Pham 20 November 2012 at 15:22 #

In the following comment, I would like to expose my point of view about the differences between R&D cooperation and competition. As said in the paper, the choice between those two options can change, depending the situation in which the firms are. Each of these also have its benefits and inconveniences.

At first, concerning the R&D cooperation, it's a great opportunity for new coming firms in a market where one big firm stands. As said in the other post ("Commercialization strategies for start-ups"), some firms can have bright ideas but don't necessary have the resources to commercialize them or even developing them by R&D researches. By cooperating, it will also allow the firms to spare on R&D costs and not waste too much money in R&D research. Meanwhile, the bigger company will benefit from the cooperation of new companies to develop new ideas while they could be tempted to rest on their laurels if there's no other firms coming in. As the bigger firm, they can also afford R&D costs in order to consolidate their dominant position.

However, R&D cooperation doesn't only involve small companies but also big firms who want to enter in a new market and who want to confront the market leaders. In that case, those are often firms who were starting on different markets. To illustrate that, we can use the example of Nokia and Microsoft on the smartphone and tablet market. Nokia who was hurt by the switch from the classical mobile phone to the smartphone and Microsoft who didn't directly jump into that market instead of Samsung or Apple are working together in order to close the gap. That collaboration will indeed allow Nokia to reduce their costs as the company is struggling in this new environment.

http://www.deccanherald.com/content/156271/nokia-cut-cost-microsoft-collaboration.html
http://www.microsoft.com/en-us/news/press/2011/feb11/02-11partnership.aspx

On a more negative side, cooperation could also lead to some unfair behaviour. For example, the market leader could absorb all the small firms and their idea or some of the firms in a cooperation will wait for the other to find the idea and develop them. This also raises the issue of synergies without which the cooperation wouldn't be successful. This is why, in order to be efficient, a R&D cooperation should be done in a framework where the conditions are clearly determined and respected by everyone.

But on the other hand, if the bigger company doesn't want to allow small firms to come into the market, they might prefer R&D competition in order to prevent the small firms to enter the market due to their lack of R&D resources. A R&D competition can also be preferable in the case of a competitive market, where each firm is battling for the biggest market share. A competition will exhort the firm to innovate in order to have a competitive edge over the concurrents which can also be benefic for the customer because of the variety of the products. We can also see that plagiarizing the ideas of each other doesn't necessarily mean a lower incentive to innovate as seen in the lawsuit between Apple and Samsung.

To summarize, the R&D competition and cooperation can both be successful but the firms have to be careful about the framework in which they are working.

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 11:20 #

Thanks for making a link between the two posts.

REPLY

Ralet Edouard 20 November 2012 at 13:58 #

Today, countries need R&D to drive their economic growth. Each year expenditures for research and development (both public and private) on creative work and on increasing knowledge (culture, media, society, humanity, new application,…) represents a percentage of a country's GDP. For instance, R&D represents 2.75% of the Belgian's GDP (http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS).

Governments should be aware of the different factors that influence cooperation and competition in the R&d sector. Indeed, in my point of view, the government as a role in promoting R&D.

According to Thomas Bolli and Martin Woerter (http://www.ifs.org.uk/bns/bn12.pdf) there are several important effects (sometimes positive, sometimes negative) of cooperation.

The first one is called the "Synergy effect". It arises due to the increasing value of innovation as competition intensifies. It represents

elimination of wasteful duplication, economies of scale, transfer of complementary resources.
Secondly, the increasing value of spillovers also called the "spill+ effect" discourages cooperation because of the increase in outgoing spillovers. Thirdly, the value of collusion also called the "collusion effect" that fosters cooperation among competitors and thus leads to a decrease in the number of principal competitors

Many other serious studies point out in the same directions and assert that there are R&D spillovers present in each cooperation. On the company point of view this leakage means that companies spend a lot so competitors end having the same innovation than theirs. From the society's point of view, spillovers are positive as it reduces the cost of other companies what gives lowers price to the final consumer.
http://www.euussciencetechnology.eu/uploads/docs/woerter_bolli_competition_collaboration.pdf

For my part, the government's role is to make sure that R&D collaboration with competitors increases innovation productivity of collaborating firms so the spillovers aren't an issue.

An interesting fact is the following: Analyses of the macroeconomic effects of the U.S. space program attempt to identify and measure that portion of economic growth attributable to technological progress. A Midwest Research Institute (MRI) study of the relationship between R&D expenditures and technology-induced increases in GNP indicated that each dollar spent on R&D returns an average of slightly over seven dollars in GNP over an eighteen-year period following the expenditure.
http://er.jsc.nasa.gov/seh/economics.html

Like: 0

REPLY

Paul Belleflamme 21 November 2012 at 11:21 #

Nice summary!

REPLY

Lim Jie Sheng 19 November 2012 at 23:07 #

I would like to first comment on B. T. Ferrari and J. Goethals' take on "paragone". I agree that productive rivalry spurs great ideas and leads to better innovation when it is not a zero-sum game. In this case, the two "competing" teams can both be winners in the end, and ultimately, the company also stands to gain from this. Everybody wins, and this is the ideal and perfect situation.

Also mentioned by B. T. Ferrari and J. Goethals is that this competition has to be properly managed for it to work out well, and I feel that good management in this aspect is the most difficult thing to achieve. I say that because from a non-economics point of view, it also involves the management of cultures and personalities. For example, the upper management can lay out certain "healthy guidelines" for this R&D competition and hope that the two competing teams would engage in some healthy competition. In the stereotypical Asian cut throat competitive culture, both teams would go all out for the win, even though it is stated by the company that it should be a peaceful kind of competition. Individuals want to outshine one another to be recognized by the management, and it perhaps may affect their payroll or promotion opportunities. How willing are they to share ideas and information then? Another question is the reward system. How do we reward these ideas and innovations? Does the "winning idea" get more recognition? As we can see, there are many questions here which do not have clear-cut answers, which is why I think although "paragone" is ideal, it seems hard to achieve.

Another point to consider is that if the company were to engage in the "paragone" model of R&D, it also means more budget because there are now more people working on a project. Therefore, this concept of "paragone" seems to be more easily applied by big firms with high R&D budget, but not SME firms with low R&D budget, because it will work against them by straining their resources.

Next, regarding international R&D cooperation/compeition between 2 firms(whichever way one sees it), the government has an important role to play in the form of strong policies and subsidies as mentioned by tax
Larry D. Qiu & Zhigang Tao(1997). This paper gives us insight on the role of the government on the paragone concept of R&D.

Other references:

Policy on international R&D cooperation: Subsidy or tax? Larry D. Qiu*, Zhigang Tao http://www.sef.hku.hk/~larryqiu/Papers/EER.pdf

Like: 0

REPLY

Paul Belleflamme 20 November 2012 at 08:15 #

As we have seen it in the last lecture, patent races (or what you describe in your comment as "races for a reward") can induce wasteful duplication of research efforts.

REPLY

Peters Pauline 19 November 2012 at 17:39 #

Start with some factors that promote cooperation in R&D. The alliance between firms is likely to generate two types of gains, very different in nature: a specific gain and gain strategic (Mucchielli, 1991). Let us focus first on the specific gain. It allows having economies of scale, reducing risk, allocating effectively expenditure on R & D and provides technological complementarity. The second is the strategy gain. This gain can be show by 3 different ways. First, there may be an alliance between followers in R & D. Their goal is then crowd out the leader firm. Second, there may be an alliance between identical firms in R&D. This allows excluding some firms in the technological race. The remaining firms are therefore more likely to be the first to innovate in the future. Finally, there may be an alliance in R&D between firms there may be an alliance in R & D between firms with different starting but ultimately the same strategies. This allows some firms to catch up.

However, there are some problems when firms cooperate in R&D. The main ones are that on the one hand, alliances between firms affect the market mechanisms and on the other hand, if there is vertical cooperation, then there is often a decline in creativity and so in innovation. There may also be other problems such as non-equitable distribution of income between firms. For example, a firm may earn more than their partner and it is not fair. In addition, be careful not to have too high costs. There may be organizational costs, transaction … There are also disagreements between individuals and firms. One last problem is the level of trust that may not be enough.

Sources :
- MOTHE Caroline, Comment réussir une alliance en recherche et développement, L'Harmattan, 1997
- COMBE Emmanuel, Revue d'économie industrielle n°78 : Alliances en R&D, course à l'innovation et gain stratégique – Eléments théoriques et application au segment des DRAM, 1996
http://www.persee.fr/web/revues/home/prescript/article/rei_0154-3229_1996_num_78_1_1642

Like: 0

REPLY

Paul Belleflamme 20 November 2012 at 08:20 #

Useful references, thanks.

REPLY

Meike Hildebrandt 19 November 2012 at 11:09 #

In the following i would like to discuss the role of R&D cooperation in the innovation process.

Mostly, innovations are not based on activities of only one firm but involve several actors. The development of new and innovating products requires an active search-process to gain new knowledge and technologies (see e.g. Nooteboom, 1999). Exchanges of informations/resources are important factors in the innovation process. Though, firms become more dependent on the know-how of other firms and competitors as well. But firms that deal with innovation activities are aware of the necessity to cooperate to get expertise which can not be gained „inhouse". By using special agreements between two or more partners, assets and activities can be pooled and collected together.

R&D cooperations are suitable for adapting external resources, but only if the 'trade-off' is positive (or can be expected to be positive). The advantages of joint R&D (see e.g. Becker and Peters) are the following:

- sharing R&D costs,
- avoiding wasteful duplication of R&D,
- realizing cost-savings / realizing economies of scale and scope,
- shortening development times.

Just as an example, Peters and Becker (2000) found an empirical evidence that in the manufacturing industry, R&D cooperation with universities increase the probability of R&D and the R&D investment of the firms. This shows a complementary effect of joint R&D with such research partners. Accordingly, firms which cooperate with universities invest more in the development of products than companies that do not cooperate with universities.

The disadvantages, caused by transaction costs (see e.g. Pisano, 1990; Williamson, 1989) to coordinate, manage and control the R&D activities of different actors, are the following:

- unification of heterogeneous structures, decision-making processes, etc.,
- coordination of different organizational routines, styles, etc.,
- combination of complementary assets, resources, etc.,
- fixation of transfer prices of intangible goods, for example information or know-how,
- regulation of the exploitation of the results (returns) of joint R&D.

Summarizing, R&D cooperations have two sides: There are several risks, such as insufficient quality of assets, delays in development time, failure of research success, change in the relative contractual (market) power of the partners, etc. So, opportunistic behaviour, such as moral hazard problems can result. But on the other hand, if the implementation of external resources is cheaper than inhouse

R&D, inter-organizational arrangements in R&D are an efficient way to expand and optimize firms' innovation activities.

Source: „R&D Cooperation and Innovation Activities of Firms – Evidence for the German Manufacturing Industry"; (Wolfgang Becker and Jürgen Dietz); University of Augsburg, Germany

Like: 0

REPLY

LIU Manjing 18 November 2012 at 16:27 #

The choice between cooperation and competition in R&D is like all other economics debate, there is never one best solution for all situations. It depends on the circumstances, such as the market structure.

If the market is formed with one big firm and a lot of small firms, then the R&D cooperation will be more appropriated.
Firstly, this is a question of justice; we should make R&D open for each interested firm. In the most of the case, small firms don't do researches because the lack of capital and information. If cooperation is possible, small firms could be arranged together in order to share the risk and the cost of the investment.
Through this mechanism, the monopoly will also have more incentive to invest. Explanation: Before the cooperation of small firms, the monopoly firm doesn't have the incentive to invest in R&D because it benefits already from its market power. But, with the cooperation, it will be threatened by a possible innovation from the group and this will push it to innovate.
As a result, we can see that cooperation in R&D can achieve a bigger aggregated incentive for innovation through a "creation" of competition in an asymmetric market.

Disregarding from the first situation, if the market is formed with a series of symmetries firms, then the R&D competition will be more appropriated. According the economics principals, we know that in a near to perfect competition, each firm has a big incentive to innovate because it will give them the possibility to achieve more market power.
In this kind of situation, I think that the incentive for innovation is bigger if the gain of a found is individual.

To sum up, I think, we should at first study the market structure and then find an appropriated type of R&D for each market.

Like: 0

REPLY

Crépin Philip 18 November 2012 at 15:09 #

I agree with the thesis of Claude d'Aspremont and Alexis Jacquemin, explaining that there exist a positive correlation between the importance of spillovers and incentives to coordinate R&D.
In my opinion, another factor that could implicitly influence the willingness to coordinate R&D is the opportunity of learning. My idea comes from an intuitive comparison of teamwork and company coordination. Indeed, previous studies* about teamwork efficiency and mechanisms revealed that best innovative groups may be characterized as follow.

Those "winning" innovative groups were heterogeneous in term of skills and knowledge. So, profiles diversity spurs creativity and innovative behavior. It is easy to link those results with the present discussion. Indeed, firms putting their searchers together will certainly increase the probability of finding new ideas. So, from a Pareto point of view, they have here an incentive to collaborate.

I would like go further and add the following point: the referenced paper emphasized the importance of a particular factor: the opportunity of learning. The idea here is the following: people's motivation to commit at the task likewise depends on the task characteristics, i.e. they must share a common goal with their colleagues and find there a unique opportunity of thriving themselves.

This latter point may easily be linked to a company coordination case. Corporate cultures and methods differ. So, R&D coordination may be seen by searchers as a unique opportunity of learning. My personal intuition is that they will be more creative and motivated by the coordination.

To sum up, I would say that companies cultural diversity have probably a positive influence on the level of R&D outcome. I would advice them to see coordination not only from the spillover point of view but also as an opportunity of learning new skills.

* "Sparkling Fountains or Stagnant Ponds: An Integrative Model of Creativity and Innovation Implementation in Work Groups" Michael A. West; Aston Business School, University of Aston, and Centre for Economic Performance, London School of Economics, UK

Like: 0

REPLY

Paul Belleflamme 19 November 2012 at 09:32 #

Good point.

REPLY

Hadelin Rosseeuw 17 November 2012 at 23:43 #

As referred in the article, both strategic decisions depend on the degree of spillovers appearing under certain circumstances of the observed industry. Consequently, each case has to be carefully analyzed in an individual approach. Nevertheless, general statements can be regarded and discussed in order to influence a firm decision towards a specific Research and Development strategy.

A principal working at E.CA Economics (economics consultancy), namely Lars Wiethaus (2005), asserts in its paper the following: "Only the cooperative behavior, however, ensures that R&D investments are allocated efficiently to innovation and to imitation (absorption) in the sense that any given amount of industry wide cost-reduction is obtained for the minimum overall R&D costs" (1). Thus, it leads us to address the credits of adapting either R&D competition either R&D cooperation.

In case of a R&D competition, this practice spurs innovation which benefits the consumer as the product quality improves for an identical price. Besides, it prompts the firms to adopt a proactive attitude towards the market and stimulates them to aspire to excellence as they will enjoy larger profits by becoming leader on the market.

In contrast, the R&D collaboration is very appealing to pool resources and cut cost in order to achieve high performance but, in the meantime, it might be a tough task to manage in practice as to maintain a balance between the related firms.

In my view, this dilemma between adopting an R&D competition or cooperation attitude can be assimilated with the one existing between competition and "co-opetition" which is a matter of strategic positioning of the firm relying on its corporate strategy and its regulatory environment. As to illustrate this, one has to be aware that some sectors such as car makers are allowed by the EU commission to gather their respective R&D investments and efforts in order to please the entire industry and so the final customer whereas the pharmaceutical firms (previous assignment) are legally compelled to compete against each other as to stimulate innovation through aggressive competition.

Sources:
(1) "Cooperation or competition in R&D when innovation and absorption are costly", L. Wiethaus (2005), p. 1 (http://www.tagung05.uni-bonn.de/Papers/Wiethaus.pdf)
http://www.jstor.org/discover/10.2307/1807173?uid=3737592&uid=2&uid=4&sid=21101449698757

Like: 0

REPLY

Irene Orlandi 17 November 2012 at 12:30 #

I would like to start my comment looking at B. T. Ferrari and J. Goethals paper. I agree with the elements they propose when describing similarities between 15-16th century Italy and current way to conduct shared researches by firms: promoting collision, giving researchers their space and setting stretch goals. However, I would like to point out also some side aspects according to which the analysis conducted by the two scholars might be expanded: concerning collision during the Renaissance, it was hardly achievable outside major hubs; moreover, transportation, communications and exchange of ideas occurred at a very slow pace – it is hard to compare these elements when today in a "click" time everything can happen. However, even in this scenario, comparisons are possible – California's Silicon Valley is an example of how firms pool themselves in the same area to take advantage of spillovers, and where teams made up of people with different background but with common targets flourish.
To continue the analysis, 500 years ago rivalry nor competition would have existed without patrons supporting and protecting the artists – fairness in contracts was not a key element, and non-compliance could led to harsh consequences, as the many cases of exile show, which anyway turned out to be a great way to spur innovation and technology in different States.
Lastly, in both periods rivalry and the need to prevail over competitors (ruling families of nearby cities then, businesses working on same products now) provide the greater push toward innovation. The latter also benefits from cooperation, which takes place anytime players share their knowledge and work together, behaviors considered by D'Aspremont and Jacquemin when concluding that, according to their level, it is possible to obtain both an increase in research and in output.

Moving to the paragone aspect: it never ceased to be used. In races held by a client that needs a specific outcome, inventors' ideas are compared, and even though it is likely to have only one winner, everyone will win by enjoying conducted research that might led to different positive outcomes. I believe paragone would be useful in developing products after R&D research has been jointly carried out by players: given a common basis obtained thanks to cooperative R&D, we would ensure consumers would have the best final good at the best achievable quantity.

Anyway, coming back to the current issue regarding the choice between competition and cooperation, it is important to keep in mind the final objective. Competition may prove good when dealing with targets that do not require extensive research and investments, where duplication of efforts and costs expenditures do not undermine the project itself or the existence of the actor implementing it; cooperation is preferable when the outcome affects society and requires massive and complicated research. An example is given by EU and Singapore conducting joint Science and Technology R&D. The two players, with similar targets and shared history, cooperate by pooling their resources and sharing knowledge with the aim of a better future. Started in 1994, such partnership still exist and is very successful. The health of this alliance is granted not only by a common objective, but also by the set up of programs (namely: cooperation, ideas, people, capacity) that clarify the rules of the game and make sure that bitterness, discord or other destructive feelings don't damage the partnership (strong management recommended by Ferrari and Goethals).

Bibliography

Bernard T. Ferrari and Jessica Goethals, Using rivalry to spur innovation, McKinsley&Company, May 2010
C. D'Aspremont and A. Jacquemin, Cooperative and Non-cooperative R&D in Duopoly with Spillovers, The American Economic Review, Vol. 78, No.5, p.1133-1137
European Commission, Singapore and the European Union: R&D cooperation for the future, Publications Office, 2006

Like: 0

REPLY

Paul Belleflamme 19 November 2012 at 09:40 #

Very instructive historical perspective.

REPLY

Georgin Maxime 16 November 2012 at 15:49 #

I would like to begin my comment by saying that the two first statements of your posts are complementary. They do not go against each other since the first one tells that R&D cooperation provides better use of R&D expenses, which seems to be obvious because of the higher efficiency of big firms than small ones thanks to economies of scale, smallest expenses in assets, no overlap, etc. You second statement, inspired by Bernard T. Ferrari and Jessica Goethals, explain that rivalry can spur innovation. Here we talk about incentives to innovate and not about capacity to use R&D spendings in a better way.

It is why I think governments should try to facilitate cooperation between firms in order to reach a better rate of innovation by $ spent. It could be done either by giving higher incentives to cooperate or by reducing incentives and capacity to try to innovate alone.
This can be achieved, for example, by giving tax rate advantages for investment in cooperative R&D labs especially on markets where there are big spillovers as cooperation is strategically better in these markets.

Unfortunately, it is sometimes difficult to give incentives to cooperate because some determinants are opposed to each other. As M. Goffin said in his comment on the post (see first comment on this post for references about these conclusions), a paper of U. Kaiser and G. Licht concludes that there is a greater probability of cooperation in areas where there are a lot of private firms but it also teaches us that there is also a greater probability when there is not many firms in the sector. These market are not often met: not many firms but all in one place.
A solution for that could be for governments or for the firms themselves to try to form areas where vertical collaboration is possible. There can be many private firms from all the value chain but not to many competitors.
I believe vertical cooperation can be easily improved and is a good way for firms to reduce R&D costs by keeping the possibility to innovate before competitors and without them. Incentives are still present since rivalry between competitors still exists.

Like: 0

REPLY

Paul Belleflamme 19 November 2012 at 09:47 #

I take your point about the complementarity between the first two statements of the post.

REPLY

Roman Jedlička 12 November 2012 at 22:47 #

I would like to discuss the incentive of firms which decide to involve in R&D cooperation. In my point of view, the general factor, which a firm takes into account, is not cost or risk, but quality of idea and, of course, trust in this idea.

According to F.A. Hayek and his phenomenal work The Use of Knowledge in Society (see for example http://www.jstor.org/stable/10.2307/1809376) there is no possibility to collect all information and ideas of all firms, because information is a key to success and, of course, future profit. That is reason why firms are usually not willing to share their information and ideas.

My extension to this theorem is about the quality of idea. If the idea is good and expected success is so high, there is no incentive to involve in R&D cooperation and share future benefits of the idea. In this case it is obviously that this firm would prefer financing its project by different ways – for example loan.

If the firm does not believe in success of the idea or has no idea at all, the best strategy for this kind of firms is to cooperate with other firms and still hope that one of these firms has valuable idea which will lead to big shared benefits – free riding.

However, if we expect that all firms behave strategically, there is almost no possibility that some firm with good idea will participate in this cooperation. The R&D cooperation will be selected only firms without good ideas and every new good idea invented by cooperation is more or less product of endogenous random process of this cooperation.

Of course, apart from these factors we have to consider risk aversion. Some firms can have very good ideas, but their owners do not believe in them. In this case some kind of cooperation can be effective. Nevertheless, I do not expect high risk aversion of firms and entrepreneurs. But it is known that risk aversion of entrepreneurs is very low in general.

Like: 0

REPLY

Delphine Delaunoy 10 November 2012 at 21:50 #

I would like to give my opinion about the R&D cooperation or competition. To begin with, it has been established that implementing a new knowledge to the innovation process is key determinant in order to have a successful innovation. This knowledge can reach a firm both from internal sources and from external information flows, commonly known as spillovers.

Indeed, Cassiman and Veugelers (2002) have shown the importance of information flows in explaining R&D cooperation both for decisions at the firm level and ultimately for economic growth.

These authors develop an empirical model to evaluate "the role for cooperation of the firms' external information sources (incoming spillovers) and the flows out of the firms measured through the ability of firms to appropriate the returns from innovation (appropriability)". They came to the conclusion that the effects on the probability of R&D cooperation were important but different. More precisely, higher incoming spillovers influence positively the cooperation with research institutes, but have no effect on cooperation with customers or suppliers (no vertical integration). And as for the appropriability, exactly the opposite results have been found.

Apart from the knowledge flows, we cannot deny the fact that there are other factors, which play a key role in the decision-making process of firms on whether to get involved in R&D cooperation or not; among them we can find the cost and risk sharing-related reasons, complementarities-related reasons and factors related with the absorptive capacity idea.

Now, I'm going to briefly describe these other determinants. To start with, firms may use cooperative R&D agreements to apply cost and risk-sharing rules in high cost and risky settings. Due to the fact that the cost and risk could be a major hindrance to innovation, firms would be more likely to make cooperative R&D agreements. If these agreements are respected it would be a win-win situation for all of them. Furthermore, exchange of skills and capabilities among the cooperative R&D partners can benefit one another since the greater the availability of technological know-how within the firm, the more likely would be the complementarities between partners in a cooperative R&D agreement. The last one which I'm going to talk about is the absorptive capacity of the firm. We can say that is closely related to knowledge flows and complementarities. The explanation for this factor is that, the higher the absorptive capacity of the firm, the higher the benefits from R&D cooperation. If a firm is not able to assimilate the new information and knowledge which are being produced through this R&D cooperation, collaborating with others would not give any gain to that firm.

Hence, we have seen that there are various factors which determine whether firms would cooperate for R&D or not. In addition, we should also point out that the states may also intervene on the market. In such a way, if it imposes a greater level of legal protection in the industry, this will have a negative effect on R&D cooperation.

Sources:

- CASSIMAN, B. and VEUGELERS, R. (2002), « R&D Cooperation and Spillovers: Some Empirical Evidence from Belgium », The A.E.R, vol. 92, n° 4, pp. 1169-1184. Article online:
http://www.jstor.org.proxy.bib.ucl.ac.be:888/stable/3083305?seq=1&Search=yes&searchText=D&searchText=r%26&searchText=Spillovers&searchText=Belgium&searchText=Cooperation&searchText=Evidence&searchText=Em

- KOSCHATZKY, K. and STERNBERG (2000), R., « R&D Cooperation in Innovation Systems », European Regional Innovation Survey (ERIS), vol. 8, Issue 4.
Article online : http://www.tandfonline.com/doi/abs/10.1080/713666415

- LÓPEZ, A. (2004), Determinants for R&D Cooperation: Evidence from Spanish Manufacturing Firms, Universidad Carlos III de Madrid. Pdf online:
http://www.ucm.es/info/ecap2/seminario/seminario05.06/Alberto%20Lopez.%2013%20de%20enero.pdf

- LÓPEZ, A. (2008), Cooperation in innovative activities, organizational innovation and productivity, thesis, Universidad Complutense de Madrid, Faculty of Economics and Business, Department of Economic Analysis I., ID: 8829. Pdf online:
http://eprints.ucm.es/8829/1/T30831.pdf

Like: 0

REPLY

Paul Belleflamme 15 November 2012 at 10:55 #

Very interesting references. Thanks!

REPLY

Marlon Braun 10 November 2012 at 10:44 #

In my opinion, choosing between cooperation and competition for research and development projects should not be a question of a general corporate philosophy, but solely depend on the nature of the project and the specific circumstances under which it takes place. A distinction of competition between companies and in-house research department is necessary as well.

Let us first discuss collusion between rivaling firms. Competition can foster innovation. As the renowned Nobel Prize laureate Kenneth Arrow already pointed out in 1962 [1] and as it is largely discussed on [2], the market form has a high influence on a company's incentive to innovate. The higher the probability of losing your position in the market or gaining a stronger one, there more a company is willing to invest in research and development. Translating this insight to the current question, we would assume that competition in research will also lead to more innovation, since incentives are higher. As already mentioned on the blog, there are however a multitude of other factors, which need to be taken into account: pooling risks, sharing costs, eliminating useless duplication of efforts, pooling complementary skills, or exploiting economies of scale. D'Aspremont and Jacquemin [3] especially point out the effect of spillovers. If spillovers are likely to appear, companies gain more incentive to innovate when collaborating. On the hand, if the probability of spillovers is low, R&D joint ventures may even result in less output and research activity than in the competitive case. Going back to the notion mentioned at the beginning of the paragraph, this makes perfectly sense. If it easy to exclude a competitor from the benefits of your own research, you have a higher incentive to innovate for acquiring a better market position.

I would also like to point out another positive effect, working together in R&D might have. Merging results from research activities by pooling patents is a great way of avoiding litigation. Annual costs of litigation in the smartphone industry exceed $30 billion by now [4]. This money could instead be spent on developing cheaper and better products.

Ferrari and Goethals [5] elaborate on the aspect of competition in in-house development. They draw comparisons from artistic achievement in Renaissance Italy to modern research. Although managers often reluctantly use the term competition for in-house development, they conclude competition between research teams and projects can lead to higher innovation. In this case, rivalry can spur the personal interest in a project leading to higher incentives to putting more effort into it. The aspiration of exceeding others and oneself is a key driver behind this behavior. Promoting competition in in-house-development can lead to a higher innovative output, but in my opinion, one should only put research teams in contest, if there are different approaches for tackling an issue. If there is an obvious path for solving a problem, it would be a waste of resources assembling another team trying to find a different approach. Thinking about competition as a well-defined process applicable to drive innovation would be a misconception of the authors' intentions. Therefore, competition should only be applied, if there is a reason to compete in the first place. For example in [5], the authors report several stories from General Electric's research projects. For example, two research teams conceptualized two different designs for an aircraft engine. Since there were two different approaches in the first place, of which none had a clear advantage over the other, it made sense to explore both designs. Finally, when applying competition in in-house-development, one should always make sure, that the effort of the defeated team or project does not go to waste. Otherwise, this would have a severe effect on morale.

[1] Kenneth Arrow, 1962. "Economic Welfare and the Allocation of Resources for Invention," NBER Chapters, in: The Rate and Direction of Inventive Activity: Economic and Social Factors, pages 609-626 National Bureau of Economic Research, Inc.

[2] IPdigitIT: R&D cooperation or competition? Retrieved 09.11.2012 http://www.ipdigit.eu/2010/09/what-is-the-link-between-competition-and-innovation/

[3] Claude D'Aspremont and Alexis Jacquemin. "Cooperative and Noncooperative R & D in Duopoly with Spillovers", The American Economic Review, Vol. 78, No. 5 (Dec., 1988), pp. 1133-1137

[4] The Hill's Congress Blog: Patent wars abuse the system. Retrieved 09.11.2012 http://thehill.com/blogs/congress-blog/technology/227525-patent-wars-abuse-the-system?tmpl=component&print=1&page=

[5] Bernard Ferrari and Jessica Goethals: Using rivalry to spur innovation. Retrieved 09.11.2012 https://www.mckinseyquarterly.com/By_Invitation/Using_rivalry_to_spur_innovation_2599?pagenum=3

Like: 0

REPLY

Paul Belleflamme 15 November 2012 at 10:52 #

Nicely illustrated summary.

REPLY

Frank Müller 9 November 2012 at 14:34 #

I'd like start to comment my opinion referring to R&D cooperation or competition. I see the reduction of R&D as one of the main reasons in R&D cooperation. That's why I would like quote my following contents from researchers who have focused on this effect.

You can describe R&D spillovers as a leakage: knowledge and benefits obtained by a firm from its R&D activities typically leak out to other firms, to consumers and even to other countries. That means that a firm cannot appropriate all the fruit of its R&D activities, especially when spillovers flow to its competitors in the same industry. However, from society's point of view, spillovers represent positive externalities in the sense that they reduce the production costs of other firms, with the ensuing result of lower prices for

consumers.

Khazabi and Quyen (2008) have shown it in an empirical way and have extended a theoretical framework for analyzing competition and innovation in presence of horizontal spillovers by introducing two scenarios how firms behave in a R&D stage and in a production stage. They have distinguished between non-cooperation in both stages and cooperation in R&D, but non-cooperation in production.

In the first one they meant the higher is the degree of spillovers,
1. the lower will be the effective R&D expenditure of each firm,
2. the higher will be the equilibrium post-innovation market price,
3. the lower will be the consumer surplus and
4. the lower will be the producer surplus.
To sum up, the higher is the degree of horizontal spillovers, the lower will be the level of social welfare. In the second case they said that the more firms there are in the market, the lower will be the R&D expenditure for the joint research lab, and, consequently, the lower will be the reduction in production cost. Furthermore, when the number of firms tends to infinity, there will be no innovation in the market.

Another empirical research underlines this fact and adds another I think more psychological aspect. Silipoa and Weiss (2004) supposed that firms tend not to trust one another. Firms may feel that in a joint venture they will be giving away too many of their secrets, and prefer to stay at arm's length. Cost sharing without a joint venture may require that each firm monitor the accounting books of the other firm – a clear intrusion into their private matters. Even if firms are willing to bear this intrusion, the monitoring process itself may be problematic. Issues of questionable cost allocations, fabrication of expenditures, and overstatement of efforts could plague the relationship. Consequently, cost sharing seems not to be the most profitable form of cooperation.

Surely, a lower production cost, which is the desired outcome of the R&D program, gives the firm a cost advantage over its rivals. Whether a program of innovation will be carried out or not depends on the cost of R&D and the market structure in which the firm finds itself. Furthermore, governments view any type of cooperation skeptically because of the fact that cooperation would be often not permitted.

Sources:
Khazabi, M.; Quyen, N. (2008): Competition and innovation with horizontal R&D spillovers; Online at http://mpra.ub.uni-muenchen.de/39453/
Silipoa, D. B.; Weiss, A. (2005): Cooperation and competition in an R&D market with spillovers; Research in Economics 59; 2005; p. 41–57.

Like: 0

REPLY

Paul Belleflamme 9 November 2012 at 17:38 #

Very instructive, thanks.

REPLY

Goffin Matthieu 8 November 2012 at 18:59 #

I chose this subject because I had a course with Claude d'Aspremont two years ago and he was an excellent teacher. It's clear that the most influence thing is the spillovers due to the possibilities of free riding. But it is already develop in the article, so I will try to find other elements that can influence the choice between cooperation and competition.

The cooperation in R&D can have a positive influence in the economic growth. The economic growth in Japan in the 60s and 70s is due to the cooperative research. So in the 80s, USA and Europe have decided to improve the cooperation in R&D. (http://mpra.ub.uni-muenchen.de/3415/1/MPRA_paper_3415.pdf).

We can see that the cooperation can increase the economic growth, this is illustrated by many paper. In this period of economic crisis, is may be an issue to boost our GDP. So the government has to promote the cooperation. The long run effect will be positive on the economic growth. But how can the government achieve this objective?

In a paper (http://econstor.eu/bitstream/10419/24278/1/dp3298.pdf), 2 economists (U. Kaiser and G. Licht) describe the elements that can influence the decision of cooperation in R&D. I will summarize their work, but I won't explain the spillovers effects because I mentioned them before. In their paper they make a distinction between the vertical cooperation and the horizontal.

"We observe a significant and positive impact of proximity to science (and thus of R&D productivity) on the choice of more complex R&D cooperative arrangements. Inversely, high R&D productivity leads to a decrease in the probability to choose vertically related firms as cooperation partners. Proximity to private firms induces firms to engage in pure vertical relations to R&D partners." To summarize, the probability of cooperation is higher when the R&D productivity is low and in an area with a lot of private firms.

"The market structure variable COMP (the number of competitors in each firm's sector) has a negative, though insignificant (p–value 0.125) impact on the decision whether or not to cooperate". Hence, there is more probability of cooperate if there are not too much firms in this sector.

"Exportshare (EXP SHARE) do not significantly influence firm's decision whether to cooperate in R&D or to conduct R&D on it's own."

To conclude I will use a thirty paper: (http://www.ulb.ac.be/cours/solvay/vanpottelsberghe/resources/rsaem_21.pdf). This paper develops the same variable as before but they try to use other determinants like the technological opportunities, appropriability conditions and market demand. This 3 elements can improve the probability of cooperation.

Like: 0

REPLY

Paul Belleflamme 9 November 2012 at 17:35 #

Thanks for these references and for summarizing a number of empirical analyses.

REPLY

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