



EC365-6-SP Theory of Monopoly and Regulation

What are Research Joint Ventures (RJVs)? Are they good for Innovation and for Economic Welfare?

Scott S. Arnold

Date: 03/05/2019

Word count: 2320

1. Introduction

Globalisation has brought multiple benefits to the world economy, yet the increased competition also pressures governments and businesses to identify new methods to enhance their own competitiveness. According to Roller et al. (1997) the emergence of the Japanese technology sector showcased a new comparative advantage which was brought about through the cooperation amongst domestic firms. Resultingly, this process of Research and Development (R&D) displaying high yields was a contributing factor towards companies adopting a cooperative approach to invest in projects together in hope of exploiting a gap in the market.

Given the significant impetus R&D has on economic growth, this essay therefore aims to investigate what RVJs are and the motivations behind it. By understanding this, we can then go onto investigate what this implies in terms of innovation and economic welfare. Finally, this will allow us to determine whether the conglomeration of firms is an overall benefit for consumers, firms and the government altogether.

2. What are Research Joint Ventures (RVJs)?

As the term almost describes itself, RVJs are the “formation of new organisations, jointly controlled by two or more parent institutions whose purpose is to engage in research and development” (Vonortas 1996, pp. 577). Commonly, there are two directions which RVJs undertake: product innovation, which is usually completed by downstream firms on tangible goods or services to enhance their quality. Or process innovation, which is mainly reserved for upstream firms that establish a new direction within the industry through technological advancements that can ultimately lead to lower costs. For firms in direct competition with each other, embarking on an RVJ can seem like something of a paradox; however, there can be considerable benefits for firms, consumers and society alike. To understand this, we must investigate the motivation for firms participating in RVJs, as any significant R&D advancement can revolutionise an industry – benefiting competitors in the process.

Firstly, spending on R&D by a monopoly is determined by either the pure efficiency effect or the replacement effect. The pure efficiency effect dictates that the incentive for a monopoly to innovate exceeds that of a new entrant looking to enter the market through their innovation. This is mainly because the benefits from remaining a monopoly exceeds the cost

that they must spend on R&D, contrasted to the case where the industry becomes a duopoly resulting in lower profits for the incumbent firm.

Alternatively, the replacement effect suggests that a monopolist would not undergo innovation if in Bertrand Price Competition as it would lead lower profits. Consequently, the monopolist would not unnecessarily invest and ‘replace itself’ during the process of innovating as there is a possibility that the rival firm will not be able to achieve a state of drastic innovation. This is consolidated by Cabral (2017) who summarises that the preference of R&D for incumbent firms is for gradual innovation; whereas, potential for drastic innovation or uncertainty in the industry causes outsiders to have the greater incentive.

Ultimately, by understanding the reasoning for conducting R&D provides inferences for why RVJs are formed. Firstly, market structure must be of low concentration to ensure profits are delivered to the monopolists. This occurs through providing heterogenous products which increases the demand of the consumer; thus, justification for investing in R&D. Given the dynamic economic environment, it could be risky for a single firm to sacrifice a large proportion of their revenue on an uncertain result. By cooperating with other firms, the input of revenue needed can be proportionately lower, as there is a pooling of resources amongst corporations ultimately reducing each respective cost. Not only this, but it can also mitigate risk as there is a smaller upfront cost for each firm; meaning, less to lose in an adverse outcome.

Another reason for RVJs is provided by Katz (1986), who states that RVJs internalise R&D spill-overs – most commonly the free rider problem. The free rider problem has non-exclusivity, so it is essentially a public good. In the context of R&D, if an individual firm made a breakthrough discovery then there is a possibility through; corporate espionage or whistleblowing that the intricacies are disclosed to others for free. However, this spill-over is internalised within an RVJ agreement as every member makes a monetary contribution in exchange for the outcome of the R&D project. Additionally, this monetary contribution also provides the incentive to apply effort into the project as it is in their best interests not to see the R&D fail. The contribution of shared knowledge and expertise, as well as the payment into the RVJ, all assists in minimising moral hazard and adds to the incentive for more firms to undergo RVJs.

Other factors are also important when firms seek to establish RVJs. Analysis conducted by Roller et al. (1997) suggests that firm heterogeneity and product market characteristics also

need to be considered. His findings showed that larger firms were less incentivised to collaborate with smaller firms in case of enhancement market power for the latter; and strong evidence that firms with complementary products are more willing to embark of joint ventures. The formation of RVJs are specifically relevant in industries displaying vertical integration and who are of equal business size.

3. Notable examples of RVJs

Learning by doing is also another trait which is derived from formation of an RVJ which is essential for reducing production costs and promoting output. In a partnership of firms, when information is disseminated, and expertise is shared, ideas are accumulated, and breakthroughs can be made quicker than a typical solo venture. An example of where this is significant is in the manufacturing of semiconductors; where production cost can decline by 20% following the doubling of R&D (Cabral 2017); thus, implying that an RVJ can utilise a 'snowball effect' to further reduce costs.

This relates to why the US government promoted a series of RVJ programs to counter the threat of Japan becoming a world leader in electronics. During the 80's, three RVJs were formed: Microelectronic and Computer Technology Corporation (MCC); Semiconductor Research Corporation and SEMATECH. One of the main goals for these firms was to develop an easier computer programming code which can promote efficiency in all sectors; and is especially pertinent for national security. Effectivity, domestic firms combining in an RVJ is a direct response to limit the influence of international competition. However, this also increases the vulnerability for anti-competitive practises, with Grossman et al. (1986) suggesting that after \$65 million was invested by MCC, regulators were intent on protecting consumer welfare. This led to the intense scrutiny of the RVJ which has the potential to stump innovation and creation out of fears of sanctions being imposed.

Shared knowledge in an RVJ may not always be exclusive to the R&D project; as in the case for BMW and Toyota where these firms have agreed to share their comparative advantage. The two rival car manufactures have arguably very different design styles, so this polarisation of ideas assisted in the formation of the RVJ. BMW could share their powerful engine characteristics to combine with the hybrid Japanese technology. The purpose of their RVJ is to develop lithium-ion batteries to allow their cars to conform to the stricter emissions and

fuel-economy standards across the globe. Reuters (2011) states that the shared benefit from this RVJ isn't just restricted to the result but also to the mutually beneficial trade amongst the firms. BMW are supplying 1.6 to 2L engines to European Toyota vehicles from 2014 whilst Toyota, with its Japanese roots, are using their technological comparative advantage to bring a market changing battery to the industry.

4. RVJ impact on Innovation

Variable	Mean
Subsample of noncoop	
PROFIT MARGIN	10.196
EMPLOYMENT	7,834.66
Total R&D Expenses (in US \$)	61,954,000.55
R&D as a percentage of total revenues	9.0
Investments as a percentage of total revenues	11.15
Total assets as a percentage of total revenues	125.593
Total revenues	1,366,272,000.73
Subsample of coope	
PROFIT MARGIN	8.124
EMPLOYMENT	28085.87
Total R&D Expenses (in US \$)	266,153,000.85
R&D as a percentage of total revenues	6.733
Investments as a percentage of total revenues	6.545
Total assets as a percentage of total revenues	101.839
Total revenues	5,702,076,000.92

The two main contributions for successful R&D development is the sharing of knowledge (inferred from employment figures) and revenue. From Figure 1 we can see that both indicators are greater under cooperative agreements rather than non-cooperative, allowing for the deduction that innovation is likely to be more prevalent under RVJs. Compounded by the work of Link (1996 as cited by Roller) who found that almost 60% of RVJs are initiated for innovative purposes rather than product improvements; consolidates the assumption that innovation will prosper under RVJs.

Figure 1: Table showing the difference in key indicators of Noncooperative R&D (top half) and cooperative (bottom half). Source: Siebert (1996 pp.6)

A recent report from Tata Steel (2018) indicates that RVJs are vital for innovation, especially in market conditions which are rapidly progressing. This innovation is not exclusive to product development but also supply chain integration through the use of better data analytics. By investing proportionately less in R&D by being apart of a cooperative agreement, allows greater innovation in other areas of the business - such as organisational

which is independent to the core project undergone in the RVJ. Ultimately, this indicates that collaborations between firms can also provide individual innovative benefits.

Depending on the stage of industry evolution of the respective firms engaging in RVJs, the results can be polarised. Vonortas (1997) implies that newer firms are more willing to undergo riskier and uncertainty in an RVJ as a way to hedge their bets as they have nothing to lose. By spreading their revenues on a vast range of products this means that only minor innovative practises could be developed. Contrastingly, mature firms seek to be more rational on their approach in an RVJ, by prioritising cost saving and investigating more extensive improvements in the standard of goods and service of today. Consequently, whilst both may increase innovation levels, the latter is more beneficial in terms of providing market changing innovations as well as increasing the general level of social welfare.

From a different perspective, RVJs are ultimately a collusive agreement for dictating the level of technological advance within an industry. Grossman (1986) speculates that this dynamic inefficiency in R&D is caused by larger firms reducing the pace of technological innovations by prolonging the scheme and decreasing the clarity in objectives. However, Katz (1986) refutes this suggesting that if a firm may believe the level of innovation in an RVJ is low, then there is an incentive to participate in individual R&D to exploit the lacklustre of the cooperative agreement.

5. RVJs impact on Economic Welfare

Following on from the discussion of innovation Poyago-Theotoky (1995) found that for the consumer, utility is only maximised when there are considerable changes in product innovation. If not, then preferences are more aligned to a variety within products rather than small to medium improvements. A fundamental deduction which can be made from this is that companies may set up an RVJ to act as a barrier to entry for potential entrants; yet only innovate to an extent which appeases regulators. As the utility for consumers is for only major improvements; it can be argued that social welfare is reduced. This is exacerbated if there are price increases following the lack of competition caused by this barrier to entry.

For the firm, through exploiting the synergies of firms eliminates the duplication of effort. The constant dissemination of information will increase efficiency and reduce overall cost through economies of scale. This is shown on Figure 2, where the lower cost means that the monopolist can supply more quantity for a lower price due to the innovation whilst increasing

the profit margin. Simultaneously, the consumer benefits from a large consumer surplus indicated by the social gain annotation.

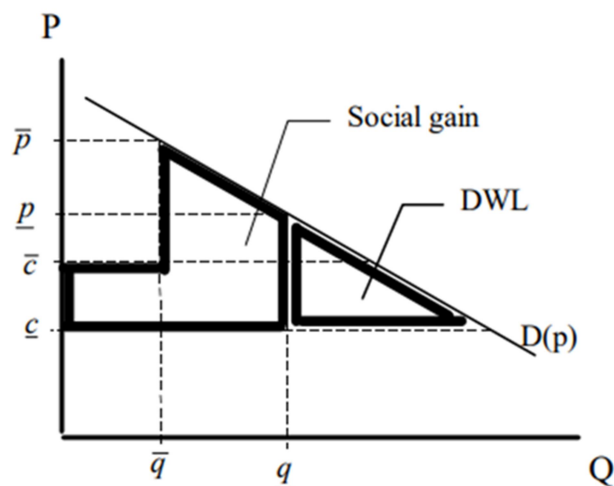


Figure 2 – Graph reflecting the gains of innovation for the monopolist and society. Source: Smith (2019)

On the contrary *Economics Incentives to Business R&D* (no date) suggests that RVJs are perhaps formed to minimise the amount of R&D conducted in the market. For firms in a Bertrand price competition with homogenous products, the cost reduction caused by an RVJ would cause the equilibrium price to reduce equivalent to that of the cost reduction. Therefore, consumers would benefit from the lower prices brought about by cooperation. In this regard, it would be feasible to suggest that the incentive for firms to conduct joint research would be diminished as the overall impact would reduce the producer surplus relative to that of the consumers.

Additionally, firms working individually provides the incentive to invest more money into R&D projects to capture market dominance. In an RVJ, with the pooling of resources, the input of each firm could be relatively smaller than what they would commit if they were undergoing a solo venture. This lack of competition illustrates no incentive to invest in higher levels of R&D as the impact on their profits would not be significantly greater than its rivals. Overall, the effect of a lower net investment into R&D can reduce the potential for innovation thus making society worse off.

6. Conclusion

The aim of this paper was to understand the impact RVJs have on innovation and economic welfare. Overall, the findings indicated that RVJs can be beneficial for innovation because the collective, shared knowledge of firms contributes to a lower costs and increases the probability for drastic innovation. Similarly, for economic welfare, RVJs are found to be useful, if the innovation either brings lower cost and more choice or a major product change. Furthermore, collaborations of firms causes a more efficient allocation of scarce resources; elimination of duplication of efforts; and perhaps a reduction in negative externalities – especially important for the electronics industry with their toxic waste.

With access to new markets becoming increasingly prominent through comprehensive trade agreements; the need for firms to revolutionise and maintain their presence in the industry is imperative. However, as the risks associated with singular R&D could potentially outweigh the marginal benefits derived, RVJs are perhaps required to ensure this innovation occurs.

On the other hand, there is a fine line between RVJs being anticompetitive through invoking a barrier to entry and being a necessity to maintain profit margins to provide the incentive to invest. Nonetheless, if the regulators ensure that the focus of RVJs are purely on research and avoid other areas of competition policy then the net benefits are positive for numerous stakeholders.

7. Bibliography

Cabral, L (2017) *Introduction to Industrial Organisation* Cambridge Massachusetts, The MIT Press, Second Edition.

Economic Incentives to Business R&D (no date), Available at: https://europa.eu/epc/sites/epc/files/docs/pages/annexd_en.pdf accessed 01/05/19

Grossman, G (1986) “Research Joint Ventures: An Antitrust Analysis” *Journal of Law, Economics & Organization*, Vol. 2, Issue 2, pp. 315-338

Katz, M (1986) “An Analysis of Cooperative Research and Development”, *Rand Journal of Economics*, Vol 17, no 4, Pp 527-543. Available online: https://www.jstor.org/stable/pdf/2555479.pdf?seq=1#page_scan_tab_contents Accessed 19/04/2019

Poyago-Theotoky, J (1996) “Research Joint Ventures And Product Innovation: Some Welfare Aspects” *Economics of Innovation and New Technology*, Vol 5, Issue 1. Available at: <https://doi.org/10.1080/10438599700000007> Accessed: 29/04/19

Reuters (2011), *Toyota, BMW join hands on green technology*, Available: <https://0-www-citethemrightonline-com.serlib0.essex.ac.uk/digital-internet/the-internet/web-pages-with-organisations-as-authors> Accessed 25/04/19

Roller LH, Tombak MM, Siebert R (1997) “Why firms form research joint ventures: theory and evidence” *WZB Discussion Paper*, No. FS IV 97-6r. Available at: <https://www.econstor.eu/bitstream/10419/50974/1/231905335.pdf> Accessed 17/04/2019

Siebert, R (1996) “The Impact of Research Joint Ventures on, Firm Performance: An Empirical Assessment” *Discussion Paper FS IV 96 - 13*, Wissenschaftszentrum Berlin.

Smith, E (2019) *R&D* [Lecture 6 for Economics module], EC365, *Theory of Monopoly and Regulation*. University of Essex. February 2019.

Tata Steel (2018) *What would a joint venture mean for innovation?* Available at: <https://www.tatasteeleurope.com/en/news/joint-venture/news/What-would-a-joint-venture-mean-for-innovation> Accessed 28/04/19

Vonortas N (1997) “Research Joint Venture in the US” *Research Policy*, Volume 26, Issues 4–5, Pages 577-595. Available online: <https://www.sciencedirect.com/science/article/abs/pii/S0048733397000322> Accessed 19/04/2019