

Start-ups for sale!

When should entrepreneurs choose to enter the market with a start-up? And when should they sell their invention or business idea? New research on how entrepreneurs decide between entry and sale offers significant insights for policy makers concerned about economic welfare.

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At first glance, the contribution of start-ups to economic welfare seems to be limited, since many are acquired before they can grow. However, if start-ups benefit from tough bidding competition when they are sold, this encourages them to develop high-quality business or R&D projects, increasing social welfare. The social benefits of such acquisitions depend on whether incumbents can identify high-quality start-ups. The asymmetric information problem can be resolved if inventors first enter the market with a start-up to signal high quality.

When firms have created inventions, they have two broad avenues for exploiting this know-how: entering the market or selling/licensing the invention to an incumbent firm. Empirically, commercialization by sale has become the dominant mode. According to a recent survey of 1,000 start-ups around the world, 18 percent aimed for an IPO, 16 percent aimed at staying private, while more than half – 57 percent – had the goal of being acquired (Silicon Valley Bank, 2018).

However, our research at the Research Institute of Industrial Economics (IFN) shows that the optimal strategy for entrepreneurs depends on a range of factors. We examine how the quality of an invention or business venture affects the likelihood that it will be sold to an incumbent, rather than commercialized through entering the market (Norbäck et al., 2016). At first sight, it seems reasonable that the quality of an invention should not matter, since the entrepreneur’s reservation price and incumbents’ willingness to pay should be equally affected by a change in quality. We show, however, that the incentive for commercialization by sale increases with the quality of the invention.

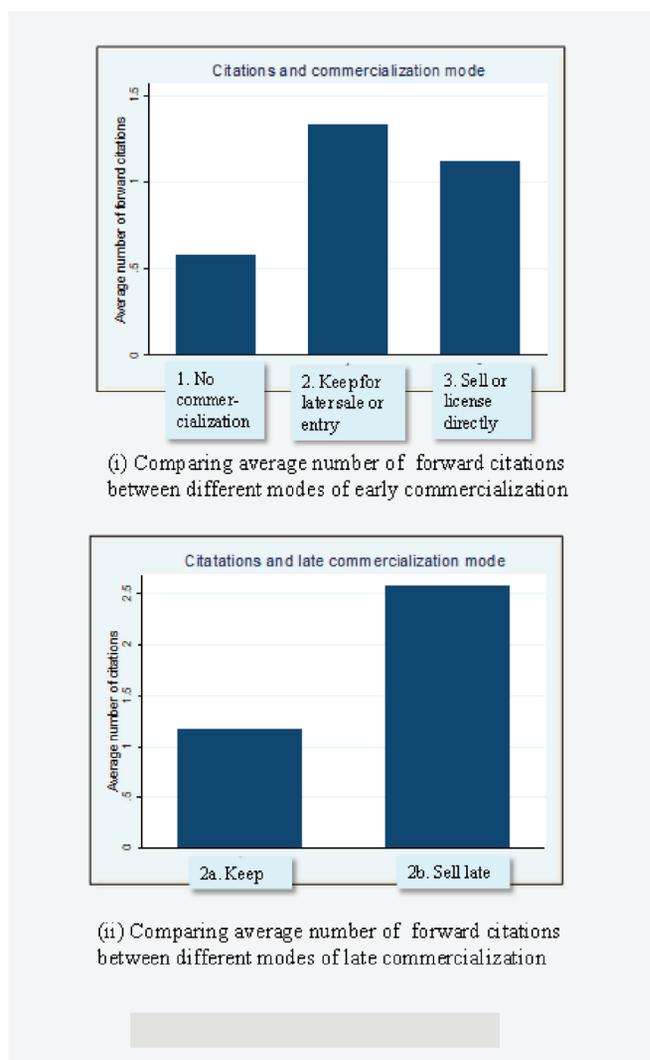
The reason is as follows. An incumbent assesses its profits when owning the invention relative to the profits it generates when a rival possesses the invention. Higher quality increases both the entrant’s and the acquirer’s profits in a similar fashion, but it also reduces the profits of an incumbent as a non-acquirer. This implies that an incumbent’s willingness to pay for the invention increases more than the entrant’s profit as quality increases. Entrepreneurs with high-quality inventions or business ideas will therefore sell, since they will be offered acquisition prices from incumbents that are substantially higher than their reservation price (determined by the profits received as a start-up).

Should we then be concerned that entrepreneurs will sell their venture instead of challenging incumbents in the product market? Not necessarily. Start-ups that face tough bidding competition when sold can in fact increase welfare, despite the increased market power for the acquiring incumbent in the product market (Norbäck et al., 2016).

The reason is that entrepreneurs who sell their inventions under pre-emptive bidding competition have a stronger incentive to develop high-quality inventions than entrepreneurs who aim at entering the market, since the reward to a successful invention can be considerably higher under a sale. The bidding war among incumbents over high-quality start-ups drives up the sales price to very high levels.

Incumbents are, of course, hurt by this creative destruction process ignited by the entrepreneurs, and thus have an incentive to undertake research to block entrepreneurs’ activities. Our analysis also shows that such efforts by incumbents can reduce, but not eliminate, entrepreneurs’ incentives to innovate for either entry or sale.

Figure 1: Entry mode and patent quality



Why entrepreneurs sell their best inventions post-entry

The discussion so far assumes full information. An invention is a complex asset, however, where the entrepreneur usually has better information about its quality than potential buyers or licensees. Due to the transaction costs associated with this asymmetric information problem, there is a risk that only bad inventions will be sold or licensed in the market – the classic “lemon problem” (Akerlof 1970). Entrepreneurs who try selling or licensing their high-quality inventions directly cannot count on receiving a high acquisition price. In effect, Akerlof argues, entrepreneurs with high-quality inventions will therefore choose not to sell or license their inventions directly.

Firms may be able to overcome these information problems, recent research has shown. For instance, Arora et al. (2018) examine the incentives for early and late sale of technology start-ups in a setting where



Flags hoisted at Rikspian in front of the Swedish Parliament. Photo: Melker Dahlstrand/Swedish Parliament.

potential acquirers can invest in absorptive capacity required to be active in the early market. However, startups might also be sold inefficiently late when venture capital is abundant.

A reputation for being a high-quality inventor might reduce the asymmetric information problem. Luo (2014) examines how the timing of sales depends on how developed an idea is, and on the expertise of the seller. It is shown empirically that buyers are reluctant to pay high prices for early-stage ideas developed by inexperienced sellers.

Sellers can also try to reduce the problem of asymmetric information. In Norbäck et al. (2018), we show that an entrepreneur can mitigate the problem by making an early entry to signal high invention quality. It is only worthwhile for the entrepreneur to pay the entry cost if he has a successful, high-quality invention in his project portfolio. This implies that potential buyers then can infer that the invention for sale is successful.

To test this prediction, we use a detailed database on patents owned by small Swedish firms and inventors. This is a unique dataset of information on whether, when, and how (entry/sale) a patent has been commercialized, but also whether the entrepreneur changed the commercialization mode: for example, by first entering the market through a start-up and later selling/licensing the patent.

Figure 1 depicts the average number of forward citations that a patent receives during a five-year period after application – our measure of invention quality – across different modes of commercialization. Panel (i) compares three groups:

- Patents that are not commercialized (Group 1).
- Patents where the entrepreneur enters the market

(retaining the patent for own use or selling/licensing it at a later stage) (Group 2).

- Patents that are sold or licensed directly (Group 3).

Patents that are not commercialized (Group 1) have the lowest average number of forward citations (lowest quality). Patents where the inventor enters the product market (Group 2) have the highest average number of citations (highest quality). Finally, patents sold directly (Group 3) have an intermediate level of citations. At first glance, these observations seem to be in line with Akerlof's lemons mechanism: patents with higher quality are kept by the entrepreneur.

However, if we study the citation pattern in more detail within the group of patents that enter the market through a start-up (Group 2), a different picture emerges. We split the latter group into:

- A group of patents with maintained entry (Group 2a).
- A group of patents that are sold or licensed post-entry (Group 2b).

Panel (ii) in Figure 1 now reveals that the average number of forward citations in the group of patents which are sold post-entry is approximately 2.5 times larger than that the group of patents kept by the entrepreneurs. Furthermore, comparing panels (i) and (ii) reveals that the group of patents sold directly (Group 3) has a lower average number of forward citations than the patents that are sold late (Group 2b). Thus, Figure 1 indicates that entrepreneurs sell their best patents post-entry.

We then undertake a more rigorous empirical analysis to test the entry for verification hypothesis and the pre-emptive bidding hypothesis. In the decision to

sell a patent (invention) pre-entry, we find that higher entry costs promote the direct sale of the invention over entry, while the quality of the invention has no effect on the choice between selling the invention or entering the market (consistent with a lemons problem pre-entry).

When estimating the role of different possible determinants of the decision to sell an invention post-entry, we establish that entry costs have no effect on this decision, as entry costs are sunk at this stage. However, the quality of the invention now has a positive and statistically significant effect on the decision to sell late.

The latter result is indeed what our proposed model predicts when a significant share of late incumbent acquisitions is pre-emptive in nature. This suggests that the entrepreneur captures a higher share of the surplus post-entry if the invention is of high quality, and then receives more than the reservation price. This reflects how entry serves as a means of signalling quality and generating bidding competition between incumbents.

Policy conclusion: stimulate the start-up acquisitions market

Most countries provide various financial support programs for start-ups and small businesses to overcome asymmetric information in credit markets. However, entrepreneurs can typically only take advantage of these programs if they enter the market themselves. Entrepreneurs who do so are granted fiscal advantages compared to those who sell their inventions to incumbent firms.

Many countries pursue policies that encourage entrepreneurship. The cost of starting a new business has declined by more than 6 percent each year over

the period 2003-08, while the decline among OECD countries has been even more dramatic, according to the World Bank. The US Small Business Administration approves billions of dollars in loans and guarantees to small businesses every year. In his State of the Union Address in September 2017, European Commission President Jean-Claude Juncker credited the European Investment Plan for “triggering investments for 225 Billion Euros and granting loans to 450 000 small firms and more than 270 infrastructure projects”.

Our research suggests that a better policy might be to combine these subsidy schemes with policies that improve the merger and acquisition market for small entrepreneurial firms. The reason is that the best strategy for innovative entrepreneurs, as well as for society in general, might be that entrepreneurs make an early entry to signal invention quality and thereby overcome asymmetric information problems. Thereafter, entrepreneurs with high-quality inventions can sell their innovations post-entry and receive a higher acquisition price. This will stimulate entrepreneurs to develop high-quality inventions, thereby increasing economic welfare.

”Make an early entry to signal invention quality and thereby overcome asymmetric information problems.”

References

Akerlof, George A. (1970), “The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism”. *Quarterly Journal of Economics*, Vol. 84, No. 3, pp. 488–500.

Arora, Ashish, Andrea Fosfuri and Thomas Rønde (2018), “Waiting for the Payday? The Market for Startups and the Timing of Entrepreneurial Exit”. CEPR Discussion Paper No. DP12724. London: Centre for Economic Policy Research.

Norbäck, Pehr-Johan, Lars Persson and Roger Svensson (2016), “Creative Destruction and Productive Preemptive Acquisitions”. *Journal of Business Venturing*, Vol. 31, No. 3, pp. 326–43.

Norbäck, Pehr-Johan, Lars Persson and Roger Svensson (2018), “Verifying High Quality: Entry for Sale”. CEPR Discussion Paper No. DP13173. London: Centre for Economic Policy Research.

Luo, Hong (2014), “When to Sell Your Idea: Theory and Evidence from the Movie Industry”. *Management Science*, Vol. 60, No. 12, pp. 3067–3086.

OECD (2010), “SMEs, Entrepreneurship and Innovation”. Paris: OECD Centre for Entrepreneurship, SMEs, Regions and Cities.

Silicon Valley Bank (2018), *US Startup Outlook 2018*. Santa Clara, CA: Silicon Valley Bank Startup Outlook Survey.

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