

EQUITY FINANCING FOR INNOVATIVE START-UPS: Lessons from the stock market in Imperial Germany

Financing innovation by selling equity is by no means a novelty of the late twentieth century, according to research by **Sibylle Lehmann-Hasemeyer** and **Jochen Streb**, to be presented at the annual congress of the European Economic Association in Mannheim in August 2015. Indeed, they find, many innovative German companies of the late nineteenth century relied on the Berlin stock exchange.

Raising money to turn innovative ideas into successful businesses can be a difficult task. Investors find it difficult to tell if the usefulness and value of new technology matches up to what the inventor claims it to be, and failure leaves nothing to salvage. This means that they typically prefer to invest in reliable, well-established firms, and several attempts to solve this problem, such as the German stock market's 'new market' segment of the late 1990s, have failed.

By studying all 474 cases of firms going public in the German capital between 1892 and 1913, the new study finds that almost 40% of firms had patented their technology either before the initial public offering (IPO) or within five years afterwards. By patenting their discovery, start-ups could prove their usefulness and make themselves more attractive to investors – and the genuinely innovative ones could still advertise themselves as such. The authors comment:

'There is strong evidence for the belief that investors in Imperial Germany associated innovativeness with higher future profits. They were capable of distinguishing between permanently innovative firms and ones that would become less innovative, even though both types of firms looked very similar at the date of the IPO with respect to their patent history'.

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A pivotal problem for many inventors is how to raise the venture capital needed to bring their innovation to the market because financing innovation raises two special problems. First, investors often lack the experience to judge whether inventors exaggerate their innovation's technological novelty and economic potential. Second, a failed innovation project does not often leave inputs that the investor can seize and sell.

As a result, investors usually shy away from supporting innovative activities of newcomers and instead prefer to invest in real capital accumulation of well-established firms. During the New Economy boom of the late 1990s, the German stock exchange tried to solve this problem by introducing the additional segment 'new market', which was supposed to promote initial public offerings (IPOs) of innovative start-up firms.

But after the bursting of the New Economy bubble, this market segment was closed in 2003. This study shows that this negative episode does not disqualify the stock exchange as an efficient market for new technology. Financing innovation by selling equity is by no means a novelty of the late twentieth century. Indeed, many innovative German companies of the late nineteenth century relied on the Berlin stock exchange.

Economic historians associate the late nineteenth and early twentieth century German economy with two distinct features: innovative firms that excelled in the industries of the

Second Industrial Revolution such as chemicals and electrical engineering; and universal banks that supposedly provided the financial means for Germany's fast transformation from a backward country to one of the global industrial leaders it had become at the eve of the First World War.

Yet there is only a small and tentative literature connecting firms' innovation with the financial system. In particular, one question has been open: how innovative German firms were able to raise the venture capital needed to finance their risky R&D projects. The new answer from this research is that they used the Berlin stock exchange as an important source of finance.

In the German Empire, innovative firms already well understood that patented innovations could serve as a positive signal that increased the attractiveness of their shares. When advertising their IPOs in listing prospectuses, they often revealed information about their patent portfolios.

For example, the machine builder *Carl Schoening AG* (IPO in 1903) emphasised that its innovative wallpaper-printing machines were patented in all important industrialised countries. The *Carl Lindström AG* (IPO in 1910), which was engaged in precision engineering, gave detailed information about the number and lifespans of its national and international patents.

Analysing all 474 cases of firms going public in the German capital between 1892 and 1913, this study shows that almost 40% of the firms received patents either before the IPO or within the first five years after. Even more surprising is the fact that innovators were not penalised by relatively high underpricing or low first trading prices. Indeed, innovative start-ups that needed equity capital to run their risky R&D projects realised comparatively high offering prices, and, in the longer run, they did not perform worse than more seasoned corporations.

These findings not only suggest that contemporary investors associated innovativeness with higher future profits. It is also strong evidence for the assumption that contemporary investors had rational expectations. In particular, they were capable of distinguishing between permanently innovative firms and firms with sharply declining innovativeness (*Buddenbrooks*), even though both types of firms looked very similar at the date of the IPO with respect to their patent histories.

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