Kodak, once a giant of global industry, is a shell of its former self — largely undone by the rise of digital photography. Borders, which operated hundreds of bookstores at its height, liquidated in 2011 — a casualty of Amazon’s dominance in online retail. Nokia, an early leader in the smartphone market, proved unable to compete with Apple’s iPhone and Samsung’s Galaxy products.

Economists and businesses have long sought to understand why established companies lag behind younger companies in introducing new technologies and innovative products. In a 1997 bestseller, “The Innovator’s Dilemma,” Harvard Business School Professor Clayton Christensen pinned the phenomenon on irrational decision making by the “old champion” firms. He based his conclusion, in part, on a case study of the hard disk drive industry.

Yale economist Mitsuru Igami, analyzing the same data on the hard drive industry, has arrived at a different conclusion: Established firms can fail to innovate even when their managers behave perfectly rationally. He described his findings in an article published recently in the Journal of Political Economy.

Igami, an assistant professor of economics, spoke with YaleNews about his work. An edited transcript of the conversation follows.
What drew you to study both the concept of the innovator’s dilemma and Christensen’s approach to it?

Trying to understand why incumbent firms lag behind new entrants when drastic innovations are happening is an old topic for economists. Karl Marx and Joseph Schumpeter in the late 19th and early 20th centuries, respectively, considered the turnover of technologies. Schumpeter coined the term “creative destruction” to describe the simultaneous turnovers of technologies and firms. New technologies come; old technologies go. New firms come; old firms go.

The term “innovator’s dilemma” focuses on the decision making of established firms. If they are too slow to innovate, they will disappear. Why do they resist innovation?

Christensen resorted to some notion of stupidity or irrationality in trying to explain why these firms failed. As a trained economist, I wanted to answer with simpler logic. Could there be a reason, even if firms behave rationally, that they would be reluctant to introduce new technology? There has been theoretical work on this question, such as late Kenneth Arrow’s paper in 1962, but my study provides the first serious empirical evidence.

How does your approach differ from Christensen’s approach?

There are three key differences. The first concerns method. He took more of an anthropological approach in conducting what is essentially a business history. He interviewed former executives at failed firms and identified factors and decisions that appeared to explain why those firms failed to grasp new generations of technologies. Christensen was sitting on this pile of quantitative data about the hard drive industry without really using it. I performed an analysis of the same data, which covered the hard drive industry 1976 through 1998, using mathematical models.

Mitsuru Igami

Secondly, Christensen mainly focuses on intra-firm politics, which is what he learned from interviewing people. As an economist, I was more interested in inter-firm competition. How many firms are competing? How many are established firms versus startups?

The third difference is the nature of our explanations. He resorted to explanations involving irrationality, including problems that arose from internal resource struggles, bounded rationality, and myopic managerial decision-making. Trained economists are skeptical of “irrationality” as a serious answer. If you say a company failed because its executives were stupid, it is almost like saying they must have been stupid because they failed. There is some sense of tautology there. I analyzed data to find whether there are fundamental reasons why old firms can behave rationally and still lag behind new firms in innovation.

What did you find?

It’s very simple: Incumbent firms — the old champions — are by definition very good at operating with the existing technology and churning out old products. To the extent that the new products and old products compete with each other, or substitute for each other — a phenomenon called cannibalization — it makes incumbent firms less inclined to embrace innovation. If you are an old champion firm introducing new products, to some extent you are just replacing your old source of profit with a new one. You might earn 5% or 10% more profits, but that’s it. By contrast, if you are
a startup, you are starting from zero profits. By definition, incumbent firms have less incentive to introduce new products.

Do the “old champion” firms possess advantages over startups? How do those advantages factor into the question?

It’s a good point. My model allows for potential differences in efficiency and capability. I’m letting data speak in terms of whether, on average, old firms or new firms are better at innovating. There are competing theories. When Schumpeter was young in the 1920s and 1930s, he argued that younger entrepreneurial firms should be leading innovation. He changed his mind as he grew older and moved from Austria to Harvard, and began arguing that established firms might have accumulated knowledge and other advantages. The only reasonable course for an empiricist like me is to let this be a free parameter in my model.

Incumbents, on average, seemed more able to innovate than new firms. This makes sense because, while my data crosses generation, it essentially involves the same hard drive engineering technology, which should give incumbents an advantage. But even with this advantage, cannibalization turned out to be a more powerful factor that pulls established firms behind.

You also examined the effects of public policies meant to stimulate innovation. What did you find?

There are many different ways people consider designing public policies to foster innovation and/or competition. I tried simulation experiments to find a combination of policies that would be most effective, because I cannot actually go back 40 years and tweak government policy on Silicon Valley. All you can do is build a theoretical model, flesh it out with data analysis, and conduct these simulation experiments.

One of my experiments concerns the patent system, such as making patents stronger or broader. The other explores whether there might be a structure of patents and licensing fees — fees charged by patent holders for use of their idea — that would foster innovation and competition simultaneously. What constitutes the optimal fee structure is an open question, so I tried many different fee structures. Nothing really convincingly outperformed the actual history of the hard drive industry.

An ideal patent system might do a good job of fostering innovation. In reality, the patent system is messy. Nobody knows who owns what patent on what piece of technology. It is hard to envision a better functioning system that could exist in reality. That sounds like bad news, but the flipside of the finding is that the actual historical trajectory of the hard drive industry is very hard to beat with clever schemes. That’s kind of encouraging.

Given your research, what is your best advice to CEOs of established technology firms?

My advice to managers who want to prolong the life of their firms is: Destroy yourself. In other words, you can survive the process of creative destruction only through self-destruction. Don’t be afraid of cannibalizing old products. Let them go and invest in new products.

Of course, from a shareholder’s perspective, this idea of rational suicide involves letting go of profits that could be earned through old tech. For them, it might make sense for the firm to continue making money with the old products. I would expect some tension and struggle between the interests of shareholders and managers, but long-term success depends on developing new and innovative products, which requires killing off the old ones.

To live, you have to die. Sounds like Zen, but that’s my research and life.