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## Our Venturesome Economy

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**America is a great place to invent, thanks to her risk-taking consumers.**



*The customer is king, right? Most of us who came from India, Taiwan, or China to the U.S. have been much more successful than if we had stayed at home, because we are close to the market here. We understand the market problem: I would understand what Bank of America's servers need better than someone sitting in Bangalore or Shanghai. And as long as the market is here, the U.S. will continue to be the place to innovate. —Founder and CEO of a venture capital-backed business*

Why is the United States a good place to innovate? The question has attracted considerable attention in recent years, particularly in Europe and Japan. Much of the writing on this topic emphasizes “supply side” factors such as the availability of venture capital, the initial public offering (IPO) market, the rule of law, and the enforcement of intellectual property rights. I will offer a complementary, “demand side” perspective, focusing on the frequently neglected role that consumers play in the innovation game.

My views have been informed by my studies over the last 20 years of new and emerging (“entrepreneurial”) businesses. Obviously, entrepreneurs are more willing to innovate—and devote resources to marketing and selling their innovations—if they anticipate a large market for their product. Developers of products that have to be tailored to a particular market or require costly sales efforts are naturally concerned about whether customers will be receptive. But that’s not all: I have observed the subtle role of customers, which goes beyond the decision of whether or not to buy. As we will see, they play an important “venturesome” role, rather like the one played by the developers of the products they use.

### The Consumer as Risk-Taker

Entrepreneurship involves responsibility for uncertainty—facing unmeasurable and unquantifiable risks rather than betting on situations where the odds have been well established by prior trials. But it is not just the producers of an innovation who face uncertainty—purchasers also cannot form objective estimates of their risks and returns.

One source of uncertainty lies in whether an innovation actually does what it is supposed to do. A product that works in the lab or in a few beta sites may not work for all users because of differences in the conditions of its implementation; a product that works fine at the outset may fail later. An innovation, like a theory, can never be proven to be “good”—at any moment, we can only observe the absence of evidence of unsoundness. Repeated use of a product may bring to the surface hidden defects that cause malfunctions, increase operating costs, or pose health and safety hazards to the user or the environment.

Customers face uncertainty about the value of an innovation in relation to its price. People don’t have a clue about the value of things they have never experienced.

Unanticipated technical failures injure not only developers but users of innovations. In many products and services, failures can cost users many times the purchase price. Defects in a word-processing or email package that costs just a few hundred dollars may wipe out many years of invaluable files and correspondence. Even if data aren’t lost, the costs of transferring files to a new software package—and learning how to use it—can be substantial. Similarly, a defective battery in a laptop can start a fire that burns down a house (this did, in fact, happen to a friend). Tires that wear badly can have fatal consequences. A security hole in an online brokerage’s servers can cripple them, and the belated discovery of the hazards of asbestos can lead to tens of billions of dollars in removal costs.

Consumers face risk if they invest in new products that work perfectly well for them but fail to attract a critical mass of other users. If that happens, vendors (and providers of complementary add-ons) often abandon the product and stop providing critical maintenance, upgrades, and spare parts.

Customers also face uncertainty about the value of an innovation in relation to its price. In the schema of neoclassical economics, consumers have a gigantic, well-specified utility function for all goods, extant as well as not yet invented. Therefore, when an innovation that serves a new want (or a new combination of old wants) appears, consumers consult their utility functions, as they might a tax table, and know exactly its worth to them. To my knowledge, there is no empirical basis for such an assumption. In fact, evidence from “behavioral” researchers such as George Loewenstein at Carnegie Mellon points in exactly the opposite direction: people don’t have a clue about the value of things they have never experienced. When researchers ask subjects how much they would pay for some novel experience, such as kissing their favorite movie star, they receive whimsical responses, anchored to some irrelevant piece of data just planted in the subject’s mind by the researcher, such as Social Security numbers. One interpretation of these behavioral experiments is that people are irrational; another is that they simply don’t know and blurt out the first thing that comes to mind to earn their five dollars for participating in the experiment.

Behavioral research has been criticized for experiments in which subjects, unlike actors in the real world, have no stake in the outcome, but in this instance the experiments do seem to correspond to reality. It is improbable, for instance, that anyone who wears glasses or contact lenses has a firm grasp of the economic value of (successful) corrective laser surgery, or that someone who has a conventional TV can gauge the value of switching to a higher-definition digital product. Indeed, I am skeptical that people who actually have laser surgery or buy a digital TV can quantify the value. Before or after a purchase, the enhanced utility is a shot in the dark, much like the value of the pleasure Loewenstein’s subjects anticipate from kissing movie stars. I personally have not seriously considered either laser surgery or buying a high-definition TV, but I have been enticed by the latest in personal computer hardware and software for more than two decades. I have no idea of the value of my numerous upgrades (or for that matter, a good estimate of the time and opportunity costs I have incurred).

Organizations that purchase expensive systems often expend many person-years’ effort to evaluate their costs and benefits. For example, Columbia Business School recently acquired a new “courseware” platform. A committee was formed, long Requests for Proposals issued, shortlists made, vendor proposals studied, and consultants retained. But for all the effort and availability of the finest analytical minds, the value of the new courseware was—and will remain—elusive. The monetary value of enhancing student satisfaction and learning and of saving faculty time can only be a blind guess. Similarly, although the

out-of-pocket costs of purchasing a system played a role in picking a vendor, the magnitude of the much larger “all in” opportunity costs (e.g., the time of faculty and staff) of switching to any new courseware platform were unfathomable, and assessing the costs and benefits of enterprise-wide software and systems used by corporations that are many times the size of the Columbia Business School is even more difficult.

### **The Consumer as Problem Solver**

The effective use of innovations usually requires acquiring or developing ground-level know-how. There are very few products that humans can use immediately: we have to acquire the knowledge, and sometimes the taste, for almost everything that we consume in our daily lives—we must learn how to brush our teeth, tie our shoelaces, knot ties, savor espressos, and drive cars.

Users often play a venturesome or ‘entrepreneurial’ role in the design of new products.

For example, an innovative biometric lock opened by swiping one’s fingers over a sensor eliminates losing or fumbling with keys, but there is a catch. As Anne Eisenberg (who reviewed the product for The New York Times) discovered, after installing the lock, she could not recall the finger-swiping technique the next day. “I swiped and swiped,” she writes, “but the door wouldn’t budge. Many speeds and angles can be used in swiping a finger, I gradually realized, and I could no longer recapture the technique I’d used the night before.” Swiping a finger isn’t necessarily harder than turning a physical key in a conventional lock; but as Stephanie Schuckers, a professor of electrical and computer engineering, points out, people have already learned to use standard locks: “We are all trained how to use keys, from when we are young.”

Differences in how products are used require consumers to do more than just acquire the knowledge of a “standard technique”—they have to develop know-how tailored to their specific requirements. For instance, users of spreadsheets don’t just acquire the knowledge of standard pull-down menus and commands; they also have to develop, or at least modify, their own templates and models.

Users who have to develop know-how require yet another set of skills—while technical knowledge is certainly necessary, managerial and organizational knowledge is crucial. Both the developers and users of innovations often require a high degree of venturesome or entrepreneurial resourcefulness in problem solving.

Developers of innovations often face situations that require such resourcefulness in the following sense: although the situation may be similar to ones the innovator has faced before, it also contains novel elements, so the innovator cannot simply repeat what has worked in the past. Experience (or “human capital”), which we may think of as the accumulated knowledge of similar past situations, helps, but it is not enough. An innovator is more than just a skilled and knowledgeable surgeon performing difficult but routine arthroscopic knee surgery. The innovator must also act resourcefully in the face of novel situations with a can-do attitude, imagination, willingness to experiment, and so on.

Consuming something novel does not always require resourceful problem solving. Drinking a new soft drink or showing up for an appointment for corrective surgery is not especially demanding. Other kinds of consumption—such as assembling a model airplane—may require patience, dexterity, and experience, but as long as the instructions are clear and complete, they do not require resourcefulness or creativity. Indeed, creative deviations from prescribed instructions can lead to undesirable outcomes.

But not all innovations come with clear and complete instructions. High-tech products, especially those with complex architectures and features, rarely do, and deriving utility from them requires a great deal of resourceful problem solving.

Manuals for Windows-based personal computers and software, for instance, are famously bewildering. This is not mainly because of the incompetence of the authors of the manuals. In considerable measure, the sometimes bewildering instructions reflect the complexity of the internal architectures of the systems,

the many options and features they contain, and the difficulty of anticipating how the components will interact. But whatever the cause of that impenetrability, my experience has been that the alluring features of new products rarely work “out of the box” if one simply follows the instruction manual. I have spent countless hours getting new gizmos to work, or trying to stop inexplicable crashes. And the toil is far from mechanical: I have to guess what might be wrong, conduct experiments, and troll through postings of user groups on the Internet trying to find solutions to similar problems. Moreover, figuring out how something is supposed to work is often only half the battle: in many innovations, users have to figure out how to make the product work well for them.

### **Not Quite Free**

Economists often believe that innovations are a gift to consumers. Stanford’s Paul Romer writes that innovators “have brought the cost of a transistor down to less than a millionth of its former level. Yet, most of the benefits from those discoveries have been reaped not by the innovating firms, but by the users of the transistors. In 1985, I paid a thousand dollars per million transistors for memory in my computer. In 2005, I paid less than ten dollars per million, and yet I did nothing to deserve or help pay for this windfall.”

I would suggest a slightly different view. In all likelihood, users do secure the lion’s share of the benefit of successful innovations. But not all innovations are successful. Apple’s iPod has been a resounding success for both the company and its customers—its Lisa and Newton were not. When products fail, the downside faced by users of innovations matches or exceeds the downside for the innovator.

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Indeed, one important challenge faced by innovators is to persuade entrepreneurs to take a chance on innovations in the absence of any hard demonstration that the returns are worth the risks. One of the notable features of the modern innovation system lies in the great many individuals and organizations that are willing to be so persuaded. At the dawn of the automobile era, only a few very rich buffs served as guinea pigs. Now, the not-so-well-off borrow against their credits cards—or spend what they “save” by buying paper napkins in bulk at Wal-Mart—to take their chances on laser surgery and flat panel TVs without much foreknowledge of the utility of their purchase. Similarly, large corporations run by the book with the help of squadrons of financial analysts will spend tens of millions of dollars on enterprise software based on the crudest of guesses of costs and benefits.

Even late adopters who only buy tried-and-tested products don’t get a free ride. Romer sells himself—and other computer users—short in declaring that they have “done nothing” to deserve the windfall of lower prices. Large markets and the prospect of their continued growth have helped drive down prices. And markets have grown because individuals and companies have invested in learning how to use computers and developing know-how. The investment is not trivial. The prices of computers have declined, but their complexity hasn’t. Feature bloat may, in fact, have made computers and programs harder to use. Yet the number of people who have made the effort—possibly incurring opportunity costs many times the purchase price of their equipment and software—has over the years continued to grow. Users who build their own templates and models for spreadsheet and database programs now number in the tens of millions, whereas the teams at Microsoft who develop such products number in the thousands.

In most mainstream economic theories, users of new technologies are at once passive and omniscient. They play no role in the development of innovations, but once innovations appear, users know whether they should buy the offering and what they should pay. Even in Joseph Schumpeter’s theories (which in other ways challenge mainstream models), the innovator is the star, while those who imitate or modify have secondary parts. Consumers don’t appear in the cast.

The neoclassical and Schumpeterian models both fail to do justice to the role of users. In a system where

innovations are carried out by numerous players, the producers of innovations are, except for the end consumers, also users of higher-level or “adjacent” innovations. Users—including those at the end of the line—often play a venturesome or “entrepreneurial” role in the design of new products, bearing “unmeasurable and unquantifiable” risks and developing ground-level knowledge. Therefore, contrary to the high-level research-centric view, the willingness and ability of users to undertake a venturesome part play a critical role in determining the ultimate value of innovations.

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