

The Techonomist in the Machine

When tech companies need to understand marketplaces, and tens of millions of dollars are at stake, some of them are turning to a new kind of researcher

BY DAVID A. PRICE

When Tom Blake was on the job market in 2012 as an economics Ph.D. student, he assumed he would land at a university or a government research department. But Blake, then studying at the University of California, Davis, accepted an on-site interview from San Jose, Calif.-based eBay. He remembers the moment during the visit when he decided he might be ready to leave academia behind.

“I was with one of the data scientists, and I started asking him questions about who has access to the data and how you get access,” Blake says. “He was quite befuddled. I had come from academic research, where data has to be begged for. After some probing, I realized that he had direct access. I realized that I would be totally unfettered in my ability to get to the bottom of any question.”

Blake joined eBay Research Labs that year and became part of the small, but growing, band of Ph.D. economists doing economic research in technology companies. One might call them the “techonomists.” Some are part of a research staff within a firm and spend all their time on economic research, while others work within a business unit of a firm while doing research as well. Whichever category they fall into, they’re in a relatively new type of job: Although economists have long worked in private companies in a handful of traditional roles — like finance, litigation consulting, and economic forecasting — the staff economist carrying out research in a technology firm, and sometimes publishing his or her work, is largely a 21st century development. (Additionally, non-technology firms have been hiring economists, not necessarily Ph.D.s, to mine the firms’ large data sets for economic insights.)

Many of the high-profile tech firms of Silicon Valley and elsewhere have techonomists on board; in addition to eBay, the club includes, among others, Airbnb, Amazon.com, Facebook, Google, Microsoft, Netflix, and Pandora. Some of these companies also engage academic economists on a part-time basis to work with their in-house economists. The problems that techonomists are stalking with big data range

from marketplace design to digital advertising strategy, from online search behavior to pricing.

Susan Athey of Stanford University, formerly chief economist at Microsoft on a consulting basis, says she is regularly contacted by firms and recruiters who are seeking pointers to possible candidates for such positions. “The flow seems to be increasing,” she says.

Mike Bailey, Facebook’s economics research manager, agrees. “It definitely seems like it’s growing at a fast pace.”

The Tech Industry’s Allure

Bailey started at Facebook as a research intern in 2011 while he was a Stanford doctoral student. Like eBay’s Blake, he too was enamored of the data. “It quickly became clear that working at Facebook would have a lot of advantages over academia,” he remembers. “I would be able to continue to work on cutting-edge economics problems, but I would have access to amazing resources — a one-of-a-kind dataset.”

For some techonomists, another attraction is the chance to influence the course of a major enterprise. Justin Rao, an economist at Microsoft Research in Redmond, Wash., says, “I’ve recently had conversations like, ‘Justin, do you believe this? Because we’ll do it if you do.’ Often, we don’t have that feeling in academia; you might be falsified in academia via replication, but maybe not. Here, you get put in positions where it will be revealed if you are right or wrong, denoted in tens of millions of dollars.”

Blake concurs. “One of the unexpected perks was the actual ability to shape a marketplace,” he says. “There’s a great deal of satisfaction in it; it’s nice to see the rubber meet the road.”

He recalls the outcome of research with co-authors on the effectiveness of online search ads. “Academically, it led to publication, which is always nice” — it appeared in *Econometrica* in early 2015 — “but internally, it led to a lot of direct actions, and the way money is allocated was changed quite dramatically.”

Still another plus of working at a tech company, as some see it, is tackling a variety of questions rather than specializing. “I enjoy working on a wide array of problems,” Bailey says. “In academia, you are rewarded for building deep expertise in one area, which takes investing years of work into a few projects; that just didn’t appeal to me in the end.”

Rao explains, “As a professor, you’re going to dig into a specific topic and become an expert on that topic. If that’s the marathoner approach, I’ve been asked to become like a middle-distance runner on a lot of topics.”

And since economists are famous for believing in the power of financial incentives, it would be surprising if money didn’t have a role in techonomists’ career choices. Rao recalls being hired for his first job out of graduate school at Yahoo by Preston McAfee, a former California Institute of Technology professor who was then Yahoo’s chief economist (a role he now holds at Microsoft). “Yahoo offered me 40 percent more money than my next best offer and the ability to stay in California, and Preston McAfee was telling me it’s an excellent risk to take. I think I signed two hours after that phone call.”

To be sure, academia still exerts a strong pull in economics. “When economics Ph.D.s hit the market, their instinct and the pressure from their department typically is to take an academic appointment and ‘moonlight’ if they are interested in tech,” according to Rao.

But that bias in favor of academic jobs could diminish in coming years. “My cohort and those that have followed [moving straight from Ph.D. work to the tech industry] have done quite well, and at the same time, more established economists like Susan Athey, Preston McAfee, Hal Varian [of Google], and Steve Tadelis [formerly of eBay, now of the University of California, Berkeley] tightened the link between industry and academia,” Rao says. “So I think the perception is changing and fresh Ph.D.s are beginning to believe that it’s more of a two-way street between academia and industry, as it is in computer science.”

The View from the Inside

Another difference between jobs in the tech industry and in academia or government, for better or worse, is the absence of private offices. For the most part, the technologist can forget about closing a door for an afternoon of quiet rumination and undistracted work. At typical companies in the Internet sector, open floor plans are the norm, partly to promote interaction among workers.

When Blake was considering eBay, the prospect of being officeless caused him some concern. But he says he now finds it beneficial. “I’m surrounded in an open space environment

The freedom to publish enables firms to attract a higher caliber of candidates.

by other economists, so it actually does facilitate collaboration. We get to bounce ideas off of each other.”

And there are escapes. “We have lots of conference rooms and lots of phone rooms so we don’t disturb people around us. And there’s always headphones. Plus, we’re not tethered to our desks — we have laptops and the ability to roam around campus, so we spend a lot of time working outside when it’s warm.” (At Microsoft’s Redmond, Wash., headquarters, economists, like software developers, have offices with glass doors, a result of founding CEO Bill Gates’ belief that offices are important to productivity.)

But an economist’s setting isn’t everything. Still more important is how they decide what problems to work on — or who decides for them. Usually, Bailey says, the company’s chief economist manages the research agenda of the group. Within this structure, the freedom given each economist to set his or her own course varies from one firm to another. “At Facebook, we give our research economists a lot of leeway in deciding what to work on and incepting their own projects, but we will often find — or people within the firm will approach us about — strategically important areas and we’ll make sure they are staffed within the team.”

At Microsoft, Rao says, “it’s self-directed with guidance.”

What Are They Working On Now?

Two economists at leading technology companies offered a peek behind the curtains at their own current research agendas. The projects they’re describing here are among the many that are active at their companies:

Tom Blake, economist, eBay

We’re currently working on a wide set of questions relating to online bargaining. eBay has a feature on its site called “Best Offer” that allows buyers and sellers to negotiate in bilateral one-on-one bargaining over particular items that are being sold. That’s a mechanism eBay can do a lot to adjust. There are a lot of ways in which bargaining can fail, and there’s a lot eBay can do to reduce asymmetric information frictions and other frictions in the market to increase transactions.

That’s in eBay’s best interest — eBay wants more transaction volume — but it’s also a really interesting way to add value to the academic literature. There isn’t a lot of detailed data out there on bilateral bargaining, on offer-level behavior, and on the actual interactions of buyers and sellers in how they position themselves to extract better deals for themselves. Running experiments by changing features of the platform generates experimental variations in bargaining settings. That level of data can inform a lot of academic questions.

Justin Rao, senior researcher, Microsoft Research

Right now, I’m focusing almost all of my energy on cloud computing. It changes the way everything works. We don’t understand a lot of the economics of it. It’s a very competitive market, with Amazon and Google also being big players.

The model of boxed software — pay \$2,000 for a license to install an application on 10 computers — just won’t be a thing in five years. A lot of what is on the cloud is basically doing the same: Bring your software license and we’ll run your software. We don’t think that is going to prevail.

I’m working mainly on cloud dynamic pricing for infrastructure and pricing models for the software. What are the mechanisms that we need to have ready for the future of computing and the future of software use — how we price it, how we sell it, the dynamics of it? I think there’s going to be a lot of mechanism design work there.

It’s in its early days, and it’s a huge space. We’re trying to identify the core economic issues, project where the market’s going, and be sitting there ready with mechanisms to sell things that are efficient, clear the market, and help us compete.

Trying to become an expert and understand the engineering side is really challenging. It’s required about a year’s investment to get up to speed. It’s just so much more complicated than anything I’ve worked on. — DAVID A. PRICE

His counsel to a recent Ph.D. hire: “Look, for the most part, follow our lead — we’ve been here a little longer and we have better-calibrated beliefs. But you should take 35 percent of your time to do, not only whatever you want, but risky stuff. We want you taking swings for the fences.”

Some techonomists have professionals in other fields taking those swings with them. Facebook economists are part of a larger research team that also includes researchers in computer science, statistics, psychology, and other disciplines. “We collaborate closely with people from across the entire team,” says Bailey, “and end up taking very interdisciplinary approaches to solving problems.” Microsoft economists may be paired on a project with a software developer who has an interest in economics, a data scientist (commonly a Ph.D. in math or statistics) who works on econometrics and other data analysis, or both.

Going Public

At some firms, techonomists share their work with their counterparts outside their companies’ walls. The simplest way that this happens is through direct exchanges with another firm.

“We don’t view what we’re doing as a zero-sum game,” Rao says. “We’ll meet with Amazon economists and talk about, let’s say, how we can use machine learning to improve recruiting from both a quality and a diversity point of view. On the one hand, yes, Amazon’s a competitor, but we think that if we both become more productive, we both benefit, and it’s fine.”

Beyond that, many of the firms allow techonomists to publish their work — and not only allow it, but encourage it. (Given the nature of their work, it may appear in either economics journals or computer science journals.)

But why would a firm unilaterally share hard-won insights and risk losing a competitive advantage? One reason is that the techonomists see value in having their work vetted by their peers in the academic community. When confidentiality is at a premium, they may pursue that goal by discussing their work with an academic who is affiliated with the company; these academics often have spent time as scholars in residence at the firms and have confidentiality agreements in place. In many cases, however, the desire to obtain additional insights from the academic community in general through broad disclosure of the research outweighs immediate competitive concerns.

Probably the most important reason the firms allow publication, though, is that when they’re hiring, the freedom to publish enables them to attract a higher caliber of economist candidates. “It does help with recruiting,” says Blake. “And it’s important to folks like myself with academic backgrounds because we want to share these really awesome insights that we get out of looking at our data.”

As these firms see it, the strongest economics Ph.D.s want to remain part of the discipline’s scholarly conversation. That’s especially true of Ph.D.s who think they may want a faculty job someday. “If you’re recruiting people in the job market and you offer the likelihood of publishing

good papers, you’re offering someone a lot of career option value,” says Rao. (Rao credits Athey, who founded the economics research group at Microsoft in 2007, with instilling that approach within the group.)

Ideas of openness that are espoused by Internet companies can help techonomists make the case for publishing when it raises concerns. “We operate a transparent marketplace,” Blake says of eBay. “The notion of ‘open and transparent’ really resonates with eBay’s values, and when we appeal to that to get papers published, that has always gone over very well.”

The Techonomist’s Path

A decade ago, techonomists didn’t have a distinct career path; for the most part, they were senior-level academics whose next move would likely be returning full time to academia. That is changing as more firms start economics groups and as those with groups expand them.

“Smaller companies will contact us and say they’re looking for a chief economist and they want to grow a group,” says Rao. “Everyone’s seeing that, and that makes it easier for us to recruit. We can recruit people who want to be chief economist somewhere one day, and we say, ‘Oh, yeah, you can do that. Be with us for five years.’”

Some believe the growth of economics in tech companies is benefiting West Coast economics departments. “It’s been great for our students,” says Stanford’s Athey. “For example, we had students working with Airbnb who wrote novel research papers. Sometimes what happens is a grad student or young faculty member forms a relationship and expands it into a long-term business role that is very symbiotic with their research.”

Bailey observes, “I have spoken to a few students and faculty who indicated that one attractive feature of Stanford and Berkeley was proximity to technology firms.” Facebook invites local faculty to give talks there and recruits their students, he notes.

And what are the companies looking for when they do? To be sure, the firms may come to the recruiting process with some cut-and-dried criteria in mind — for instance, a background in empirical work in general and, perhaps, in a sub-field like industrial organization, in particular. And academic departments and tech companies alike value collegiality.

But the unique setting of a tech firm may lead them to other intangible criteria, as well. “A fundamental part of our job is speaking many languages,” says Blake. “We have to be able to communicate with a really diverse set of people — businesspeople with their MBA vernacular, lawyers, finance people, a lot of engineers — to get them to understand what our hypothesis is or what we believe is happening in the market.

“Researchers who want to hole up in their offices and just work on their own thing and push the papers out would be a bad fit,” he adds. “But for folks who do want to engage and who enjoy having coffee with engineers and explaining to them why they think they found the coolest new feature, that’s somebody who does very well here.” **EF**