



E-business infrastructure

SHANE GREENSTEIN
greenstein@kellogg.nwu.edu

..... Economic statistics usually involve something almost obvious, but not immediately apparent. Their construction often resembles that old saying about elephants sitting in trees. The elephants are invisible until someone points them out. After someone points them out, the elephants seem to be everywhere, and we wonder how we missed them before.

Accordingly, recent federal government initiatives to measure electronic business throughout the US get a mixed reaction. A skeptic would correctly ask whether these initiatives measure anything other than the obvious. A supporter also correctly responds that if society wants an accurate count of all the electronic elephants in trees, then the US government is in a good position to measure the obvious. These initiatives raise one of the oldest questions about government agencies collecting statistics: What should these agencies collect and why?

Many federal agencies already collect data on different aspects of electronic commerce. These agencies include the Bureau of Labor Statistics, the National Telecommunications Industry Administration, the Bureau of Economic Analysis, and the Federal Communications Commission, just to name a few. To illustrate the issues related to statistics collection, I will focus on the US Census Bureau's E-Stats program to measure e-business. If you want to observe E-Stats in action, go to <http://www.census.gov/> and click on "E-Stats."

What do they do?

It is important to understand that the US Census does more than count the entire US population every decade. As a division of the Department of Commerce, this agency also spends considerable time gathering economic data about business establishments throughout the country. This is especially true in the non-decennial years, when the staff has time for special projects, such as an economic census of business establishments. This data is of use to marketing experts, regional economists, and certain macro-economists.

When the US Census first began these economic censuses many decades ago, they primarily surveyed manufacturing establishments. As time has passed, however, the US economy has become less devoted to manufacturing and more focused on services, thus, the US Census now surveys more than just manufacturers.

The E-Stats program is one of several programs tracking statistics for manufacturing and nonmanufacturing commerce. The motivation comes from a variety of sources. Some agencies, such as the Federal Reserve, need more accurate statistics for the part of the US economy behind recent productivity gains and, more recently, volatility in economic activity. Other agencies, such as the Bureau of Economic Analysis, need a better sense of what fraction of gross domestic product (GDP) is attributable to e-commerce and similar phenomena.

Many public-policy programs—such as the \$2 billion E-Rate program—hinge on having unbiased data that sorts between hyperbole, hypothesis, and mere speculation. For example, debates about broadband would benefit from more accurate censuses of Internet use at homes and private business establishments. These initiatives at the US Census could ground discussion, orient debate toward the right set of questions, and, at a minimum, avoid common misconceptions. In this sense, we can view these initiatives in an overall positive light.

That said, this type of measurement is not easy to carry out. To illustrate, I now focus on a US Census proposal to measure e-business infrastructure. Why is this so interesting? To oversimplify this a bit, different regions of the country need to know whether they are ahead or behind economically. Economists will use this data to explore whether the more information-intensive industries underwent more or less growth compared to other industries. Economists are also curious about whether investment in e-business infrastructure helped induce more revenue in some regional industries and not in others. We cannot make such determinations without data.

What is infrastructure?

To understand some of the difficulties with measuring elephants, let's dig below the surface. Measurement must take

place in ways that recognize some of the unique features of IT markets.

Consider the measurement of software and the problems that software's attributes pose in constructing an e-business infrastructure index. Whatever way we define it, e-business infrastructure comprises a wide variety of disparate technological pieces with a wide set of uses. This makes it difficult to identify impact, trace the lines of causality from infrastructure to outcomes, and so on. One way to more easily identify these linkages is to collect information about many circumstances in many different markets or industries.

Yet, in practice this will be challenging. Infrastructure is made up of routers, computers, optical communications, and software. But how about fax machines or CT scanners? Are these part of e-business infrastructure? How about equipment used for radio and television broadcasting? What definition is appropriate, a broad or a narrow one?

Here is another challenge. The general rule of thumb within most corporate information groups is that packaged software and hardware constitute a large but not overwhelming share of overall expense. Conversely, maintenance, administration, support, and software programming are the largest expenses. These assets involve a lot of human capital, complex investments, and the construction of idiosyncratic assets. Often, they have little resale value but a high service value to the owner. Unfortunately, these patterns are quite problematic for the US Census when carrying out measurements.

What is the proper way to estimate the value of software? I do not think anyone has a perfect answer. While packaged software, such as MS Office, has a set market value attached to it, the market value of much contract software from consultants is less clear. What is the value of old, yet functioning software acquired a few years ago? What is the best way to benchmark the value of a program that took years to debug and refine? These seemingly simple accounting questions will have enormous consequences for any estimate of e-business infrastructure. This

is an art at best and not yet a science.

In addition, there is tremendous variance in ownership structures for IT services delivery. Normally, this would not cause data collectors problems because there are ways to correct for rental/ownership differences across firms and industries. However, many firms outsource only parts of their business computing and communications. Many firms do not have clean boundaries between assets owned by the firm, rented from others but kept on the premises, and effectively rented from others who provide end services. Data back up; hosting; and many routine data functions in payroll, benefits, insurance claims, and other administrative tasks fall into this category. Some firms own these tasks, and some outsource them. The same work can occur in-house or off-site, but in each case, there is a different asset owner and a different work location.

This trend is already significant, at least as measured by the many firms supplying outsourcing. The most optimistic forecasters predict that outsourcing will spread into many other facets of IT applications in the form of application service providers. So the US Census has to figure out what part of corporate IT goes to a firm such as EDS or Perot Systems, and what part stays in-house.

In other words, a census cannot attribute a specific amount of e-business infrastructure to a specific industry without also accounting for some fraction that is missing because the service is rented from an upstream supplier. Because IT outsourcing is a huge industry, the companies in it are constantly changing their organization, merging, disbanding, and recombining in new variations. In such an environment, nobody wants an e-business infrastructure statistic that is sensitive to arbitrary decisions about vertical integration or disintegration.

What should be left to markets?

IT markets differ from other infrastructure in one other way: A lot of commercial companies are already tracking considerable information. For example, a trend

among commercial data-collecting firms is to learn about Internet users, sometimes by going directly to the Internet to track conduct. Commercially available data sets provide information about whether households are online, if businesses have access to Internet services, the time users spend online at work and at home, user surfing habits at advertising-supported sites, online spending habits, and so on. These data come from such firms as Jupiter, Forrester, Media-Matrix, Plurimus, ComScore, Harte Hanks, IDG, DataPro, PNR, and many others.

These firms tailor most of these data to marketing departments' needs, and some of it is experimental, but these facts do not make these data useless for every government purpose. Said another way, if many commercial providers supply information about electronic commerce, what type of information should a government agency spend its time collecting?

The short answer goes something like this: Governments shouldn't collect data that commercial firms can track just as well. On the other hand, there are plenty of measures—such as GDP measurement and unemployment statistics—that matter to society at large, but that commercial firms do not compile. The US Census has a comparative advantage in collecting this important data in that it is comprehensive, covering every establishment in every location.

Does this e-business infrastructure measurement play to the comparative advantage of the census office, or could data from private firms provide adequate information? Do we need a government program for this project? These are open questions that economists are still debating.

In the meantime, some well-meaning government employees are figuring out whether it's feasible to measure e-business infrastructure. The total will probably reach into the hundreds of billions of dollars, so the task is potentially quite important. At the same time, the task is extremely challenging. These employees' biggest hope is that in the process, they'll avoid creating an even bigger white elephant.