The Circuits Come to Town

An Analysis of Technology Use and Electronic Delivery of Government Services in Kentucky

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THE KENTUCKY LONG-TERM POLICY RESEARCH CENTER

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Preface

The Kentucky Long-Term Policy Research Center is engaged in a continuing effort to understand the future implications of an array of trends affecting the Commonwealth. In this report we examine technology use in Kentucky and how it differs by age, income, education, and other factors. We offer our findings to suggest ways that state and local governments can make electronic government services accessible to all citizens. Although we focus on technology as a tool for government, we recognize that technology has much broader applications—health, education, entertainment, economic development, and more. People interested in these applications will find this report useful for its discussion of the demographics and geography of technology use in Kentucky.

For more information, visit the Kentucky Long-Term Policy Research Center's Web site:
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THE KENTUCKY LONG-TERM POLICY RESEARCH CENTER

The Kentucky Long-Term Policy Research Center was created by the General Assembly in 1992 to bring a broader context to the decisionmaking process. The Center's mission is to illuminate the long-range implications of current policies, emerging issues, and trends influencing the Commonwealth's future. The Center has a responsibility to identify and study issues of long-term significance to the Commonwealth and to serve as a mechanism for coordinating resources and groups to focus on long-range planning.

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Contents

Figures

Tables

Summary

People today talk about *reinventing* government to make it more efficient and responsive to citizens' needs. Information technology such as the Internet, magnetic stripe cards, and interactive voice response (IVR) telephone systems allow 24-hour-a-day, 7-day-a-week access to government, while enabling government agencies to streamline business processes and integrate diverse information systems.

But one of the hazards of making our reinvented governments so dependent on technology is that many people have never seen the World Wide Web or used a computer. Some people do not even own a telephone. The National Performance Review addresses the issue of technology "have nots" in its plans; state and local governments must do so as well.

To identify the technology have nots and the barriers to full citizen participation, we surveyed Kentucky adults about their use of six Information Age technologies: computers, the Internet/World Wide Web, IVR systems (in which a voice on the telephone guides a caller through a series of steps and the caller responds by pressing a number on the dial pad), automated teller machines (which use magnetic stripe cards), e-mail, and video conferencing.

Who Uses Technology in Kentucky?

Computer use in Kentucky is close to the national average. After making small age and education adjustments to our raw data, we estimate that 29.8 percent of Kentucky adults use a computer at home, 40.6 percent use a computer at work, and a total of 56.8 percent use a computer somewhere—at home, at work, at school, or elsewhere. The most recent national data are from 1993, so we can only estimate current national usage. Using a very simple model, we estimate computer use at home to be around 30 percent nationally, use at work around 40 percent, and use overall around 60 percent.

Estimating Internet or Web use is a tricky business, and comparing surveys is even trickier, but Kentucky's Internet use also appears to be close to the nation's. Slightly over a quarter of adults have used the Internet or the World Wide Web in the past 12 months (while 9 percent of Kentuckians have never heard of the Internet or the Web).

We asked about ATMs because they use magnetic stripe cards that access an account. Three quarters of adults have a bank account that lets them make transactions using an ATM, and close to half of those people who have access to an ATM actually use it. But nearly everyone—even people who could use an ATM but don't—said that they think an ATM is either somewhat easy or very easy to use.

Fifty-seven percent of adults have used an IVR system to get information from the government or from a financial institution. The percentage of adults who have used an IVR system to perform some sort of transaction, such as filing a tax return or making a credit card purchase is lower: 6 percent have filed a tax return (a relatively low percentage of people are eligible to do so) and 28 percent have made other financial transactions. A total of 31 percent have used an IVR system to conduct some sort of transaction, either with the government or a financial institution. Slightly over one quarter of adults have sent or received e-mail in the past 12 months, and less than 10 percent have used video conferencing.

The two factors that seem to have the largest effect on technology use are education and age. One factor the government is primarily responsible for providing, the other factor government can do nothing about. Income also has an effect, but it is not as strong as that of education or age. Location also

Technology Use in Kentucky
(Percent of Kentuckians who use each technology)

Computer at home	29.8
Computer somewhere	56.8
Internet/ WWW	26.1
ATM (if available)	44.0
Touch-tone to conduct a transaction	31.4
Touch-tone to obtain information	57.1
E-mail	26.8
Video conferencing	8.6

affects technology use. Even taking into account the differences between urban and rural areas in educational achievement, income levels, age and other demographic characteristics, where a person lives appears to have some effect on whether he or she uses technology. Gender makes a difference, but not a great one. All other things being equal, women are somewhat more likely to use computers, but men are more likely to use the Internet and e-mail. Gender also accounts for small differences in the use of touch-tone phones to get information and to conduct transactions. Less important is employment status. Employment helps determine whether a person uses a computer, but it does not have much of an effect on other technology use. Nothing in the data suggests that race affects technology use, although our sample size of nonwhites is too small to conclude much about racial factors.

Attitude Counts

Despite the gaps in technology use, we still find that some of the elderly, the poor, the less educated, and rural residents use computers, access the Internet, have an ATM card and obtain information by touch-tone phone. This is so because demographic factors alone do not determine whether a person uses technology; attitude also counts. People who see the computer as a helpful and efficient tool rather than an intimidating and complicated contraption are more likely to use it.

Technology optimism and pessimism transcend other demographic groups. Technology optimists may be young or old, poor or wealthy, but they still *tend* to be younger, better educated, and urban. While Kentucky certainly has many technology optimists, it is likely that many more people are technology pessimists. Fifty percent of Kentuckians who don't work, 60 percent of Kentuckians with less than a high school education, and 73 percent of Kentuckians age 65 or older said they would be very unlikely to use things like a computer, an ATM or a touch-tone phone to receive government services.

Bridging the Gaps

Because the benefits of technology extend so far beyond the realm of government service, there is no reason for governments, be they federal, state, or local, to work in isolation from each other or from the nonprofit and private sectors as they begin to deploy new technologies. In other words, state government needs partners to help it nurture technology use in Kentucky. Therefore, our policy options are not simply directed at state government but at all agencies, groups, and individuals who are working to increase Kentuckians' use of new technology.

If the challenge of increasing technology use is daunting, it might seem more manageable if we break it into a few smaller tasks. We suggest three:

1. Increase the number of technology optimists.

As we found in our survey, many citizens are wary of, or unaware of, the potential use of technology to deliver government services. But citizens are not the only people who can be technology pessimists. Some policymakers are unconvinced that supporting a government Web page or issuing a benefits debit card is worth the money, the time, or the hassle. Others have never even considered the possibilities of electronic government. Arguments may persuade some, but nothing is as convincing as a demonstration. Following are several suggestions for increasing the number of technology optimists by demonstrating the benefits of technology.

⇒ Hold an information technology expo.
⇒ Provide universal e-mail access.
⇒ Build local electronic networks.
⇒ Use traditional communications to support new technology.

2. Train people to use technology/Make it easier to use.

People will no doubt feel even more optimistic about information technology once they are trained to use it. Of course, the easier the technology is to use, the easier it is to train people to use it, so these two tasks fit closely together.

⇒ Make user interfaces simple, same and similar.
⇒ Limit options and menu levels of IVR.
⇒ Apply the "one-stop-shopping" principle to government services.
⇒ Use a standard URL protocol for local governments.

⇒ Train people to use information technology by using local resources.
⇒ Use community colleges and universities to help with the training.

3. Give people access to the technology.

Access to different technologies varies. According to the Kentucky Telephone Association, all local service providers have the equipment necessary to allow touch-tone dialing. Most banks allow their customers to use ATMs, although some have many more machines than others. Access to video conferencing is limited. Many people do not have access to a PC.

⇒ Provide computers with Internet connections at public libraries.
⇒ Use schools to provide computer access.
⇒ Put technology where people are.

Making It All Happen

The policy options listed in this final chapter are specific activities which will help accomplish three tasks: increase the number of technology optimists, make sure people can use the technology, and give people access to the technology. Once people want to use something, know how to use it and have access to it, they will probably use it. Unfortunately, getting to that goal will not be easy. Our telephone survey found that a large share of Kentuckians do not use computers, the World Wide Web, e-mail, or video conferencing; many people don't have or don't use an ATM card; many people have not performed a transaction or even received information using a touch-tone phone. In addition to these obstacles, other issues will need to be addressed as state and local governments increasingly use technology to provide citizen services.

⇒ Bring back a legislative committee for information technology.
⇒ Local and private cooperation are essential.

Final Checklist

Government cannot force people to use technology, but it can encourage technology use. We offer this final checklist of questions for any government agency, state or local, planning to provide services or information electronically.

⇒ How many people who currently receive this service or obtain this information by conventional means are technology pessimists?
⇒ Is our user interface easy to use? Have we followed the three S's (Simple, Same and Similar)?
⇒ How can we coordinate with other agencies at other levels of government to improve, simplify and enhance our services?
⇒ Will people have access to the necessary technology?
⇒ Do people need any special training to use the technology? If so, who should do the training, and how do we train the trainers?

Glossary

ATM—An Automated Teller Machine, which allows bank and credit card users to perform transactions using a plastic card and an identification number.

e-mail—Electronic Mail, sent from computer to computer, which may or may not travel over the Internet, depending on how the computers are connected.

The Internet—A global network of computer networks that communicate with one another using a standard set of protocols.

IT—Information Technology, a broad term encompassing a variety of technologies that enable rapid processing and communication of large amounts of information.

IVR—Interactive Voice Response, an automated telephone system which prompts callers to enter information using a touch-tone telephone.

KIH—The Kentucky Information Highway, a statewide, integrated communications and information network.

PC—Personal Computer

URL—Uniform Resource Locator, which is simply a web page address. For example, the URL for the Kentucky Long-Term Policy Research Center's home page is www.lrc.state.ky.us/ltprc/home.htm

WWW—The World Wide Web, a graphics-based system of communication on the Internet.

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Finally, this report, like all other products of the Kentucky Long-Term Policy Research Center, is the result of teamwork and cooperation. Every member of our small agency contributed in some way. Executive Director *Michael Childress*, *Billie Sebastian*, *Michal Smith-Mello*, and the Center's interns provided editorial support and other assistance.

While many individuals contributed to the development of this report, the Center assumes full responsibility for its content.

Introduction

On March 10, 1876, Alexander Graham Bell shouted those famous words: "Mr. Watson, come here. I want you!" and the telephone's swift journey from new contraption to bare necessity began. Just eight years later, Boston and New York City were connected by long-distance telephone lines. Fewer than 50 years later, on May 19, 1924, pictures were first transmitted over telephone wires. The 1960s saw the introduction of touch-tone dialing, international communications satellites, and the 911 universal emergency telephone number. Cell phones and fiber optics were introduced in the 1980s. Today, the world is crisscrossed with over 600 million subscriber telephone lines, one quarter of them in the United States,[1] and the telephone is now considered so essential that you actually have to pay a fee to have your number *not* be listed.

Naturally, the telephone brought changes in government. As early as 1918, the federal government assumed control of the nation's telephone and telegraph systems during wartime, and since then governments at all levels have legislated and regulated telecommunications. Moreover, the telephone has improved the delivery of government services. Touch-tone dialing, for example, enables citizens to exchange information with government agencies easily and quickly, often at any time of the day or night, while reducing the number of people answering phones. And one of the most important services government provides—emergency response—is predicated on the assumption that someone near the problem will have a telephone.

Like the telephone, the World Wide Web may change our government, but it may also change our society and culture. The Web is a highly personal medium that enables us to share not only typed messages, but also pictures, songs, real-time stock prices, and even radio broadcasts of basketball games with people around the globe. With 40 million Americans now using the World Wide Web, it has already become another tool for the masses. Increasingly, it is also becoming a tool for government.

How might government use this tool? People today talk about *reinventing* government to make it more efficient and responsive to citizens' needs. The Web and other technologies allow 24-hour-a-day, 7-day-a-week access to government, while enabling government agencies to streamline business processes and integrate diverse information systems. By far the most visible effort at reinventing government has been Vice President Al Gore's National Performance Review, which was created in 1993 and is responsible for, among other things, recommending and monitoring ways to improve federal government operations with information technology (IT). In Kentucky, state agencies had already begun using IT when EMPOWER Kentucky was introduced in 1995 to coordinate disparate technology plans and to encourage agencies to redesign their internal processes and external citizen services. Although the EMPOWER Kentucky program is not intended to be permanent, its results should be. Surely many local governments in Kentucky will also want to reinvent themselves, and IT will be a key component of their plans.

But one of the hazards of making our reinvented governments so dependent on technology is that many people have never seen the World Wide Web or used a computer. Some people do not even own a telephone. The National Performance Review addresses the issue of technology "have nots" in its plans; state and local governments must do so as well.

To identify the technology have nots and the barriers to full citizen participation in electronic government, we surveyed Kentucky adults about their use of six Information Age technologies: computers, the Internet/World Wide Web, interactive voice response (IVR) systems (in which a voice on the telephone guides a caller through a series of steps

1. Webb & Associates, Telecommunications Consultants. *Telecommunications History Timeline*. www.webbconsult.com/timeline.html accessed 10/29/97.

and the caller responds by pressing a number on the dial pad), automated teller machines (which use magnetic stripe cards), e-mail, and video conferencing. Ironically, we conducted a telephone survey, which of course necessitated that a respondent already use at least one piece of communications equipment—the telephone—in order to participate. This is an important caveat, because some areas of the state have significant portions of the population without telephones. Nonetheless, the survey findings tell some very interesting stories.

Age and education have the biggest impact on technology use; income, employment status and gender also matter, but not as much; where a person lives affects technology use, even when we account for other factors; race does not appear to have a significant effect on technology use. We examine these findings in more detail in the following chapter.

Then we look at attitudes toward technology, how they differ across demographic groups, and how they affect technology use. Attitudinal barriers to technology use are probably more formidable than demographic ones, and must be overcome if citizens are to receive the benefits of reinvented government.

In the final chapter we offer some policy options that should improve citizen attitudes toward electronic government services, increase access to the technology, and facilitate use.

Telephone Time-Line

1876
First telephone patent issued to Alexander Graham Bell.

1915
The first transcontinental phone line, from New York to San Francisco, opens.

1935
The first round-the-world telephone call is made, between two people in the same building.

1958
Bell System announces its Data-Phone service, which enables high-speed transmission of data over regular telephone circuits.

1960
Bell Laboratories scientists speak coast-to-coast on the telephone by "bouncing" their voices off the moon.

1976
AT&T installs its first digital switch.

1988
The first transatlantic fiber optic cable is completed.

1996
The cable modem is introduced.

Compiled by Webb & Associates, Telecomm. Consultants. www.webbconsult.com accessed 10/29/97.

Internet Time-Line

1962
The RAND Corporation begins research into military communication networks.

1969
Researchers at four U.S. universities create the first hosts of the ARPANET.

1972
The first e-mail program is written.

1974
Telenet, the first commercial version of ARPANET, opens.

1982-83
TCP/IP is adopted, enabling communication between networks, and the term "Internet" is first used.

1988
The "Internet Worm" disables 1/10th of the world's Internet hosts.

1991
Gopher, enabling point and click navigation of the Internet, is distributed from the University of Minnesota.

1993
Mosaic, the first graphics-based Web browser, is available.

Compiled by PBS. www.pbs.org/internet/timeline/ accessed 10/29/97.

Technology: Who Uses It, Who Doesn't

Organizations public and private frequently take polls to find out who is using new technology and for what purposes. Most often, these polls focus on the Internet, the World Wide Web and on-line services such as CompuServe and America Online. The polls are conducted differently, have different definitions of what exactly constitutes being "on-line," and are aimed at a moving target because the number of people on-line continues growing quickly. According to two surveys conducted in the spring of 1997, 30 to 40 million Americans use the Internet.[2, 3]

The popularization of this technology will make it an important tool for government, but we know that the Internet is not the only technology governments are using to reinvent themselves. They are also using things like IVR systems to obtain information or make transactions, magnetic stripe cards, e-mail, and video conferencing. The Kentucky Long-Term Policy Research Center, working with the Kentucky Information Resources Management Commission and the Center for Rural Development, sponsored a statewide telephone survey to find out which and how many Kentuckians use IT today. The survey was conducted by the University of Kentucky Survey Research Center in December 1996 and obtained responses from 676 Kentuckians aged 18 or older. Results appear in Table 1.

First, some basic numbers

Computer use in Kentucky is close to the national average. After making small age and education adjustments to our raw data, we estimate that 29.8 percent of Kentucky adults use a computer at home, 40.6 percent use a computer at work, and a total of 56.8 percent use a computer somewhere—at home, at work, at school, or elsewhere. The most recent national data are from 1993 so we can only estimate current national usage. Using a very simple model, we estimate computer use at home to be around 30 percent nationally, use at work around 40 percent, and use overall around 60 percent.[4]

Estimating Internet or Web use is a tricky business, and comparing surveys is even trickier, but Kentucky's Internet use also appears to be close to the nation's. Slightly over a quarter of adults have used the Internet or the World Wide Web in the past 12 months (while 9 percent of Kentuckians have never heard of the Internet or the Web).

We asked about ATMs because they use magnetic stripe cards that access an account. Three quarters of adults have a bank account that lets them make transactions using an ATM, and close to half of those people who have access to an ATM actually use it. But nearly everyone—even people who could use an ATM but don't—said that they think an ATM is either somewhat easy or very easy to use.

Fifty-seven percent of adults have used an IVR system to get information from the government or from a financial institution. The percentage of adults who have used an IVR system to perform some sort of transaction, such as filing a tax return or making a credit card purchase, is lower: 6 percent have filed a tax return (a relatively low percentage of people are eligible to do so) and 28 percent have made other

Table 1: Technology Use in Kentucky
(Percent of Kentuckians who use each technology)

Computer at home	29.8
Computer somewhere	56.8
Internet/ WWW	26.1
ATM (if available)	44.0
Touch-tone to conduct a transaction	31.4
Touch-tone to obtain information	57.1
E-mail	26.8
Video conferencing	8.6

Note: Estimates based on actual results of telephone survey

2. CommerceNet, Nielsen Media Research. (1997). *Internet Demographics Survey*. www.commerce.net/nielsen/index.html. accessed 11/4/97.
3. A census in cyberspace. (May 5, 1997). *Business Week*. p. 84.
4. The most recent computer use data are from the U.S. Census Bureau's 1993 Current Population Survey. Using data from 1984, 1989, and 1993, we developed a very simple exponential growth function to project national figures for 1997 so that we could have a rough basis for comparison. Our national projections should by no means be considered official.
See www.census.gov/population/socdemo/computer/compusea.txt ac-

Citizen Interest in Using Public Internet Computers and Electronic Government Services

To gauge the possible demand for receiving routine government services electronically, we asked, "If you could do things like buy a license, receive a tax refund, register an automobile, or receive information from a government agency by using an ATM, a telephone, or a computer, would you be very likely, somewhat likely, somewhat unlikely, or very unlikely to use this method?" Only a little more than half—56 percent—of Kentucky adults replied, "very likely" or "somewhat likely." Nine percent said, "somewhat unlikely," and a third said "very unlikely." We did not ask people why they said they were unlikely to do so, but security concerns typically arise when personal information is being transferred electronically. No doubt a second factor is that some people prefer face-to-face transactions or at least some sort of human contact. Third, many people do not see the benefit of using electronic government services. We examine this issue more thoroughly in the next chapter.

When asked whether they would use the Internet at a local library if it were available,[5] 13 percent of respondents said they would be "very likely" to use it, 28 percent said "somewhat likely," 10 percent said "somewhat unlikely," and 38 percent said "very unlikely," while the rest didn't know.[6]

Table 2A: Interest in Using Technology to Receive Government Services

Likely		Unlikely	
Very	Somewhat	Somewhat	Very
25%	31%	9%	33%

Table 2B: Interest in Using the Internet at a Public Library

Likely		Unlikely	
Very	Somewhat	Somewhat	Very
13%	28%	11%	38%

Note: Actual results of telephone survey

5. If anyone asked, we said to assume usage would be free or very inexpensive.
6. The 9 percent who do not know what the Internet is were not asked the question.

financial transactions. A total of 31 percent have used an IVR system to conduct some sort of transaction, either with the government or a financial institution.

Slightly over one quarter of adults have sent or received e-mail in the past 12 months, and less than 10 percent have used video conferencing.

Who uses technology in Kentucky?

The people who use technology tend to be younger, better educated, wealthier, and urban. Gender and employment status affect the use of certain technologies, especially computers and the Internet, but not others. It is unclear what effect race has on technology use. Because we did not use any special sampling techniques, we had a fairly small number of nonwhites in our sample. Their rates of technology use were higher than those of whites, but the differences were not statistically significant.

One problem with looking at rates of technology use by people in different demographic categories is that demographic characteristics are correlated. College graduates earn more money than high school graduates, urban residents are younger than rural residents, and men are more likely to be employed than women. These relationships make it difficult to see which individual factors have the greatest impact on technology use.

Fortunately, we can use some advanced statistical techniques that help demonstrate the *independent* effects of various factors. These techniques enable us to say, "All other things being equal, each additional year of education raises the probability that a person will use the Internet by X percent." Or, "Even when income, age, education, etc. are the same, an employed person is X percent more likely to use a computer than a person who is not employed." Without getting too technical (we do that in the appendix), we constructed separate statistical models for each technology using a common set of explanatory variables to predict usage. The common set of explanatory variables is gender, age, race, employment status, years of education, household income, and location (counties are ranked along a 10-point urban-rural continuum). The statistical models enable us to isolate the effects of each of these explanatory variables on each technology.[7]

Why do we care about the independent effects of different demographic variables? They drive policy considerations. For example, we know that people in rural areas are less likely to use technology, but is that because of where they live or is it because they tend to have less income and therefore cannot afford new technology? By looking at the independent effects of location and income, we can answer this question. In fact, our statistical models suggest that even if two people—one urban, the other rural—had exactly the same income (and for that matter, the same education, age, race, gender, and employment status), the rural person would still be less likely to use technology. In other words, location has an independent effect on technology use. This, in turn, would lead us to conclude that rural areas might need special attention as state government implements electronic services for citizens. Another independent effect we discuss in more detail is that of education. This is one of the most important factors affecting technology use. Education's large independent effect is heartening, suggesting that education encourages people to use IT.

While reading the rest of this chapter, remember that numbers and percentages can tell vastly different stories. For example, 55 percent of Kentucky's college graduates and 22 percent of Kentucky's high school graduates use a computer at home, but Kentucky has only 486,000 college graduates, compared to 1 million people who stopped after high school.[8] Add to this the 707,000 adults who do not have a high school diploma (10 percent of whom use a home computer) and it turns out that fewer home computer users in Kentucky have a college degree than have a high school degree or less—266,000 versus 285,000. Therefore, when we explain which demographic groups are most likely to use technology, consider not only the rate of technology use within a group but also the size of the group.

7. Specifically, we developed bivariate probit full information models to predict computer use, Internet use, e-mail use, and ATM use. Simple probit models predict touch-tone phone use for a transaction, touch-tone phone use to get information, and video conferencing use. Model specifications and parameters are listed in Appendix A.

8. U.S. Bureau of the Census, Current Population Survey. (March 1996 update). *Educational Attainment in the United States.* Washington, D.C.: Author. p. 77.

Age

Generally, the younger a person is, the more likely he or she is to use technology, but that is not always the case. For example, Table 3 shows that computer use at home appears to peak for the age group between 35 and 49. At 44 percent, it is higher than computer use at home by adults under age 35 (34 percent) and adults age 50 to 64 (29 percent). A probable explanation is the effect of income: people age 35 to 50 typically have higher incomes than people under age 35, so they can more easily afford a computer. The only technology that people under age 35 use substantially more than people age 35 to 49 is the Internet. Although Internet use is becoming more widespread, it is still dominated by youth. Internet use is extremely low for older Kentuckians, with fewer than 2 in 10 Kentuckians age 50 to 64 having used the Internet in the past year and only 2 in 100 Kentuckians age 65 or older having done so.

The effects of age on technology use become much clearer when we eliminate the influence of other factors. Figure 1 demonstrates the estimated independent effect of age on technology use and suggests that when we eliminate the effects of other variables,[9] younger people are considerably more likely to use a computer. Although the downward slope for computer use is somewhat steep, its overall level is fairly high; even people in their 60s are estimated to have over a 30 percent probability of using a computer somewhere. The downward slope for e-mail use is roughly parallel to the slope for computer use, but overall levels are much lower. On the other hand, the downward slope for Internet use is more severe, suggesting a strong effect of age. For people in their mid-20s we estimate a 50 percent probability of using the Internet, compared with less than a 10 percent probability for people in their mid-50s. Folks older than 50 are even less likely to use the Internet.

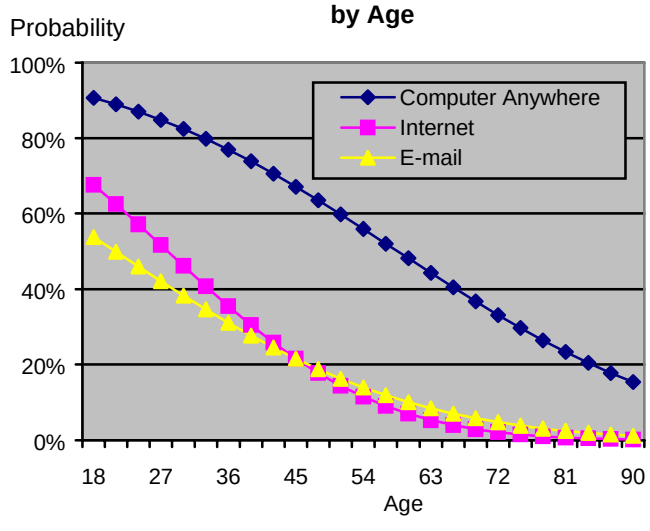
Younger people are also considerably more likely to get information or perform transactions with IVR systems. The similar usage rates across age groups listed in Table 3 show the effects of other variables that also affect use of touch-tone phones to obtain information or to perform transactions. When controlling for other factors, we estimate that a 25-year-old is about twice as likely to perform a transaction using a touch-tone phone as a 60-year-old. At all ages, it is fairly likely that a person has used a touch-tone phone to get information from an automated voice response system.

Table 3: Technology Use in Kentucky by Age
(Percent in each group who use the technology)

	Under 35	35-49	50-64	Over 64
Computer at home	34	44	29	10
Computer somewhere	74	73	46	19
Internet/ WWW	44	32	14	2
ATM (if available)	70	65	28	25
Touch-tone for transact.	42	37	24	16
Touch-tone for info	63	74	56	34
E-mail	41	35	18	7
Video conferencing	13	13	5	4

Note: Actual results of telephone survey.

Figure 1: Predicted Technology Use by Age



Note: For this and following graphs, the curves for Internet and e-mail use represent the probability that a person will use either technology, *given that he or she already uses a computer*. The curve for computer use is the probability of using a computer for everyone. The curves were generated using the statisti-

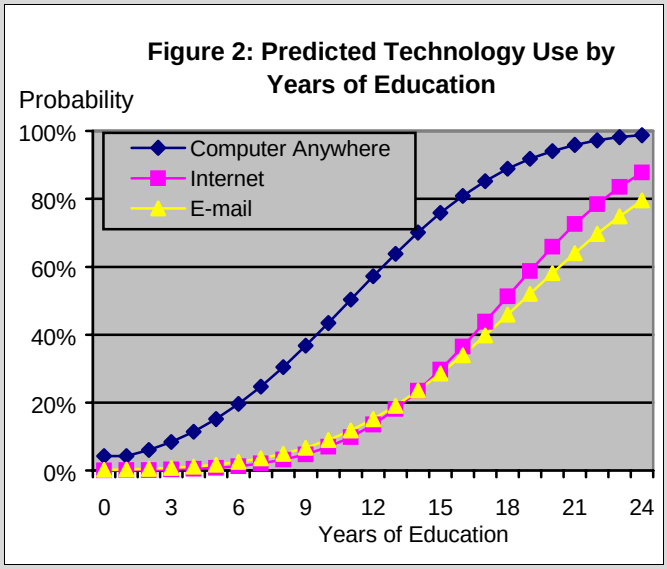
9. Recall that the common set of demographic variables used in all models is gender, age, race, employment status, years of education, household income and location. Eliminating the effects of variables means we set them at their mean levels and only change the variable of interest, which in this case is age.

Table 4 shows that people with more education are far more likely to use IT, and the gap between people in the highest and lowest education groups is often large. For example, more than half of all college graduates use a computer at home, compared with only one in five high school graduates and one in ten people who didn't finish high school.[10] More than half of all college graduates have also used e-mail and the Internet, while slightly more than 10 percent of high school graduates have used either, and only 4 or 5 percent of people without a high school diploma have used either.

Table 4: Technology Use in Kentucky by Educational Attainment
(Percent in each group who use the technology)

	Less H.S. Diploma	Diploma or GED	Some post-sec.	B.A./B.S. or more
Computer at home	10	22	40	55
Computer somewhere	20	46	73	83
Internet/ WWW	5	11	35	53
ATM (if available)	33	44	54	64
Touch-tone for transact.	14	24	38	49
Touch-tone for info.	24	55	71	81
E-mail	4	12	37	58
Video conferencing.	0	2	11	26

Note: Actual results of telephone survey



When we hold other demographic variables constant at their average levels, we find that education has a strong independent effect on technology use. Figure 2 illustrates the probability of using computers, the Internet, and e-mail as years of education change, independent of all other variables. The shape of the curves is noteworthy. The computer use curve has a steep slope between about 10 and 16 years of education, the range in which most Kentuckians fall. At the low end of this range, we predict only a 40 percent probability of computer use, compared to an 80 percent probability at the high end. The Internet and e-mail use curves are flat for much of the educational scale and do not get steeper until a person has graduated high school and begins postsecondary schooling. This suggests that a little bit of education after high school goes a very long way toward increasing Internet and e-mail use. All other things being equal and average, a college graduate is nearly three times more likely to use the Internet and more than twice as likely to use e-mail as a high school graduate. This may be due in part to the types of jobs college graduates and high school graduates tend to have. That factor is not controlled for in our models.

The independent effects of education are evident but aren't nearly as strong for use of a touch-tone phone to get information or to perform some sort of transaction. College graduates are about 15 percent more likely to get information and 12 percent more likely to perform a transaction than high school graduates. Predicted video conferencing use is very low for most people, but turns upward sharply for those who have more than a bachelor's degree.

10. For clarity, college graduates are not counted as a subset of high school graduates. Technically they are, of course, but when we use the phrase, "high school graduates, we are referring only to those people who received a high school diploma or a GED, but nothing more.

Income

Table 5 compares technology use among individuals in approximate quartiles for household income. Notice that the gap between people in the third and fourth quartiles is typically much smaller than the gap between people in the second and third quartiles. For example, 86 percent of those in the top quartile use a computer somewhere and 74 percent of those in the third quartile do, but only 46 percent in the second quartile use a computer. Likewise, 44 percent in the top quartile have used the Internet, compared to 35 percent in the third quartile and only 10 percent in the second quartile.

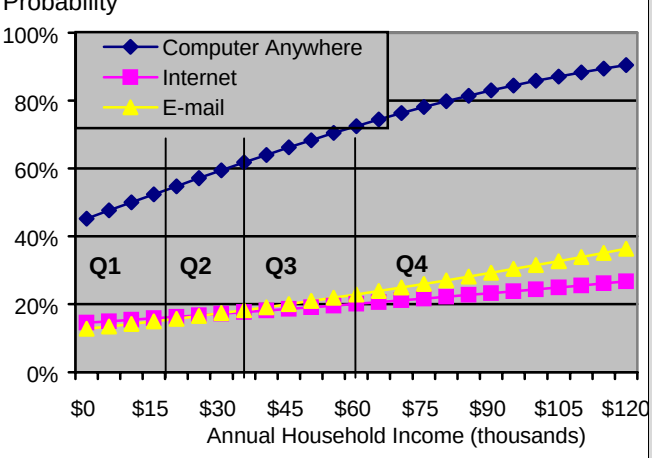
When we control for other variables correlated with income, such as education and age, we find that much of the difference across income groups disappears. Income does have an independent effect on technology use, but education and age are more significant factors. People in the highest income quartile are more likely to use computers, but the independent effect of income on technology use is not nearly as strong as the independent effects of age or education. The curves in Figure 3 for Internet and e-mail use are almost flat. Similarly, once we control for other variables we do not see large differences in the use of touch-tone phones to get information and to perform transactions, and there is almost no difference across income groups in the use of video conferencing.

Table 5: Technology Use in Kentucky by Household Income Quartile
(Percent in each group who use the technology)

	Thousands of dollars			
	$0-17.5 Q1	$17.5-35 Q2	$35-60 Q3	$60 + Q4
Computer at home	10	21	40	59
Computer somewhere	29	46	74	86
Internet/ WWW	14	10	35	44
ATM (if available)	32	51	60	58
Touch-tone for transact.	18	20	37	55
Touch-tone for info	38	58	74	84
E-mail	10	14	36	50
Video conferencing.	3	4	12	21

Note: Actual results of telephone survey

Figure 3: Predicted Technology Use by Household Income



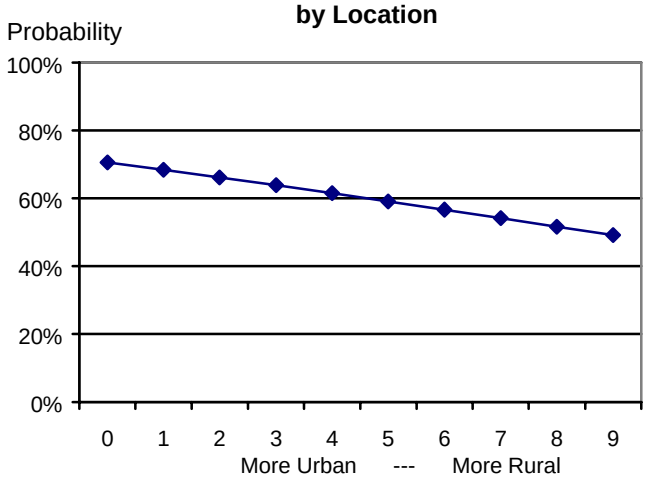
The rural-urban gap in technology use is sometimes large, sometimes small. Internet use in urban counties is double the use in rural ones, and the same is true for e-mail, but touch-tone phone use for information and for transactions is reasonably close and use of video conferencing is virtually the same. But a simple rural-urban dichotomy masks some of the subtleties of the locational effects on technology. Although they are not classified as urban, counties like Franklin, Hardin, McCracken and Warren have fairly large cities (Frankfort, Elizabethtown, Paducah, Bowling Green) and are probably more similar to urban counties than they are to counties like Hickman or Clinton. These intermediate counties generally have somewhat lower rates of usage than the true urban counties, but have higher, sometimes much higher, usage rates than counties that are extremely rural.

Table 6: Technology Use in Kentucky by Location
(Percent in who use the technology)

	Urban	Rural
Computer at home	40	25
Computer somewhere	65	50
Internet/ WWW	35	18
ATM (if available)	62	40
Touch-tone for transact.	35	29
Touch-tone for info	69	52
E-mail	38	19
Video conferencing	10	9

Note: Actual results of telephone survey.

Figure 4: Predicted Computer Use by Location



Note: We used a slightly different probit model in order to generate this chart. The location variable was continuous, from 0 to 9, rather than a series of dummy variables, which we used in all other cases.

The findings in Table 6 are not unexpected, because people in rural areas tend to be older, have less education, and have less income, all factors which would contribute to lower rates of technology use. But even when we control these other variables location appears to have an independent effect on the use of some technologies (see Figure 4). Using a 10-point urban-rural scale developed by the U.S. Department of Agriculture,[11] we find that the more rural a county is, the less likely it is to use IT. The one exception seems to be touch-tone phones for transactions, for which locational effects are negligible.

Exactly what accounts for the independent effects of location on technology use is unclear. Possibly social effects are at work which are not measured and therefore are not taken into account by our models. People in urban areas who do not use technology are surrounded by people who do, thus increasing opportunities for informal demonstrations and tutoring, as well as creating a climate in which technology use is simply expected.

Attitude may also play a role. We examine attitudes in detail in the next chapter, but it is worth noting here that rural areas tend to have more "technology pessimists"—people who do not see the benefits of using technology.

People in rural areas stand to benefit most from using time-saving and distance-eliminating technologies, but they also are less likely to use them, even when we account for other demographic factors. The independent effect of location on technology use in Kentucky is therefore an important finding of this report.

11. To see how each county is rated on the 10-point urban-rural scale, see Appendix B.

Government Assistance

Many people do not interact with the government very often. They pay taxes, register their automobiles and maybe vote every year, but other than that they do not have much occasion to use a magnetic stripe card or the World Wide Web to conduct business with the government. Other people, however, rely on the government directly or indirectly to ensure that they have proper medical care, nutrition, and income. These are people who receive Temporary Assistance to Needy Families, unemployment insurance, worker's compensation, and Social Security benefits. They interact with federal, state and local governments on a regular basis and will soon be required to use magnetic stripe cards, and possibly smart cards, to access accounts to which the government will transfer benefits electronically. They may also be able to call state agencies and, using an IVR system, get information about their benefit eligibility or their account status. Perhaps they will even be able to file forms or receive information using the World Wide Web.

People receiving government assistance have, on average, less education, less income, and are somewhat older, particularly the Social Security recipients. Together, these factors make people who receive government assistance significantly less likely to use IT on their own. For instance, 70 percent of the general population uses a computer somewhere, compared with only 30 percent of those receiving government assistance. Nearly 60 percent of the general population with access to an ATM uses one, compared to 35 percent of those receiving government assistance. People who receive government assistance are similarly less likely to use the Internet and touch-tone phones to get information or to perform financial transactions.

Table 7: Technology Use in Kentucky by People Receiving Government Assistance
(Percent in who use the technology)

	Recipients	Non-recipients
Computer at home	15	40
Computer somewhere	29	71
Internet/ WWW	8	34
ATM (if available)	34	58
Touch-tone for transact.	19	38
Touch-tone for info	42	68
E-mail	9	36
Video conferencing.	1	13

Note: Actual results of telephone survey.

When we control for other variables, such as education and income, we find that receiving government assistance has no independent effect on technology use. In other words, there is nothing inherent about people who receive government assistance that makes them less likely to use a computer or conduct a transaction using a touch-tone phone. Rather, it is their age, income, education and employment status that account for the gaps in technology use between them and the rest of the population.

Gender

Gender gaps are usually not large and for two technologies are nonexistent. An equal percentage of men and women have used a touch-tone phone to get information (60 percent) and an ATM (51 percent). On the other hand, 40 percent of men and only 24 percent of women use a computer at home, and 30 percent of men versus 22 percent of women have used the Internet in the past year.

When controlling for other factors we find that women are about 7 percent *more* likely to use a computer somewhere. This may be explained by computer use at work. Men and women with advanced education tend to be professionals and technical workers, many if not most of whom use a computer at work. At the lower end of the education scale, men are more likely to be laborers while women are more likely to be in service occupations, which have a higher rate of computer use. Among people who use computers, men are about 6 percent more likely to use the Internet and e-mail. When we control for other factors we find that men are more likely to conduct transactions using a touch-tone phone, but women are more likely to get information using a touch-tone phone.

Employment Status

Employed people typically use IT about twice as frequently as the nonemployed (which includes those looking for work and those not active in the labor force). However, we see a different picture once we control for other factors. Computer users who are employed actually have a *lower* likelihood of using the Internet than computer users who are not employed, and they have only a slightly higher likelihood of using e-mail. Possibly this is because Internet and e-mail use are restricted in some workplaces. The estimated employment effect in our statistical models is generally fairly weak for most technologies (computer use is a notable exception), which means that most of the differences we see in Table 9 are due to factors other than employment status.

Table 8: Technology Use in Kentucky by Gender
(Percent in who use the technology)

	Male	Female
Computer at home	40	24
Computer somewhere	61	53
Internet/ WWW	30	22
ATM (if available)	51	51
Touch-tone for transact.	36	27
Touch-tone for info	60	60
E-mail	33	23
Video conferencing	12	7

Note: Actual results of telephone survey.

Table 9: Technology Use in Kentucky by Employment Status
(Percent in who use the technology)

	Employed	Not Employed
Computer at home	41	18
Computer somewhere	77	29
Internet/ WWW	35	12
ATM (if available)	60	35
Touch-tone for transact.	39	21
Touch-tone for info	72	42
E-mail	39	11
Video conferencing	13	5

Note: Actual results of telephone survey.

Race

Nonwhites in our survey use all technologies more than whites. However, only 49 people in the survey classified themselves as some race or ethnicity other than white (two refused to answer the question), and with such a small sample size the differences in usage are not statistically significant. We expected usage to be lower among nonwhites, not because of their race but because of other factors that correlate with race, such as education, income, and employment.[12] Because of the small sample size, it would be imprudent to read much into these findings.[13]

For most of our statistical models, the coefficient for race had a large standard error relative to the coefficient. Put more simply, we're not sure the models really tell us anything about the effects of race. The models tend to narrow the gap in usage between whites and nonwhites, but for e-mail and touch-tone phones for transactions, the gap remains the same.

12. Even age is correlated with race, although this factor would favor nonwhites. The median age for nonwhites is about five years less than the median age for whites.

13. When we examined the data, we found that nonwhites in our survey were over-represented by people with some postsecondary training. This may explain the unexpected results.

Summary

The two factors that seem to have the largest effect on technology use are education and age. One factor the government is primarily responsible for providing; the other factor government can do nothing about. Income also has an effect, but it is not as strong as that of education or age. Location also affects technology use. Even taking into account the differences between urban and rural residents in educational achievement, income levels, age and other demographic characteristics, where a person lives appears to have some effect on whether he or she uses technology. Gender makes a difference, but not a great one. All other things being equal, women are somewhat more likely to use computers, but men are more likely to use the Internet and e-mail. Gender also accounts for small differences in the use of touch-tone phones to get information and to conduct transactions. Less important is employment status. Employment helps determine whether a person uses a computer, but it does not have much of an effect on other technologies. Least important, it appears, is race. Nothing in the data suggests that race affects technology use, although our sample size of nonwhites is too small to conclude much about racial factors.

In the next chapter, we look at a factor that we could not directly measure in our survey but has just as significant an effect on technology use as age or education or income. That factor is attitude. Regardless of how people are grouped demographically, the more optimistic they are about the uses and benefits of technology, the more likely they are to use it.

Attitude Counts

The previous chapter showed that some Kentuckians—those who are older, poorer, less educated, and living in rural areas—are less likely to use technology. But still we find that some of the elderly, the poor, the less educated, and rural residents use computers, access the Internet, have an ATM card, and obtain information by touch-tone phone. This is so because demographic factors alone do not determine whether a person uses technology; attitude also counts. People who see the computer as a helpful and efficient tool rather than an intimidating and complicated contraption are more likely to use it.

Who are the technology optimists? Who are the pessimists? According to Forrester Research, Inc., technology optimism and pessimism transcend other demographic groups; technology optimists may be young or old, poor or wealthy. Forrester combines a person's attitude toward technology with his or her primary motivation (family and self-improvement, career, entertainment, or status) and disposable income to create a "technographic" profile, which suggests the extent to which a person uses technology.

Forrester divides the population into the 12 categories shown in Table 10 based on disposition to use technology. According to Forrester, the largest category, accounting for more than one third of all consumers, are the *sidelined citizens*, people with low incomes who are skeptical about the benefits of technology. The next largest group, about 14 percent of consumers, is the *neo-hearthminders*, family-oriented people who are optimistic about technology's benefits. They have the highest potential for using technology. Income does not have an important

Table 10: Technographic Segments of the Population

		Primary Motivation			
		Family or Self-Improvement	**Career**	**Entertainment**	**Status**
Technology Optimists	**High Income**	*Neo-hearthminders* Highest potential group of future technology consumers	*Fast Forwards* Adopters of business technologies and productivity software	*Mouse Potatoes* Seek interactive entertainment on a PC; Web surfers	*Cyber Snobs* Technology lovers; buy big-ticket items like IBM Aptiva, DBS
	Low Income		*Techno-strivers* Students, young professionals; highest computer ownership among low-income segments	*Gadget Grabbers* Buyers of low-cost high-tech toys like Nintendo or Sega	*X-techs* Attracted to social technologies like cell phones, pagers; Web surfers
Technology Pessimists	**High Income**	*Traditionalists* Midwestern and small-town folks with little more than a VCR	*Handshakers* Successful professionals; value relationships over technology	*Media Junkies* TV lovers; visual consumers; not PC-savvy	*Country Clubbers* Indifferent to technology
	Low Income	*Sidelined Citizens* Least receptive audience for any technology			

Source: Forrester Research, Inc.

influence on technology use for neo-hearthminders. Income does not affect the pessimists' technology use, either. Similarly, our survey of Kentuckians found that while household income does affect technology use, other factors are more significant.

The technographic profiles do not directly consider age, but Forrester does provide some additional data suggesting that technology optimism is related to age. Half of men and women under age 45 are optimists, 33 percent of men and 23 percent of women age 45 to 64 are optimists, and 12 percent of seniors are optimists.

Forrester does not examine the influence of education on technology optimism, although it does note that 75 percent of students are classified as technology optimists. We found education to be a significant factor affecting technology use. One might argue that people with more education have probably had more opportunities to use and to see the benefits of computers, e-mail, and other technologies, thus increasing their chances of being technology optimists.

Location also appears to affect technology optimism. Forrester claims that technology pessimism is more prevalent in the Midwest (which Kentucky borders and is sometimes considered a part of) and small towns (of which Kentucky has an abundance).

Table 11: Interest Among Kentuckians in Using Technology to Receive Government Services, by Demographic Group (percent)

"If you could do things like buy a license, receive a tax refund, register an automobile, or receive information from a government agency by using an ATM, a telephone or a computer, would you be very likely, somewhat likely, somewhat unlikely or very unlikely to use this method?"

		Likely		Unlikely	
		Very	Somewhat	Somewhat	Very
Income	Under $17,500	14	20	10	56
	$17,500-$35,000	22	32	6	40
	$35,000-$60,000	29	43	7	21
	Over $60,000	37	37	10	15
Age	Under 35	39	37	12	13
	35-49	29	42	10	19
	50-64	19	24	9	46
	Over 64	7	12	5	73
Education	Less than H.S. Diploma	6	24	4	60
	Diploma or GED	22	31	12	35
	Some postsecondary	30	32	8	30
	Bachelor's or more	40	34	10	15
Use computer somewhere		35	39	10	16
Doesn't use computer		12	21	9	56

Note: Actual results of telephone survey.

Who are the technology optimists in Kentucky?

As we noted in the previous chapter, only a little more than half of adults responded that they would be very likely or somewhat likely to use an ATM, a telephone or a computer to do simple things like buy a license, receive a tax refund, register an automobile, or obtain government information. This does not mean that half of adults *wouldn't* use electronic government services as much as it suggests that they *don't see the benefits* of doing so. In other words, it gives us a rough idea of who the technology optimists and pessimists are. Table 11 lists the response rates to this question by people in various demographic categories. Somewhat unexpected are the large percentages of people in some groups who said they would be *very unlikely* to use technology to receive government services—50 percent of people who do not work, 60 percent of people with less than a high school education, 73 percent of people age 65 or older. They are the technology pessimists.

People who already use technology are much more interested in using electronic government services. Among people with a high school education or less, only 30 percent of people who do not use a computer said they would be somewhat or very likely to use electronic government services, compared with 70 percent of computer users. Among people age 50 or older, 21 percent of people who do not use a computer said they would be somewhat or very likely to use electronic government services, compared with 53 percent of computer users.

We asked another question to examine people's interest in using technology: "If a local library made computers with Internet connections available for public use, do you think that you would be very

likely, somewhat likely, somewhat unlikely or very unlikely to use the Internet at the library?" Less than half replied, "very likely" or "somewhat likely." Table 12 lists the responses by demographic group.

The responses are very similar across income and education groups, probably because the responses reflect not only interest but current access. People with higher incomes and more education are probably more interested in using the Internet, but they are also more likely to already use it and thus would not need to use it at the library. People with less income and education are probably less interested in using the Internet, but are also less able to afford private access if they want it. Still, we know that attitude strongly affects the response to this question, because of the clear effects of age. Older people, who we know are not using the Internet anywhere else, say they are not likely to use it even when it's available at a public library.

Table 12: Interest Among Kentuckians in Using the Internet at a Public Library, by Demographic Group (percent)

"If a local library made computers with Internet connections available for public use, do you think that you would be very likely, somewhat likely, somewhat unlikely, or very unlikely to use the Internet at the library?"

		Likely		Unlikely	
		Very	Somewhat	Somewhat	Very
Income	Under $17,500	19	23	9	47
	$17,500-$35,000	12	37	8	44
	$35,000-$60,000	17	32	16	34
	Over $60,000	12	29	12	46
Age	Under 35	19	48	10	22
	35-49	17	36	13	33
	50-64	10	19	16	54
	Over 64	5	12	8	75
Education	Less than H.S. Diploma	10	18	6	63
	Diploma or GED	12	32	13	43
	Some postsecondary	16	37	10	36
	Bachelor's or more	17	31	15	37
Use computer somewhere		20	38	13	29
Doesn't use computer		5	20	11	63

Note: Actual results of telephone survey.

Things might be better than they look

No doubt many of our technology pessimists shop in mega-marts, never realizing that IT is used in all sorts of store operations so that prices can be kept lower. Many people purchase lottery tickets without ever thinking about the technology behind them. As people increasingly understand that they benefit by using IT indirectly, they may be more willing to use it without an intermediary.

As the technology continues to improve, the number and quality of applications will increase and more people will want to use the technology.

Also, low-priced but powerful computers are becoming a larger and larger share of the market. As computing ability and Internet access become increasingly available and affordable via the TV, more people will have a chance to use the technology and enjoy its benefits.

The number of computers on the job will also increase, but many people will not be able to conduct personal business at work. Thus people will likely become more interested not only in using the technology but also in using it at home or even in places like the public library.

For now, though, it is mainly younger, wealthier, better educated Kentuckians who are most interested in using electronic government services. One way to increase exposure to the technology is to make it available in public places such as libraries, but *without other incentives* most people do not seem particularly interested in taking advantage of this opportunity. Technology is not a field of dreams; it is wrong to just assume that if we build it, people will come. More must be done. In the final chapter, we offer some policy options which will improve attitudes toward technology in addition to making it more accessible and easier to use.

Bridging the Gaps

A great challenge confronts Kentucky. The very people who stand to benefit most from technology's abilities to shorten distances and alleviate isolation are the least likely to put new technology to use. Moreover, this is true not just for individuals but also for municipalities. While some towns have created electronic networks, others do not even have a fax machine. Although the focus of this report is on government services, it is certainly true that low levels of technology use have broader economic development and quality of life implications for individuals, businesses, and communities. At the same time, though, technology is not a panacea to cure all of Kentucky's problems. We must see it for what it is: one more tool that we can use to make our lives easier, our businesses more competitive, our communities more pleasant, and our government more efficient and effective.

Because the benefits of technology extend so far beyond the realm of government service, there is no reason for governments, be they federal, state, or local, to work in isolation from each other or from the nonprofit and private sectors as they begin to deploy new technologies. In other words, state government needs partners to help it nurture technology use in Kentucky. Therefore, our policy options are not simply directed at state government but at all agencies, groups, and individuals who are working to increase Kentuckians' use of new technology.

If the challenge of increasing technology use is daunting, it might seem more manageable if we break it into a few smaller tasks. We suggest three:

1. Increase the number of technology optimists.

2. Train people to use technology/Make it easier to use.

3. Give people access to the technology.

1. Increase the Number of Technology Optimists

As we found in our survey, many citizens are wary of, or unaware of, the potential use of technology to deliver government services. But citizens are not the only people who can be technology pessimists. Some policymakers are unconvinced that supporting a government Web page or issuing a benefits debit card is worth the money, the time, or the hassle. Others have never even considered the possibilities of electronic government. Arguments may persuade some, but nothing is as convincing as a demonstration. Following are several suggestions for increasing the number of technology optimists by demonstrating the benefits of technology.

Hold an IT Expo

Government agencies wishing to demonstrate to elected officials the merits of using IT to deliver government services might consider an IT Expo. An IT Expo is an excellent opportunity to show elected officials how technology not only serves citizens but also improves internal operations in government.

While such an expo might not be feasible for a single small municipality, a group of local governments could hold a regional IT Expo, which could enable local governments to learn from each other and might even foster coordination of things like policing, welfare, and job training. A state IT Expo could be held in Frankfort with all of the legislators and other state elected officials invited. An IT Expo would surely attract private-sector interest, perhaps even sponsorship, and could also help promote Kentucky's IT-related businesses.

Provide universal e-mail access

One simple but effective way to demonstrate the benefits of IT to private citizens is to give them personal e-mail accounts. According to a 1993 RAND study, e-mail is for many people the critical first entry point to broader participation in electronic communities.[14] Once people see that communicating by e-mail is cheap and easy, they are often willing to experiment with more advanced activities, such as conducting searches and retrieving files. In our survey of Kentuckians, we found that e-mail users are more likely to be technology optimists, regardless of their economic or educational standing. State government and its partners might consider the feasibility of setting up universal e-mail accounts on the Kentucky Information Highway (KIH). E-mail accounts maintained by the KIH could offer government agencies an inexpensive way to communicate news and information. Citizens could access e-mail accounts at computers in the public library or in local technology centers like those being set up by the Center for Rural Development and the Kentucky Science and Technology Council.

Build local electronic networks

By offering local news, information, links to government services, and links to people inside and outside the physical community, an electronic community induces people to use the Internet and the World Wide Web. A local community network could serve as home to civic groups, schools, and businesses, and could provide a forum for people to communicate by using their free e-mail addresses. Of course, a local community network is where many people would go to search for government services on-line. The former coordinator of Minnesota's website for government information and services has found that citizens almost always start looking for government services that are local, such as renewing a dog license.[15]

Developing an electronic community network will require a strategic alliance between businesses and a local government. Cable television operators and electric utilities are major players in local IT infrastructure planning and provision. Other businesses will be interested in tapping information resources about markets, suppliers, and competitors. The state could set up a loan program for communities that want to establish an electronic community; Indiana has such a network.[16] Community colleges and local school districts could play a role in providing training and access to the technology once such a network is in place.

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14. Anderson, R.H. et al. (1993). *Universal access to e-mail: Feasibility and societal implications*. Santa Monica, CA: RAND.
15. Newcombe, T. (October, 1997) If you build it, will they come? *Government Technology*. October 1997. supplement p. 22.
16. National Governors' Association. (1996). *Ideas that work: Infrastructure*. Washington, D.C.: author. pp. 80-81.

Use traditional communications to support new technology

This is simple. When people perform a transaction electronically, send them a piece of paper to confirm that it was recorded successfully. When people want to call a government agency and speak to another human being, give them that option. Although this may sound like it runs counter to the notion of increasing electronic government services, in fact it does not. It acts as a reassurance to people that the technology does work, that there really is somebody on the other end, and that the technology can be accommodating. When the federal government wanted to find out how people felt about electronic funds transfer of benefits, it learned that people want to be notified when their benefits are deposited and they want to be able to call somebody in case there is a problem with the electronic transfer. With these measures in place, recipients of government assistance said they would be more willing to try electronic funds transfer.[17]

2. Train People/Make Technology Easier to Use

People will no doubt feel even more optimistic about IT once they are trained to use it. Of course, the easier the technology is to use, the easier it is to train people to use it, so these two tasks fit closely together.

Simple, Same, Similar

State and local agencies must remember the three S's: *Simple, Same, and Similar*. User interfaces, be they voice or visual, should always be *simple* to use. Government agencies should coordinate with each other so that the *same* Web site or IVR menu can serve several purposes whenever possible. Otherwise, the interfaces should at least look and sound *similar,* so that people don't have to learn how to use a new system when they need services from another agency.

Limit options and menu levels of IVR

IVR systems should be kept *simple* by limiting the number of options and menu levels of the system. When the Center for Technology in Government tested an IVR system in New York state that gave callers business permit information, it found that the average participant obtained only 38 percent of the necessary information about which agencies needed to be contacted, which forms had to be filed, and which fees had to be paid. Worse, 43 percent of the participants were either confident or highly confident that they had obtained all of the necessary information. The Center for Technology in Government recommended that it would be more cost effective to add a human operator capable of answering more questions than those answered by an automated system.[18]

17. Booz, Allen & Hamilton Shugoll Research. (1997). *Mandatory EFT demographic study*. Washington, D.C.: United States Department of the Treasury. www.fms.treas.gov/eft/demogra.html accessed 11/4/97.
18. Andersen, D.F. et al. (1995). *Reviewing the performance of ORMA's voice response system for automated business permit information: Integrating technical, cost-based, and customer-oriented evaluations of system performance*. Center for Technology in Government University at Albany—SUNY. p. 9.

Apply the "one-stop-shopping" principle to government services

When a new business opens, it may have to submit forms to federal, state, and local governments; when people want to renew a license or pay a property tax, they may not know whether it falls under the jurisdiction of state or local government; even if people know exactly which level of government has jurisdiction over a service, they may not know which branch of which division of which department of which cabinet they need to contact. In short, citizens should be able to go to the *same* Web site to receive a variety of government services. In the long run, federal, state, and local services will be integrated into a single site; the state of Iowa is already developing a "seamless" Web site using a $3.9 million grant from the federal government.[19] Kentucky's state government will need to cooperate with local jurisdictions to reach a point where citizens can receive all of their government services in one place. That is a long-term goal.

Meanwhile, Kentucky's government Web sites could use some major rearranging. At Kentucky's official state home page, the "state government information" page is arranged organizationally rather than functionally, a characteristic of many state agency Web sites. This is a problem because many, perhaps most, people do not know which particular agency nestled somewhere inside state government provides the information or the services they want. State agencies might consider doing something as simple as featuring a frequently asked questions (FAQ) link on their home pages. The state home page should prominently feature links to various government services and information (as opposed to government agencies). Local government Web sites suffer from similar problems

Use a standard URL protocol for local governments

Finding the local governments that have Web sites is often challenging. Many local governments do not have a site and those that have one do not follow a standard addressing protocol. Presently, almost every state government in the nation has a website at www.state.*st*.us. For example, Kentucky's state government website is at www.state.ky.us, Tennessee's is at www.state.tn.us, Ohio's is at www.state.oh.us, and so forth. The same is not true for local governments in Kentucky. Their government homepages have a confusing mish-mash of domain names, extensions, and unintelligible abbreviations. Someone looking for information or on-line services from Louisville's city government would need to go to www.louisville.ky.us, while the same information for Owensboro is at www.owensboro.org, and for Pikeville it's at www.kymtnnet.org/PikeC1.html, to say nothing of the 15 area development districts, 120 counties, 176 school districts, and countless other government and quasi-government entities in the state. Nationally, some city and county governments use the following protocols: www.ci.*cityname*.*st*.us and www.co.*countyname*.*st*.us. Local governments should adopt these formats when setting up a Web site, and other governments which already have a site could change their addresses or set up a page at the new address which will automatically load their current page.

19. Grimley, B. (October 1997). Service without the seams. *Government Technology*. supplement p. 19.

Train people to use IT by using local resources

The Economic Development Cabinet has a "train-the-trainers" program for people involved in international trade. The same principle should be applied to government technology. The Southern Technology Council examined the process of technology adoption in schools (including several of the technologies discussed in this report) and concluded that "key resources are local and peer-to-peer."[20] Teachers who face the intimidating task of learning to use computers, e-mail, and the Internet turn to one another for help. By relying as much as possible on local, familiar trainers, government can help ease people into using new technology. Moreover, teaching everyone in Kentucky to use a computer is too large a task for any state agency. The state could start by identifying and training local administrators, who in turn might design their own "train-the-trainers" program to be carried out on a peer basis. When it comes to training people to use new technology, the more familiar the trainer is to the trainee, the better.

Use community colleges and universities to help with the training

Kentucky's newly restructured postsecondary system is currently forming a new mission and goals for community colleges and technical schools. This is an excellent opportunity to incorporate improving local IT literacy as a goal of the community college system. Not only might community colleges and technical schools train people to use the technology, they could also act as clearinghouses of information, with experts to answer questions on electronic government services. Local school districts and adult education programs could also offer short courses in technology use.

3. Give People Access to the Technology

Access to different technologies varies. According to the Kentucky Telephone Association, all local service providers have the equipment necessary to allow touch-tone dialing. Most banks allow their customers to use ATMs, although some have many more machines than others. Access to video conferencing is limited. Many people do not have access to a PC.

Provide computers with Internet connections at the libraries

Libraries have historically been a place where people access information, usually at very low cost, so they are one logical place to have public computers with Internet access. However, many counties have few publicly-available computers. In fiscal year 1994-95, only eight counties had more than three library computers available to the public for every 10,000 people living in the county. Nearly half had none.

In the fall of 1997, the Kentucky Department of Libraries and Archives announced the "Internet Access in Public Libraries" demonstration project, in which 24 public libraries were initially selected to provide free Internet access. The project is intended to show the need for Internet access in all public libraries. But local partners also have an important role to play in deciding what sort of computer training and support services might be necessary, whether to target specific groups and cater to their needs, and how much

20. Casson, L. et al. (1997). *Making technology happen*. Research Triangle Park, NC: The Southern Technology Council. p. 132.

additional funding to provide for facilities, hardware, and software.

Use schools to provide computer access

All 176 school districts in Kentucky are connected to the Internet, and the state is working to connect all schools. In many schools nobody uses the equipment after 3 p.m., because everyone goes home and the doors are locked. This is due mainly to the fact that it costs money to keep a computer lab open in the evening and to pay someone to be there in a support role. The local chamber of commerce might provide funding to a school to open its computer lab one or two nights a week as an economic development project. People interested in starting a business or finding a better job, and businesses looking for market information or contract information from the state could use these school computers in the evenings.

Put technology where people are

Everyone goes to the grocery store. Banks realized this and began putting ATMs there. Today a person can walk into one of the larger grocery chains and receive full-service banking. Post offices, schools, libraries, county health departments, and hospitals are other places that not only have a lot of traffic, but also tend to be places people go when they have a problem or a need. ATMs and Internet-connected kiosks in these places could allow people to check on benefits, obtain information, and interact with government electronically.

Making It All Happen

The policy options listed in this final chapter are specific activities which will help accomplish three tasks: increase the number of technology optimists, make sure people can use the technology, and give people access to the technology. Once people want to use something, know how to use it and have access to it, they will probably use it. Getting there will not be easy. Our telephone survey found that a large share of Kentuckians do not use computers, the World Wide Web, e-mail, or video conferencing; many people don't have or don't use an ATM card; many people have not performed a transaction or even received information using a touch-tone phone. In addition to these obstacles, other issues will need to be addressed as state and local governments increasingly use technology to provide citizen services.

Bring back a legislative committee for IT

There is no single entry point to the state legislature for technology planners. The Special Subcommittee on Statewide Information was dissolved in 1994 in an effort to reduce the number of legislative committees, so today jurisdiction of technology issues is spread among several committees. With IT becoming increasingly important for state operations, particularly now that EMPOWER Kentucky is well underway, the state legislature should consider bringing back a joint committee or special committee for IT to act as the communications channel between the executive and legislative branches on technology issues. It could also be responsible for matters such as a statewide program to assist communities developing a local network.

The state also needs to hire a Chief Information Officer, who, with a legislative oversight committee, can answer some increasingly important questions: What is the role of state government in funding and supporting local technology projects? How should technology used by the judicial, legislative, and executive branches be coordinated? Are technology projects receiving adequate funding by state government? Might something like matching grants and a promise of a couple years of technical support spur local groups to pursue more technology projects? These are all important issues for state government to address.

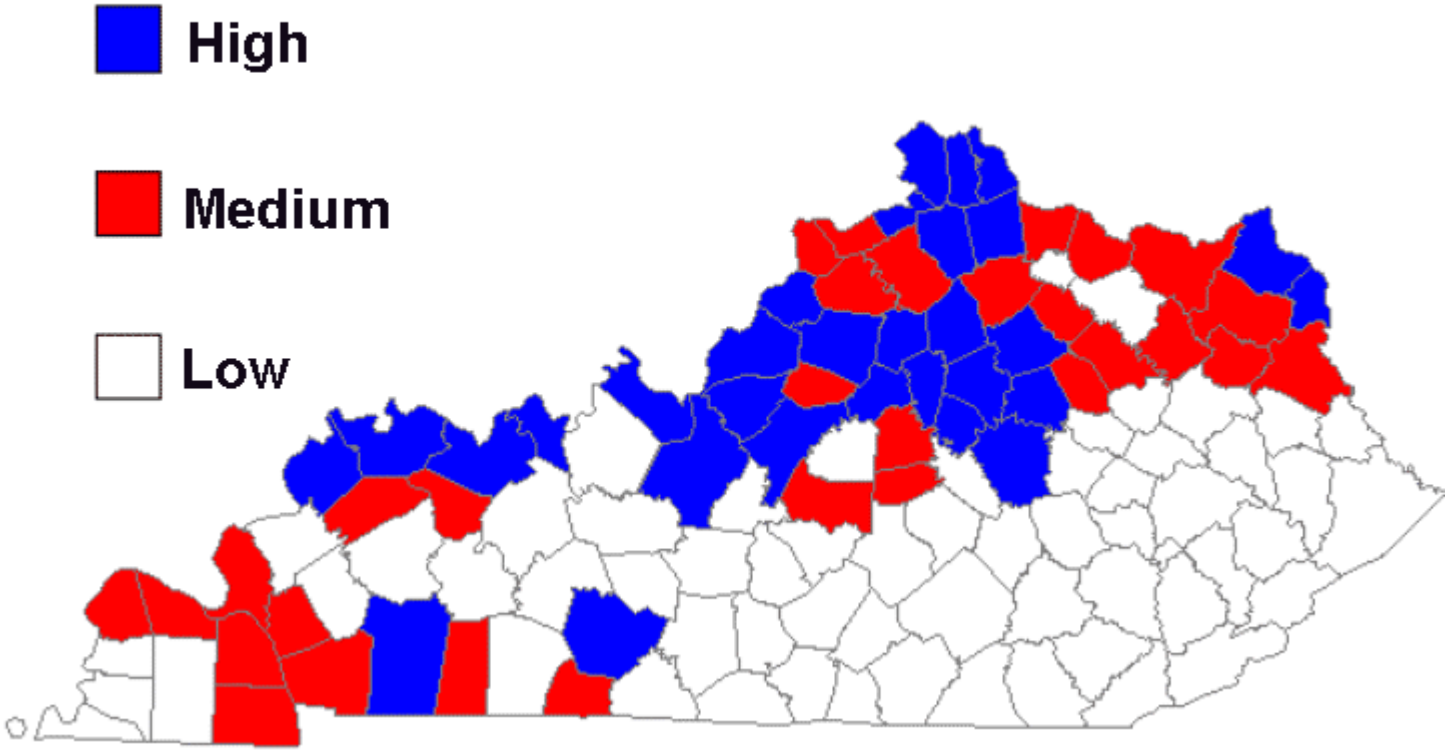
Local and private cooperation are essential

The private sector also has a huge role to play in promoting technology use, providing training, and perhaps even access. Private sector efforts will be rewarded, because the level of technology use in a state, region, or town is just as much a competitiveness factor as the quality of sewers, roads, or schools. Moreover, public-private cooperation could help more businesses gain access to the Internet, e-mail, and electronic data interchange. According to a separate survey by the Kentucky Long-Term Policy Research Center, only 49 percent of new, small businesses have access to the Internet, 29 percent use e-mail, and 12 percent use electronic data interchange. Seventeen percent do not even use a computer. Only about 1 or 2 percent of the state's firms have Web sites. The telephone survey did not include enough people in any single county for us to say with much certainty what percent of people in each county use IT. But by using our statistical models, we can predict usage rates based on each county's educational achievement, income levels, employment levels, and so forth. Figure 5 (on the following page) shows predicted technology use in each county. Counties in eastern and south central Kentucky are predicted to have low levels of technology use, while rural counties in the Bluegrass, north eastern and western areas of the state are predicted to have medium levels of use, and urban counties are predicted to have high levels of use.[21] As we stated in the introduction to this chapter, the very people who stand to benefit most from using IT are the people who are least likely to use it. Civic leaders in these counties must work with organizations like the Center for Rural Development in Somerset and the Kentucky Science and Technology Council, which are helping communities set up local technology centers.

We should not underestimate the importance of coordination between different levels of government and different agencies both inside and outside of government. As the federal government reinvents itself, it will hand more and more responsibilities and control to state and local governments. State and local agencies will handle these responsibilities better and more efficiently if they work together to develop a coordinated plan for reinventing government in Kentucky. This will not be easy, however. When Utah began implementing its program for bringing electronic government services to its citizens, it found that two of its most difficult obstacles were disagreements over jurisdiction and standards. Agencies had to accede to common hardware, operation and

21. Each county received one "point" for every technology that at least half of the adult population was predicted to use. Counties ranked as low technology users had a score of 0 or 1 out of a possible 6. Counties ranked as medium technology users had a score of 2 or 3, and those ranked as high technology users scored 4 or higher. For each county's score for each technology, see Appendix C.

Figure 5: Map of Predicted Technology Use by County



management, in addition to uniform naming and addressing standards.[22] But the benefits are worth the trouble. After all, one of the great strengths of Information Age technology is its ability to integrate. Information is no longer compartmentalized, and communication is so rapid that physical distances are almost meaningless. It would be a shame to stop short of government's full potential.

Final checklist

Government cannot force people to use technology, but it can encourage technology use. We offer this final checklist of questions for any government agency, state or local, planning to provide services or information electronically.

- ⇒ How many people who currently receive this service or obtain this information by conventional means are technology pessimists?
- ⇒ Is our user interface easy to use? Have we followed the three S's?
- ⇒ How can we coordinate with other agencies at other levels of government to improve, simplify, and enhance our services?
- ⇒ Will people have access to the necessary technology?
- ⇒ Do people need any special training to use the technology? If so, who should do the training, and how do we train the trainers?

22. National Governors' Association. (1996). *Ideas that work: Infrastructure*. Washington, D.C.: author. p. 103.

Appendix A

The basic decision modeled here is whether household i has adopted the jth type of information technology. The technology choice set includes the use of computers, e-mail, the Web, ATM cards, and telephones to interact with IVR systems. We hypothesize that the adoption is based on the following socioeconomic variables, with the abbreviation of each variable and (where anticipated) the expected direction of the effect on the adoption probability shown in parenthesis: the household's total income (INC; >0);[A1] the highest education achieved by the respondent (EDU; >0); whether the respondent is currently employed (WRK; >0); the respondent's age (AGE; <0); and, as demographic controls, the sex (SEX) and race (RAC) of each respondent. Previous work, including that of Kusmin (1996) and the Census Bureau has shown these variables to affect the use of computers.[A2] In particular, education is important because it is correlated with occupation. To capture the location of the household in terms of metro or nonmetro counties, we use the Beale code, which classifies counties both in terms of their population size and adjacency to metro areas. In particular, BEA4, BEA5, . . . BEA9 denote an increasing degree of rurality for each respondent's place of residence.

In principle, each equation predicting the use of a given technology can be estimated using probit maximum likelihood methods:

$$1) \quad w_i = \beta' x_i + \varepsilon_i = \Phi(\beta' x_i)$$

where w_i=1 if the ith respondent uses a particular information technology and w_i=0 otherwise, x_i is a vector of exogenous household characteristics affecting the probability that a given technology is being used, β is a coefficient vector, $\varepsilon_I \sim N(0,1)$ is a random error term, and Φ is the cumulative standard normal distribution function. The corresponding log-likelihood function is:

$$2) \quad \mathcal{L}_i = \Sigma [w_i \ln\Phi(\beta' x_i) + (1- w_i)\ln(1-\Phi(\beta' x_i))]$$

with derivatives

$$\delta\Phi(\beta' x_i)/\delta x_i = \phi(\beta' x_i)\beta.$$

For example, equation 1) can be used to estimate the probability of using computers.

In practice, however, the estimation procedure is complicated by the fact that some of the technology choices are conditional. For example, the use of e-mail or the Web is conditioned on the use of a computer, while the use of an ATM card is possible only if a respondent has an account at a bank that offers such a card. More specifically, it is not possible to observe whether individuals who are presently not using computers would use the web or e-mail if they used computers: the sample is censored in that information on Web and e-mail use is available only for the nonrandom subset of respondents actually using computers at present. Similarly, for an individual who does not have an account at a bank that offers an ATM card, the question whether that individual uses such a card is moot, and it is not possible to observe whether the individual would use a card if it were available.

A bivariate probit model with sample selection accounts for the censoring that arises in these situations and provides unbiased coefficient estimates:[A3]

A1. There is ample evidence to suggest that access to computers also affects wages (e.g., see Krueger, A.B. (1993, February) How computers have changed the wage structure: Evidence from microdata, 1984-1989. *Quarterly Journal of Economics, 108*, 33-60.); however, we assume that income is predetermined in the context of these regressions.

A2. Kusmin, L.D. (1996, June). Computer use by rural workers rapidly increasing. *Rural Development Perspectives, 11*, 11-16.

A3.Greene, W.H. (1993). *Econometric analysis* (2nd ed.). New York: MacMillan.

3) $w_{i1} = \beta_1' x_{i1} + \varepsilon_{i1}$, $z_{i1} = 1$ if $w_{i1} > 0$ and 0 otherwise,
$w_{i2} = \beta_2' x_{i2} + \varepsilon_{i2}$, $z_{i2} = 1$ if $w_{i2} > 0$ and 0 otherwise,
$[\varepsilon_{i1}, \varepsilon_{i2}] \sim$ bivar. norm. $(0,0,1,1,\rho)$, where
$(z_{i1,} x_{i1})$ is observed only if $z_{i2} = 1$.

Here, w_{i1} may refer to computer use, while w_{i2} refers to the use of e-mail or the Web, conditional on computer use. The log-likelihood function in this case is:

4) $\mathcal{L}_i = \Sigma \ln \Phi^b(\beta_1' x_{i1}, \beta_2' x_{i2}, \rho) + \Sigma \ln \Phi^b(-\beta_1' x_{i1}, \beta_2' x_{i2}, \rho) + \Sigma \ln \Phi^b(-\beta_2' x_{i2},)$

where Φ^b is the cumulative bivariate normal distribution function, $n_{1,1}$ is the set of observations i for which $w_{i1} = w_{i2} = 1$ (those who use computers and e-mail), $n_{0,1}$ is that for which $w_{i1} = 0$ and $w_{i2} = 1$ (those who use computers but no e-mail), and n_0 is those observations for which $w_{i2} = 0$ (respondents who do not use computers and, therefore, do not use e-mail).

Table A1: FIML Bivariate Probit Model Estimates for Use of Computers, e-mail, and the Internet/World Wide Web, with Sample Selection

Variable	Use computers	Use e-mail	Use computers	Use the Web
Constant	-0.848*	-1.169**	-0.848*	-0.714
	(1.65)	(2.21)	(1.67)	(1.38)
INC	0.116***	0.066**	0.119***	0.069#
	(4.84)	(2.25)	(5.10)	(1.33)
EDU	0.173***	0.155***	0.173***	0.189***
	(6.01)	(4.91)	(6.13)	(5.60)
WRK	0.597***	0.079	0.597***	-0.364*
	(3.83)	(0.39)	(3.79)	(1.80)
AGE	-0.0325***	-0.0327***	-0.0325***	-0.0461***
	(6.99)	(5.52)	(6.95)	(7.26)
SEX	-0.191	0.258*	-0.191	.0236
	(1.32)	(1.67)	(1.36)	(1.49)
RAC	-0.058	-0.311	-0.058	-0.199
	(0.25)	(1.19)	(0.25)	(0.73)
BEA4	0.477	-0.132	0.477	-0.116
	(0.81)	(0.36)	(0.82)	(0.31)
BEA5	0.602	-0.566#	0.602	0.242
	(1.11)	(1.35)	(1.12)	(0.53)
BEA6	-0.404#	-0.214	-0.404#	-0.501*
	(1.63)	(0.85)	(1.62)	(1.95)
BEA7	-0.573***	-0.712***	-0.573***	-0.707***
	(3.24)	(3.73)	(3.45)	(3.83)
BEA8	-0.102	-0.379	-0.102	-0.373
	(0.29)	(0.71)	(0.29)	(0.64)
BEA9	-0.226	-0.737**	-0.226	-0.828***
	(1.03)	(2.49)	(1.05)	(2.78)
RHO(1,2)	0.950***		0.950***	
	(2.80)		(9.34)	

Table A2: FIML Bivariate Probit Model Estimates for Access to a Bank with ATM and Use of ATM, with Sample Selection

Variable	Access to Bank w/ATM	Use ATM
Constant	-1.023	0.972
	(2.02)	(1.14)
INC	0.177***	-0.0083
	(5.63)	(0.23)
EDU	0.098***	0.063#
	(2.99)	(1.59)
WRK	0.212	0.131
	(1.20)	(0.70)
AGE	0.0029	-0.0345***
	(0.67)	(6.76)
SEX	-0.152	-0.111
	(0.95)	(0.75)
RAC	0.203	0.197
	(0.72)	(0.62)
BEA4	0.516	0.162
	(0.81)	(0.37)
BEA5	-0.610#	0.486
	(1.54)	(0.81)
BEA6	-0.629***	-1.106***
	(2.74)	(4.00)
BEA7	-0.606***	-0.832***
	(3.40)	(3.45)
BEA8	-0.629*	-0.014
	(1.72)	(0.03)
BEA9	-0.677***	-0.645**
	(2.83)	(2.09)
RHO(1,2)	-0.0055	
	(0.01)	

Statistical significance levels: *=10%, **=5%, ***=1% or lower in a two-tailed test; #=significant at the 10% level or lower in a one-tailed test.

Table A3: Probit Model Estimates for Use of Phone for Obtaining Information and Conducting Transactions

Variable	Phone for information	Phone for transaction
Constant	-0.124	-0.795
	(1.65)	(2.21)
INC	0.0922***	0.0929***
	(4.84)	(2.25)
EDU	0.0960***	0.0824***
	(6.01)	(4.91)
WRK	0.188	-0.185
	(3.83)	(0.39)
AGE	-0.0177***	-0.0183***
	(6.99)	(5.52)
SEX	-0.300**	0.169
	(1.32)	(1.67)
RAC	-0.011	-0.270
	(0.25)	(1.19)
BEA4	0.534	0.091
	(0.81)	(0.36)
BEA5	1.091	0.590
	(1.11)	(1.35)
BEA6	-0.139	0.370*
	(1.63)	(0.85)
BEA7	-0.478***	-0.153
	(3.24)	(3.73)
BEA8	-0.292	0.411
	(0.29)	(0.71)
BEA9	-0.549***	-0.557***
	(1.03)	(2.49)

Table A4: Probit Model Estimates for Use of a Computer at Home and Video Conferencing

Variable	Computer at Home	Video conf.
Constant	-1.761	-3.535
	(3.92)	(5.68)
INC	0.123	0.0600***
	(5.14)	(2.12)
EDU	0.107	0.173***
	(4.10)	(4.81)
WRK	-0.007	-0.116
	(0.05)	(0.55)
AGE	-0.0141	-0.011***
	(3.17)	(1.78)
SEX	0.292	0.160
	(2.31)	(0.92)
RAC	0.052	-0.080
	(0.23)	(0.26)
BEA4	0.053	0.806
	(0.17)	(2.40)
BEA5	0.257	1.243
	(0.66)	(3.19)
BEA6	-0.333	0.366*
	(1.59)	(1.42)
BEA7	-0.511***	-0.151
	(3.19)	(0.66)
BEA8	0.167	-5.05
	(0.48)	(0.00)
BEA9	-0.417***	-0.141***
	(1.85)	(0.41)

Statistical significance levels: *=10%, **=5%, ***=1% or lower in a two-tailed test; #=significant at the 10% level or lower in a one-tailed test.

Appendix B

ADAIR	7	GRAVES	7	MENIFEE	9	METROPOLITAN COUNTIES (0-3)	
ALLEN	7	GRAYSON	7	MERCER	6		
ANDERSON	6	GREEN	9	METCALFE	9		
BALLARD	9	GREENUP	2	MONROE	7	**0—**Central counties of metropolitan areas of 1 million population or more	
BARREN	7	HANCOCK	8	MONTGOMERY	6		
BATH	8	HARDIN	4	MORGAN	9		
BELL	7	HARLAN	7	MUHLENBERG	7	**1—**Fringe counties of metropolitan areas of 1 million population or more	
BOONE	0	HARRISON	6	NELSON	6		
BOURBON	2	HART	9	NICHOLAS	8		
BOYD	2	HENDERSON	2	OHIO	6		
BOYLE	7	HENRY	8	OLDHAM	2	**2—**Counties in metropolitan areas of 250,000 - 1,000,000 population	
BRACKEN	8	HICKMAN	9	OWEN	8		
BREATHITT	9	HOPKINS	7	OWSLEY	9		
BRECKINRIDGE	9	JACKSON	8	PENDLETON	1		
BULLITT	2	JEFFERSON	2	PERRY	7	**3—**Counties in metropolitan areas of less than 250,000 population	
BUTLER	9	JESSAMINE	2	PIKE	7		
CALDWELL	6	JOHNSON	7	POWELL	6		
CALLOWAY	7	KENTON	0	PULASKI	7		
CAMPBELL	0	KNOTT	9	ROBERTSON	9	NON METROPOLITAN COUNTIES (4-9)	
CARLISLE	9	KNOX	7	ROCKCASTLE	6		
CARROLL	6	LARUE	7	ROWAN	7		
CARTER	2	LAUREL	7	RUSSELL	9	**4—**Urban population of 20,000 or more, adjacent to a metropolitan area	
CASEY	9	LAWRENCE	8	SCOTT	2		
CHRISTIAN	3	LEE	9	SHELBY	6		
CLARK	2	LESLIE	9	SIMPSON	6		
CLAY	9	LETCHER	7	SPENCER	8	**5—**Urban population of 20,000 or more, not adjacent to a metropolitan area	
CLINTON	9	LEWIS	8	TAYLOR	7		
CRITTENDEN	7	LINCOLN	7	TODD	8		
CUMBERLAND	9	LIVINGSTON	9	TRIGG	8	**6—**Urban population of 2,500-19,999, adjacent to a metropolitan area	
DAVIESS	3	LOGAN	7	TRIMBLE	8		
EDMONSON	9	LYON	9	UNION	6		
ELLIOTT	8	MCCRACKEN	5	WARREN	5		
ESTILL	6	MCCREARY	9	WASHINGTON	7	**7—**Urban population of 2,500-19,999, not adjacent to a metropolitan area	
FAYETTE	2	MCLEAN	8	WAYNE	7		
FLEMING	7	MADISON	2	WEBSTER	6		
FLOYD	7	MAGOFFIN	9	WHITLEY	7		
FRANKLIN	4	MARION	7	WOLFE	9	**8—**Completely rural (no places with a population of 2,500 or more) adjacent to a metropolitan area	
FULTON	7	MARSHALL	7	WOODFORD	2		
GALLATIN	1	MARTIN	9				
GARRARD	6	MASON	6				
GRANT	1	MEADE	6			**9—**Completely rural (no places with a population of 2,500 or more) not adjacent to a metropolitan area	

Source: United States Department of Agriculture, Economic Research Service. www.econ.ag.gov/epubs/other/typolog/TYP89.TXT

Appendix C

This appendix lists the predicted usage of six different technologies, using the models specified in Appendix A. The columns reflect, from left to right, predicted computer use anywhere, including at work, school, and elsewhere, predicted Internet/World Wide Web use (among people who already use a computer), predicted e-mail use (among people who already use a computer), predicted ATM use (among people who have access to one), predicted use of a touch-tone phone to obtain information, and predicted use of a touch-tone phone to perform a transaction. Scores of 50 percent or higher are in bold font.

	Computer	Internet	e-mail	ATM	Touch-tone Information	Touch-tone Transaction
Adair	36%	6%	21%	29%	49%	21%
Allen	35%	5%	20%	27%	48%	20%
Anderson	**64%**	15%	**60%**	24%	**74%**	**50%**
Ballard	**59%**	6%	28%	36%	**51%**	14%
Barren	40%	6%	24%	28%	**51%**	23%
Bath	**51%**	10%	29%	**59%**	**54%**	40%
Bell	32%	7%	18%	29%	46%	22%
Boone	**87%**	42%	**80%**	**71%**	**84%**	44%
Bourbon	**73%**	29%	**63%**	**64%**	**75%**	34%
Boyd	**73%**	31%	**63%**	**63%**	**76%**	35%
Boyle	**53%**	11%	35%	32%	**59%**	30%
Bracken	**59%**	13%	36%	**60%**	**59%**	44%
Breathitt	47%	6%	18%	38%	44%	12%
Breckinridge	**51%**	5%	22%	35%	47%	13%
Bullitt	**81%**	35%	**72%**	**69%**	**80%**	39%
Butler	47%	4%	18%	34%	44%	11%
Caldwell	48%	11%	43%	19%	**65%**	43%
Calloway	**56%**	15%	38%	36%	**60%**	30%
Campbell	**81%**	35%	**72%**	**67%**	**80%**	39%
Carlisle	**55%**	5%	24%	34%	49%	13%
Carroll	**54%**	13%	49%	22%	**69%**	46%
Carter	**61%**	23%	48%	**63%**	**69%**	28%
Casey	45%	4%	17%	34%	43%	10%
Christian	**81%**	42%	**72%**	**71%**	**79%**	40%
Clark	**75%**	31%	**65%**	**65%**	**77%**	35%
Clay	41%	5%	15%	37%	41%	11%
Clinton	42%	4%	15%	34%	41%	10%
Crittenden	38%	6%	22%	27%	**50%**	23%
Cumberland	39%	3%	13%	31%	39%	9%
Daviess	**78%**	34%	**68%**	**66%**	**78%**	36%

	Computer	Internet	e-mail	ATM	Touch-tone Information	Touch-tone Transaction
Edmonson	46%	5%	18%	35%	44%	11%
Elliott	48%	11%	26%	**60%**	**53%**	40%
Estill	38%	9%	34%	20%	**60%**	39%
Fayette	**89%**	**52%**	**82%**	**73%**	**85%**	46%
Fleming	39%	6%	23%	29%	**50%**	22%
Floyd	36%	8%	21%	31%	49%	24%
Franklin	**92%**	31%	**69%**	**71%**	**92%**	43%
Fulton	35%	6%	20%	24%	49%	23%
Gallatin	**69%**	25%	**58%**	**64%**	**73%**	31%
Garrard	48%	10%	44%	20%	**66%**	43%
Grant	**72%**	27%	**61%**	**65%**	**75%**	33%
Graves	43%	8%	27%	28%	**54%**	25%
Grayson	35%	6%	20%	28%	48%	21%
Green	49%	4%	20%	33%	45%	11%
Greenup	**72%**	30%	**61%**	**64%**	**75%**	35%
Hancock	**71%**	20%	49%	**65%**	**67%**	**52%**
Hardin	**93%**	40%	**71%**	**78%**	**92%**	45%
Harlan	33%	7%	19%	29%	48%	23%
Harrison	**53%**	12%	49%	21%	**68%**	45%
Hart	46%	4%	18%	34%	43%	11%
Henderson	**77%**	32%	**67%**	**66%**	**78%**	36%
Henry	**65%**	15%	42%	**62%**	**63%**	47%
Hickman	**52%**	5%	22%	31%	48%	13%
Hopkins	47%	9%	31%	30%	**56%**	28%
Jackson	43%	9%	22%	**59%**	49%	37%
Jefferson	**82%**	39%	**73%**	**66%**	**81%**	41%
Jessamine	**79%**	33%	**69%**	**69%**	**79%**	37%
Johnson	39%	9%	23%	31%	**51%**	24%
Kenton	**84%**	39%	**76%**	**69%**	**82%**	41%
Knott	46%	6%	18%	38%	45%	12%
Knox	31%	7%	17%	30%	46%	21%
Larue	43%	8%	27%	29%	**53%**	25%
Laurel	41%	8%	25%	32%	**52%**	24%
Lawrence	48%	11%	26%	**59%**	**53%**	41%
Lee	39%	4%	14%	34%	40%	10%
Leslie	46%	6%	18%	38%	44%	12%
Letcher	33%	7%	18%	30%	47%	22%
Lewis	**51%**	10%	29%	**60%**	**54%**	40%
Lincoln	37%	6%	22%	29%	49%	22%
Livingston	**57%**	6%	26%	36%	**50%**	14%
Logan	44%	7%	27%	29%	**53%**	25%
Lyon	**58%**	8%	27%	36%	**52%**	16%
Madison	**70%**	42%	43%	**80%**	**97%**	**59%**
Magoffin	42%	5%	14%	37%	40%	10%
Marion	44%	13%	38%	**60%**	**60%**	45%

	Computer	Internet	e-mail	ATM	Touch-tone Information	Touch-tone Transaction
Marshall	47%	27%	**58%**	**67%**	**73%**	32%
Martin	**50%**	5%	15%	38%	42%	11%
Mason	**53%**	9%	27%	31%	**53%**	25%
McCracken	**90%**	9%	30%	29%	**56%**	27%
McCreary	40%	7%	20%	39%	47%	14%
McLean	**61%**	12%	48%	21%	**68%**	45%
Meade	**69%**	24%	**65%**	29%	**76%**	**55%**
Menifee	47%	5%	18%	37%	44%	11%
Mercer	**55%**	12%	**50%**	21%	**69%**	46%
Metcalfe	44%	3%	17%	33%	42%	10%
Monroe	31%	4%	17%	26%	45%	19%
Montgomery	**51%**	12%	46%	22%	**67%**	44%
Morgan	43%	5%	16%	35%	42%	11%
Muhlenberg	40%	8%	24%	29%	**51%**	24%
Nelson	**61%**	16%	**57%**	25%	**72%**	**50%**
Nicholas	**59%**	11%	36%	**60%**	**58%**	43%
Ohio	43%	10%	38%	20%	**62%**	41%
Oldham	**90%**	48%	**84%**	**72%**	**86%**	48%
Owen	**61%**	12%	38%	**60%**	**60%**	44%
Owsley	32%	3%	10%	32%	36%	9%
Pendleton	**70%**	27%	**59%**	**65%**	**74%**	32%
Perry	37%	8%	21%	31%	**50%**	24%
Pike	38%	8%	22%	31%	**51%**	24%
Powell	43%	10%	39%	22%	**62%**	41%
Pulaski	42%	8%	25%	30%	**52%**	24%
Robertson	49%	4%	20%	34%	46%	12%
Rockcastle	37%	8%	33%	20%	**59%**	38%
Rowan	**52%**	16%	35%	40%	**58%**	29%
Russell	**51%**	5%	21%	35%	46%	12%
Scott	**78%**	30%	**68%**	**64%**	**78%**	36%
Shelby	**65%**	16%	**61%**	22%	**74%**	**52%**
Simpson	**55%**	12%	**50%**	21%	**69%**	46%
Spencer	**66%**	15%	43%	**63%**	**63%**	47%
Taylor	46%	8%	30%	31%	**55%**	25%
Todd	**58%**	11%	35%	**59%**	**58%**	44%
Trigg	**60%**	13%	37%	**57%**	**60%**	45%
Trimble	**66%**	15%	43%	**62%**	**63%**	48%
Union	**62%**	20%	**58%**	25%	**73%**	**53%**
Warren	**94%**	**51%**	**52%**	**85%**	**97%**	**63%**
Washington	41%	7%	25%	29%	**52%**	24%
Wayne	30%	5%	17%	28%	45%	20%
Webster	**50%**	11%	45%	20%	**67%**	45%
Whitley	39%	9%	23%	32%	**50%**	24%
Wolfe	41%	5%	14%	36%	41%	10%
Woodford	**86%**	40%	**78%**	**69%**	**83%**	43%

Publications and Other Products from
THE KENTUCKY
LONG-TERM POLICY RESEARCH CENTER

💻**The Kentucky State Budget Game** (1997). An interactive learning tool, this computer game puts players, students and interested citizens alike, in the seat of power. They make tough policy choices, balance the budget, and watch public support rise and fall. Can be downloaded from the Center's website or ordered on diskette.

🕮 **Exploring the Frontier of the Future** (1996). The Center's second biennial trends report includes 30 articles on the trends that are influencing the Commonwealth's future by some of the state's leading experts.

🕮 **Forecasting Kentucky's Environmental Futures** (1996). A collaborative effort of the Kentucky Institute for the Environment and Sustainable Development and the Cabinet for Natural Resources and Environmental Protection to forecast possible environmental futures.

🕮 **$5.8 Billion and Change: An Exploration of the Long-Term Budgetary Impact of Trends Affecting the Commonwealth** (1996). An analysis of alternative future budgetary scenarios, driven by key trends influencing the future of the state.

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🕮 **The Context of Change: Trends, Innovations and Forces Affecting Kentucky's Future** (1994). Now in its second printing, the Kentucky Long-Term Policy Research Center's inaugural biennial report on issues that are likely to influence the future of the Commonwealth.

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