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Race, Internet Usage, and E-Commerce

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Race, Internet Usage, and E-Commerce

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Abstract: The authors examine racial and ethnic differences in computer ownership and Internet usage using data from a survey conducted by the Nomura Research Institute in 2000. They focus on on-line shopping because few studies have examined racial and ethnic differences in e-commerce. The results indicate that blacks and Hispanics are less likely to own or use a computer than are non-Hispanic whites but are not less likely to shop on-line. Indeed, blacks appear to shop on-line more frequently and to spend more than non-Hispanic whites do.

JEL classification: O33, L86, J15

Key words: Internet, on-line shopping, e-commerce, race

Race, Internet Usage, and E-Commerce

The issue of whether the United States faces a "digital divide," or that minorities and other socioeconomically disadvantaged groups have less access to computers and the Internet than whites and middle- and upper-income groups do, has received considerable attention from policy makers. Investigating the extent, causes, and consequences of a digital divide is important because of the rising use of computers and the Internet in workplaces, schools, and homes. In addition, there is widespread concern that inequalities in access and usage may limit opportunities for employment, education, and political participation among certain demographic groups (Anderson et al., 1995). This paper therefore examines whether computer ownership and Internet usage differ across racial and ethnic groups, focusing on differences in online shopping.

There is a general consensus that minorities are less likely to own a computer or use the Internet. The National Telecommunications and Information Administration (NTIA) reports that 33 percent of black households and 34 percent of Hispanic households had computers at home in 2000, compared with an overall penetration rate of 51 percent (NTIA, 2000). About 24 percent of black and Hispanic households had home access to the Internet, compared with 42 percent of all households in the U.S., a gap which rose during the 1990s (NTIA, 2000). Research on whether income and education differences fully account for the disparity has reached mixed conclusions. Some studies conclude that differences in socioeconomic characteristics explain the racial and ethnic gaps in computer ownership (e.g., Novak and Hoffman, 1998), whereas others find that gaps persist even after controlling for demographics (e.g., Babb, 1998; Bikson and Panis, 1999; Goolsbee and Klenow, 2000).

Online shopping is the fastest growing segment of Internet usage in the United States (NTIA, 2000), but few researchers have addressed online shopping. Spooner and Rainie (2000)

1

report that whites with Internet access are more likely to have bought products online than blacks, whereas Hoffman et al. (2001) find no difference between blacks and whites in the incidence of online shopping. Neither study controls for socioeconomic characteristics in a multivariate regression context. Our focus on e-commerce and race is motivated by previous research that shows that certain minority groups may face price discrimination in retail transactions that involve face-to-face interactions (Ayres and Siegelman, 1995; Graddy, 1997). Because transactions over the Internet are race-blind, minorities may shop online more frequently and spend more than whites if minorities face discrimination in retail outlets. Indeed, recent research suggests that minorities and whites who buy a car over the Internet pay similar prices, whereas minorities pay more at dealerships than whites do, on average (Scott Morton et al., 2001).

We use data from the 2000 Cyber Life Observations survey by Nomura Research Institute to examine computer ownership, Internet usage, and e-commerce patterns among individuals in the United States. This survey, which has not been used previously, offers several advantages compared with publicly available data sources. In addition to asking about computer ownership and use and whether an individual has shopped on the Internet—questions asked by the Current Population Survey, for example—the Nomura survey asked about frequency of online shopping and actual spending. The detailed survey questions offer insights about racial and ethnic differences in e-commerce behavior as well as in computer ownership and usage. The regression results indicate that blacks and Hispanics are less likely to own or use a computer than non-Hispanic whites are but are not less likely to shop online. Indeed, blacks appear to shop online more frequently and to spend more than non-Hispanic whites do.

I. Theoretical Background

There are several reasons why computer ownership, Internet usage, and online shopping patterns may differ across racial and ethnic groups. First, disparities in income and education may contribute to differences in ownership, as the results of previous studies suggest, because blacks and Hispanics tend to be poorer and have lower educational attainment and computer ownership is strongly linked to income and education. Differences in computer use at work may lead to differences in household computer ownership as well since blacks and Hispanics are less likely to use a computer at work than non-Hispanic whites are (Krueger, 2000).

Differences in the costs and returns to computer and Internet usage may also contribute to the digital divide. Individuals are more likely to buy a computer in areas with high rates of computer ownership or when their friends and families own computers, suggesting that network externalities and learning from others influence computer ownership (Goolsbee and Klenow, 2000). Since computer ownership rates are lower among blacks and Hispanics, these groups may have higher costs of learning about computers and perceive lower benefits to owning them.

Racial and ethnic differences in online shopping patterns may be related to perceived differences in the benefits of shopping over the Internet. Increased variety and ease of comparing prices are among the reasons why consumers shop over the Internet.[1] Previous studies suggest that minorities tend to pay higher prices in retail outlets for cars and fast food than whites pay (Ayres and Siegelman, 1995; Graddy, 1997). If blacks and Hispanics have fewer choices in local retail stores or face higher prices than non-Hispanic whites do, then blacks and Hispanics may have greater benefits to online shopping than non-Hispanic whites.

II. Data

The Nomura Research Institute conducted a survey of technology usage in the United States in 2000. The survey, which was fielded in October 2000, asked respondents about their attitudes toward technology and their use of various types of information technology, including computers and the Internet. The survey was administered in person to 1,009 individuals aged 15 to 59. Quota sampling was used to ensure that the sample was demographically representative of the population. The survey reports respondents' demographic characteristics, including race and ethnicity as assessed by the interviewer. Complete responses to the questions examined here and demographic background are available for 868 individuals.[2]

The Nomura survey asked individuals about ownership and usage of a personal computer at home, Internet usage at home and at other locations, and online shopping. The e-commerce questions include how many times an individual has shopped on line, with responses in nine categories ranging from never to 100 or more times, and how much an individual has spent on online shopping during the past year, with responses in nine categories ranging from zero to $5,000 or more.

We examine several aspects of computer usage. First, we examine whether an individual lives in a household that owns a computer, whether an individual uses a computer at home given that there is computer in the household, and whether an individual uses the Internet at home given computer usage at home. We also investigate the determinants of whether an individual uses a computer at home without conditioning on ownership. Non-Hispanics whites have the

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[1] A November 2001 study by Accenture found that convenience, comparison shopping, and lower prices were among the primary reasons cited by people for shopping on line. See also marketing studies about consumer choice behavior in online versus offline environments (e.g., Alba et al., 1997; Bhatnagar et al., 2000).

[2] Only one person per household was interviewed. Asians are omitted from the sample used here because there are only 20 in the survey. Race/ethnicity was not reported for 70 individuals.

highest proportion of computer owners and users and Internet users, as the descriptive statistics in Table 1 indicate.

We also investigate the likelihood that an individual has shopped online, the frequency of online shopping among individuals who have shopped online, and online spending among individuals who have purchased something online. Among home Internet users, a lower proportion of blacks have shopped online than among Hispanics or non-Hispanic whites (Table 1). Among all individuals surveyed, the proportion of individuals who have shopped on line is highest among whites. Among individuals who have shopped online regardless of Internet use at home, the average number of times shopped is higher among blacks than among whites or Hispanics. Average spending is also higher among blacks who have bought something than among Hispanics or whites for both the sample of home Internet users and all Internet shoppers. The analysis below further investigates these racial and ethnic differences in a multivariate setting.

Part of the analysis compares the results for the Nomura data set to results for similar questions asked in the August 2000 Current Population Survey (CPS), which included a supplement on computer and Internet usage. The advantage of using the CPS is that the survey has a large sample size, yielding more precise estimates of the relationship between computer usage and race. However, the CPS contains only two questions about e-commerce, and the questions are simply yes/no questions. For questions asked in both data sets, we compare the results as a means of gauging the representativeness of the Nomura data set.

The CPS questions include whether there is a personal computer or laptop in the household; whether an individual uses the Internet at home for any purpose; whether an individual regularly uses the Internet at home to shop, pay bills, or other commercial activities;

and whether an individual uses the Internet outside the home to shop or pay bills. The CPS e-commerce questions differ slightly from the Nomura questions, which ask about only shopping and do not include bill paying or other commercial activities. If there are systemic differences across demographic groups in using the Internet to pay bills or for other commercial activities among individuals who do not use the Internet to shop, the CPS and Nomura results would diverge without necessarily indicating concerns about the Nomura sample. The CPS question about e-commerce behavior at home asks about regular use, not any use, and the survey does not define how frequent regular use is.

The CPS sample of individuals aged 15 to 59 consists of 69,489 observations. Four indicator variables are constructed from the CPS: whether there is a computer in the household; whether an individual uses the Internet at home; whether an individual who uses the Internet at home uses the Internet for e-commerce; and whether an individual uses the Internet anywhere for e-commerce, not conditional on computer ownership or usage.

III. Methods

Logit and ordered logit models are used to investigate the determinants of computer ownership and usage, Internet usage, and online shopping behavior. Logit regressions are used to examine whether an individual lives in household that owns a computer, whether an individual uses a computer at home, and whether an individual uses the Internet at home. Logit regressions are also used to examine whether an individual has shopped on line, both conditional on using the Internet at home and unconditionally. Frequency of online shopping and online spending are examined with ordered logit regressions. The dependent variable in each ordered logit regression ranges from 1 to 8, with higher values indicating more frequent use or greater

6

spending. We examine these variables among individuals who have used the Internet at home
and among all individuals.

The regressions include indicator variables for black and Hispanic, with non-Hispanic
whites as the omitted group. The regressions control for age, sex, education, marital status,
family size, metropolitan residence, and household income. Appendix Table 2 presents sample
means for these variables in the Nomura data set. Similar measures of demographic
characteristics were constructed for the CPS data set.

IV. Results

The results indicate that blacks and Hispanics are less likely to own a computer and less
likely to use a computer at home than non-Hispanic whites are, as columns 1 and 2 of Table 2
report. However, conditional on computer ownership, race and ethnicity are not significantly
related to the likelihood of computer usage at home (column 3). Race and ethnicity are also not
significantly related to the likelihood of Internet usage at home, conditional on computer usage at
home (column 4). These results are consistent with previous findings that almost all of any
differences in Internet usage appear to be explained by differences in computer ownership, or
that there are few demographic differences in whether people use the Internet given that they
own a computer that is connected to it (Novak and Hoffman, 1998; Nie and Erbring, 2001).

Some of the race and ethnicity results for the CPS computer ownership and usage
questions are similar to those for the Nomura data. The CPS results are reported in Appendix
Table 2. In both data sets, blacks and Hispanics are less likely than non-Hispanic whites to live
in a household that owns a computer. The CPS results indicate that blacks and Hispanics who
own a computer are significantly less likely to use the Internet than are non-Hispanic whites,

whereas the coefficients on the race and ethnicity variables are negative but not statistically significant for the Internet use results in the Nomura data.

There are no significant racial or ethnic differences in the likelihood of having shopped online in the Nomura data. Column 1of Tables 3 and 4 reports the results for the dichotomous variable indicating whether an individual has ever shopped online conditional on having used the Internet at home and unconditionally, respectively. The CPS results, in contrast, indicate that blacks and Hispanics are less likely to use the Internet for e-commerce activities. The difference in the results may indicate that whites are more likely to use the Internet for bill paying and other non-shopping e-commerce activities than other groups or that the Nomura sample is too small to accurately measure the relationship between online shopping and race/ethnicity.

Among those individuals who have shopped online, blacks have shopped more times. In both the sample of home Internet users and all online shoppers, the frequency of online shopping is significantly higher among blacks than among non-Hispanic whites (column 2 of Tables 3 and 4). In addition, blacks who use the Internet at home spend significantly more money online than do non-Hispanic whites (column 3 of Table 3). None of the online shopping frequency or amount coefficients are statistically significant for Hispanics.

None of the results based on the Nomura data indicate that computer ownership or usage differs significantly across sexes. The August 2000 CPS results indicate that women are more likely to use the Internet and to shop online than men are; previous research based on other data sources concludes, in contrast, that women are less likely to use the Internet than comparable men are (Bimber, 2000; Hoffman et al, 2001). The likelihood of computer ownership and use, Internet usage, and online shopping tend to increase with education and household income in the Nomura and the CPS data.

V. Discussion and Conclusion

This study used data collected by the Nomura Research Institute in 2000 to examine racial and ethnic differences in computer ownership, Internet usage, and online shopping. The results indicate that blacks and Hispanics are less likely to own or use a computer than non-Hispanics whites are. Results from the August 2000 Current Population Survey indicate similar patterns in computer ownership and Internet usage. However, the Nomura data indicate that minorities are not less likely to shop online, and blacks appear to shop online more frequently and to spend more than non-Hispanic whites do.

The implications of a racial gap in computer ownership and usage are important because some studies suggest a link between computer skills, and wages and job opportunities (Krueger, 1993, 2000). In addition, Internet access may foster civic involvement and political participation (Ayres, 1999). Online shopping may offer greater variety, easier comparison shopping, and lower prices than are available in traditional stores only. Our finding that, controlling for income and other characteristics, blacks shop online more frequently than non-Hispanic whites do is particularly provocative given the literature that suggests that minorities pay higher prices in retail outlets and that race is not related to prices paid by consumers who buy a car over the Internet but is related to prices paid at dealerships (Ayers and Siegelman, 1995; Graddy, 1997; Scott Morton et al., 2001). The possibility that blacks use the race-blind anonymity of the Internet to make purchases—and perhaps to search for jobs—is an area for further research.

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TABLE 1

DESCRIPTIVE STATISTICS FOR COMPUTER USAGE QUESTIONS IN NOMURA DATA SET

	All	Whites	Blacks	Hispanics
Computer in home	.66	.71	.46	.42
	(.02)	(.02)	(.05)	(.07)
Use computer at home	.57	.61	.42	.35
	(.02)	(.02)	(.05)	(.06)
Use computer at home, given computer in home	.87	.86	.92	.83
	(.01)	(.02)	(.04)	(.08)
Use Internet at home, given use computer at home	.87	.87	.84	.80
	(.02)	(.02)	(.05)	(.09)
Shop online, given use Internet at home	.49	.50	.45	.50
	(.02)	(.03)	(.08)	(.13)
Frequency of online shopping, given shop online and use Internet at home	3.57	3.50	4.41	3.38
	(.12)	(.13)	(.47)	(.26)
Online spending category, given shop online and use Internet at home	4.51	4.46	4.94	4.50
	(.10)	(.10)	(.49)	(.33)
Shop online, not conditional on Internet at home	.30	.32	.21	.19
	(.02)	(.02)	(.04)	(.05)
Frequency of online shopping, not conditional on Internet at home	3.44	3.41	3.95	3.09
	(.11)	(.12)	(.42)	(.31)
Online spending category, given shop online but not conditional on Internet at home	4.38	4.35	4.62	4.55
	(.09)	(.09)	(.44)	(.41)
Total number of observations	868	704	107	57

Notes: Standard errors are in parentheses. The frequency of online shopping variable ranges from 1 (1 to 2 times) to 8 (100 or more times), and the online spending category variable ranges from 1 (less than $10) to 8 ($5000 or more).

TABLE 2
DETERMINANTS OF COMPUTER OWNERSHIP AND USAGE

	Computer in Household	Computer Usage at Home	Computer Usage at Home, Given Ownership	Internet Usage at Home, Given Computer Usage
Black	-.888**	-.527*	.424	-.432
	(.249)	(.249)	(.567)	(.477)
Hispanic	-.863**	-.634*	.192	-.924
	(.316)	(.320)	(.632)	(.661)
Female	.051	.116	.134	.196
	(.165)	(.158)	(.266)	(.284)
Less than high school	-1.561**	-1.781**	-1.627**	-.028
	(.355)	(.361)	(.611)	(.788)
High school graduate	-1.075**	-1.128**	-.840*	-.504
	(.237)	(.221)	(.368)	(.399)
Some college	-.263	-.160	.110	-.228
	(.244)	(.222)	(.390)	(.392)
Married	.277	.228	.054	-.087
	(.208)	(.200)	(.347)	(.385)
Family size	.248**	.172**	-.010	.045
	(.070)	(.066)	(.113)	(.121)
Metropolitan area resident	-.041	-.172	-.322	.921**
	(.169)	(.162)	(.274)	(.298)
Log-likelihood	-455.9	-490.5	-200.7	-177.5
Number of observations	868	868	574	493

* p<.05; ** p<.01

Notes: Shown are results from logit models. Regressions also include dummy variables for 8 age groups and 6 income groups and a constant.

TABLE 3

DETERMINANTS OF ONLINE SHOPPING FOR USERS OF INTERNET AT HOME

	Shop Online	Frequency of Online Shopping	Online Spending, Given Online Shopping
Black	-.313	1.392**	1.183*
	(.374)	(.502)	(.572)
Hispanic	.049	.534	.297
	(.544)	(.665)	(.659)
Female	.026	-.291	-.156
	(.207)	(.265)	(.291)
Less than high school	-.892	-1.994*	-2.058*
	(.544)	(.814)	(1.007)
High school graduate	-.360	-.178	.344
	(.305)	(.375)	(.427)
Some college	-.358	-.024	.352
	(.262)	(.347)	(.383)
Married	-.265	-.249	-.221
	(.276)	(.349)	(.379)
Family size	.097	-.041	-.193
	(.089)	(.110)	(.122)
Metropolitan area resident	.415	.012	.844
	(.214)	(.273)	(.302)
Log-likelihood	-280.3	-358.0	-277.8
Number of observations	427	211	196

* $p<.05$; ** $p<.01$

Notes: Columns 1 reports results from logit models, and Columns 2 and 3 report results from ordered logit models. Regressions also include dummy variables for 8 age groups and 6 income groups and a constant. The sample in column 2 includes individuals who report shopping online, and the sample in column 3 includes individuals who reported spending money online.

TABLE 4
DETERMINANTS OF ONLINE SHOPPING FOR ALL INDIVIDUALS

	Shop Online	Frequency of Online Shopping	Online Spending, Given Online Shopping
Black	-.443	.965*	.750
	(.276)	(.432)	(.500)
Hispanic	-.348	.233	.476
	(.371)	(.567)	(.565)
Female	.051	-.389	-.239
	(.161)	(.232)	(.258)
Less than high school	-1.577**	-2.169**	-2.355*
	(.386)	(.780)	(.957)
High school graduate	-1.119**	-.044	.331
	(.225)	(.320)	(.353)
Some college	-.611**	.126	.391
	(.206)	(.306)	(.329)
Married	-.084	-.394	-.418
	(.207)	(.309)	(.333)
Family size	.105	-.059	-.125
	(.068)	(.100)	(.109)
Metropolitan area resident	.272	-.151	.616*
	(.165)	(.246)	(.266)
Log-likelihood	-475.3	-446.9	-355.2
Number of observations	868	259	239

* $p<.05$; ** $p<.01$

Notes: Columns 1 reports results from logit models, and Columns 2 and 3 report results from ordered logit models. Regressions also include dummy variables for 8 age groups and 6 income groups and a constant. The sample in column 2 includes individuals who report shopping online, and the sample in column 3 includes individuals who reported spending money online.

APPENDIX TABLE 1

DETERMINANTS OF COMPUTER OWNERSHIP AND USAGE IN AUGUST 2000 CPS

	Computer in Household	Internet Usage, Given Computer Ownership	E-Commerce, Given Use Internet at Home	E-Commerce, Unconditional
Black	-.893** (.047)	-.616** (.058)	-.262** (.070)	-.728** (.056)
Hispanic	-1.013** (.050)	-.649** (.058)	-.192** (.072)	-.669** (.059)
Female	.035* (.015)	.043* (.020)	.134** (.025)	.152** (.021)
Less than high school	-1.429** (.045)	-1.001** (.053)	-.917** (.075)	-1.688** (.061)
High school graduate	-1.076** (.036)	-.955** (.038)	-.628** (.041)	-1.194** (.035)
Some college	-.357** (.036)	-.419** (.036)	-.343** (.035)	-.521** (.030)
Married	.254** (.030)	-.153** (.035)	.056 (.039)	.060 (.032)
Family size	.177** (.013)	-.093** (.013)	-.182** (.014)	-.139** (.012)
Metropolitan area resident	.218** (.038)	.138** (.042)	.097* (.047)	.189** (.039)
Log-likelihood	-36,474.6	-25,168.4	-19,180.7	-28,877.7
Number of observations	69,489	44,133	30,655	69,489

* p<.05; ** p<.01
Notes: Shown are results from logit models. Regressions also include dummy variables for 8 age groups and 14 income groups and a constant.

16

DESCRIPTIVE STATISTICS FOR SOCIOECONOMIC CHARACTERISTICS IN NOMURA DATA SET

	All	Whites	Blacks	Hispanics
Female	.52	.52	.51	.54
Less than high school	.13	.11	.27	.14
High school	.31	.30	.21	.60
Some college	.30	.31	.35	.18
Married	.50	.53	.33	.42
Family size	2.97	2.93	3.06	3.30
Metropolitan area resident	.54	.53	.64	.53
Age 15-19	.11	.11	.13	.09
Age 20-24	.10	.09	.15	.16
Age 25-29	.11	.10	.11	.21
Age 30-34	.09	.10	.05	.07
Age 35-39	.15	.14	.19	.14
Age 40-44	.13	.13	.14	.18
Age 45-49	.10	.11	.09	.04
Age 50-54	.11	.12	.07	.07
Household income < $20,000	.13	.11	.28	.19
Household income $20,000-40,000	.23	.21	.28	.44
Household income $40,000-60,000	.18	.20	.15	.09
Household income $60,000-80,000	.14	.15	.07	.11
Household income $80,000-100,000	.07	.08	.06	.05
Household income > $100,000	.07	.09	.01	.02