Health Disparities and Direct-to-Consumer Advertising of Pharmaceutical Products

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1. Introduction

Health information drives crucial consumer health decisions and plays a central role in health care markets. Consumers who are better-informed about smoking, diet, and physical activity make healthier choices outside the health care sector (Kenkel, 1991; Ippolito and Mathios, 1990, 1995; Meara, 2001). Better-informed consumers also interact differently with physicians and other health care providers (e.g., Cutler et al., 2006). In addition to the immediate consequences for individual consumers, health economists have long recognized that information also has broader implications for principal-agent relationships and the functioning of health care markets.[1] More recent lines of research in health economics and medical sociology emphasize the potential role of consumer information in explaining health disparities associated with socio-economic status (Deaton, 2002; Goldman and Lakdawalla, 2001; Glied and Lleras-Muney, 2003; Link and Phelan, 1995). Both health economists and medical sociologists stress that because of disparities in consumer information, rapid medical progress tends to be accompanied by increased disparities in medical treatment and health outcomes.

The link between medical progress and health disparities raises the concern that the rapid advances in the pharmaceutical industry lead to increased disparities in pharmaceutical use. As discussed in more detail below in section 2, research suggests that socio-economically disadvantaged groups and racial/ethnic minority groups are less likely to be treated with newer pharmaceutical products. However, the recent trend towards direct-to-consumer (DTC) advertising provides a source of information for consumers across the socio-economic spectrum. In general, DTC advertising is most common for new drugs that treat chronic conditions

[1]Arrow's (1963) classic paper contains many of the key insights about the role information plays in medical care markets. McGuire (2001) reviews theoretical and empirical studies of physicians as patients' agents.

(Donahue et al., 2007). With the advent of DTC advertising on television beginning in the later 1990s, the pharmaceutical industry began to use a powerful and far-reaching medium to promote its new products.

In this paper, we explore how consumer exposure to DTC advertising on television varies with socio-economic status and race. As discussed in detail in section 3, we create and use unique data on individual consumers' potential exposure to DTC advertisements. Our individual-level data come from 10 waves of the Simmons National Consumer Survey (NCS) administered from 1999 - 2004. The combined waves of the NCS provide rich data for over 80,000 respondents' consumer and media behavior, including their television-viewing habits. We merge the NCS data with data from TNS Media Intelligence on the airings of DTC advertisements for products that treat conditions ranging from high cholesterol to toenail fungus. We measure an individual's potential advertising exposure based on the number of DTC advertisements that aired during the specific programs or time slots he or she reports regularly watching.

Section 4 present results from descriptive multiple regression models that explore how advertising exposure varies with a consumer's employment status, race/ethnicity, schooling, income, and health insurance status. Section 5 concludes.

2. Background on Health Disparities, Use of Pharmaceuticals, and DTC Advertising

Health disparities refer to differences in health outcomes and treatments associated with socioeconomic status. Differences in life expectancy and mortality provide some of the starkest examples. In the National Longitudinal Mortality Study, the life expectancy of people with family incomes below $5,000 in 1980 was 25 percent lower than people with family incomes

above $50,000 (Rogot et al., 1992). According to National Vital Statistics data, life expectancy at birth in 2002 for whites was 77.7 years, compared to 72.3 years for Blacks (Arias, 2004). The *Healthy People 2010* report cites evidence that heart disease death rates are more than 40 percent higher for Blacks than whites, and that cancer death rates are 30 percent higher for Blacks than whites (U.S. Department of Health and Human Services 2000). Smith (1999) and Deaton (2002) review evidence on the strong gradient between wealth and health outcomes, while Cutler and Lleras-Muney (2006) and Grossman (2006) summarize the large body of research on the gradient between schooling and health. Outside economics, more attention has focused on the link between social class and health. The Whitehall studies document a steep gradient between the employment grade of British civil servants and health outcomes (Marmot et al., 1991). It is notable that this gradient is estimated for a population of mostly office workers with stable employment and who had universal access to Britain's National Health Service.

Reducing health disparities is a major public policy challenge. The *Healthy People 2010* public health initiative sets out two major goals: to increase quality and years of healthy life; and to eliminate health disparities. However, Mechanic (2002) and Keppel et al. (2007) stress that progress towards these two goals may not necessarily coincide. Based on the mid-course review of the *Healthy People 2010* initiative, Keppel et al. report that, for 69 specific objectives, the outcome was progress towards increasing the quality and length of life with little or no change in relative disparity. For ten objectives progress towards the two goals actually moved in opposite directions. The Agency for Healthcare Research and Quality's *National Healthcare Disparities Report* finds that "disparities related to race, ethnicity, and socioeconomic status still pervade the

American health care system," and documents disparities across all dimensions of quality and access to health care (AHRQ, 2006).

The causes of health disparities are very difficult to determine, but some researchers suggest that they may partly be the unintended, and perhaps unavoidable, consequence of medical progress. In an influential paper in medical sociology, Link and Phelan (1995, p. 87) stress the importance of "fundamental causes of disease" that "involve access to resources that can be used to avoid risks or to minimize the consequences of disease...." They define resources broadly to not only include money but also knowledge and other intangible resources. Link and Phelan argue that a necessary condition for fundamental causes to emerge is "change over time in the diseases afflicting humans, the risks for those diseases, knowledge about risks, or the effectiveness of treatments for diseases." In his article reviewing the gradient between wealth and health Deaton (2002) emphasizes "the possibility that widening gradients are related to life-saving bursts of technical progress." Theoretical and empirical health economics studies of the relationship between health disparities and medical progress include Goldman & Lakdawalla (2001), Lleras-Muney and Lichtenberg (2002) and Glied and Lleras-Muney (2003).

If health disparities are linked to medical progress, the high rate of innovation in the pharmaceutical industry might be expected to result in disparities in pharmaceutical use. The research literature on disparities in health care is extremely broad and difficult to summarize. Still, several pieces of evidence are consistent with the prediction that innovations have led to disparities in pharmaceutical use. Lleras-Muney and Lichtenberg (2002) and Wang et al. (2007) use the age of a drug, defined as the number of years since approval by the Food and Drug Administration (FDA), to measure innovation. In data from the Medical Expenditure Panel

Survey (MEPS), both studies find evidence of disparities in new drug utilization related to education, race, and insurance status. Nelson et al. (2002) use data from the Third National Health and Nutrition Examination Survey (NHANES) conducted between 1988 and 1994 to study the utilization of pharmaceutical products to treat high cholesterol. The NHANES data capture drug utilization around the beginning of the market for statins, an important innovation in the treatment of high cholesterol: the first statin was approved in 1987, followed by additional new approvals in 1991 and 1993 (Yang et al, 2007). Nelson et al. find that Blacks and Mexican Americans are less likely to be screened for cholesterol. Of those advised to take a prescription drug, Blacks and Mexican Americans were also less likely to be taking a cholesterol drug.

The potential of DTC advertising to affect health disparities has emerged because of fairly recent regulatory changes. In 1985 the FDA lifted a moratorium on print DTC advertisements for prescription products. However, until another regulatory change in 1997, it was impractical for most television advertisements to meet the FDA required disclosures of side effects and contraindications. In 1997 the FDA relaxed the disclosure requirements for DTC advertisements on television and radio, marking the beginning of the modern DTC era. Over the decade from 1996 to 2005, the pharmaceutical industry's expenditures on DTC advertising increased by 330 percent, from $985 million in 1996 to $4.2 billion in 2005.

Because the pharmaceutical industry tends to advertise new drugs, DTC advertising has the potential to reduce innovation-related disparities in pharmaceutical utilization. Donohue et al. (2007) broadly summarize DTC advertising patterns: "Drugs that are advertised to consumers are predominantly new drugs used to treat chronic conditions." In particular, they note that of the 20 most-advertised drugs in 2005: 10 were introduced in 2000 or later; and 17 of

the 20 advertising campaigns began within a year after FDA approval. The pharmaceutical industry faces strong incentives to advertise new products. Advertisements for new products might be more effective in stimulating demand because they provide consumers with new information. For some products, such as cholesterol medications, DTC advertisements inform consumers that they might have an asymptomatic but treatable condition. For other products, such as anti-depressants, DTC advertisements inform consumers that an effective medical treatment exists for their symptoms. Advertisers generally use "new and improved" claims in advertising; in a content analysis of DTC print advertisements from 1989 - 1998 40 percent used claims of "innovativeness" (Wilkes et al. 2000). Finally, because pharmaceutical companies earn most of their profits from products under patent protection, they have an especially strong incentive to advertise their newest products.[2]

3. Data on Consumer Exposure to Television DTC Advertisements

Measuring Potential Exposure to DTC Advertising

To measure individuals' potential exposure to DTC advertising we link data on individuals' television-viewing habits with data on television advertisements of pharmaceutical products. The individual-level data come from the Simmons National Consumer Survey (NCS). The NCS is a repeated cross-sectional survey, where the sample for each wave is an independently drawn multi-stage stratified probability sample. Because it is a marketing survey, higher-income households were intentionally over-sampled. We use data from 10 NCS waves administered from 1999-2004. The data on television advertisements come from TNS Media Intelligence. We have data on televisions advertisements for prescription-only and over-the-

[2]While it has also been suggested that advertising can be an entry barrier, Scott-Morton (2000) concludes that pharmaceutical advertising is not a barrier to entry by generics.

counter pharmaceutical products. We use TNS data on advertisements that aired from 1998-2004 on national networks, cable, and spot markets identified by Designated Marketing Areas (DMAs). From 1998-2001 the TNS data cover the largest 75 DMAs; from 2002 - 2004 the TNS data cover the largest 100 DMAs.[3]

We measure consumers' potential exposure to pharmaceutical advertisements that appeared over the past year during programs or time slots they report regularly watching.[4] To match advertisements that appeared in spot markets, we need information on the consumer's DMA of residence. We therefore limit the NCS sample to the approximately 80,000 consumers with an identified DMA of residence; this is about 70 percent of the full NCS sample for the waves we use.[5] Residents of smaller DMAs tend to be excluded from our analysis sample, but otherwise the excluded and included respondents appear to be generally similar.

[3]It appears the addition of 25 DMAs was phased in during 2001. In 2001, the TNS data cover some but not all of the DMAs covered 2002 - 2004. While the 2001 data cover advertisements that appeared in up to 95 DMAs, in some of the newly added DMAs the number of advertisements appear unusually low.

[4]An example helps clarify the timing of the matching process. Our earliest NCS wave was conducted between October 1, 1999 and April 1, 2000. For respondents to this wave, we match advertisements that aired between October 1, 1998 through October 1, 1999. We use a similar timing of the matching process for the other NCS waves. The NCS does not provide the exact interview date.

[5]The NCS provides partial information on respondents' locality of residence by Designated Marketing Areas (DMAs) within state. A DMA is typically identified by its largest city, and includes any surrounding counties where that city's television broadcasts are most popular. These counties can be within one state or across state boundaries. The NCS has identifiers for each of the 12 most populous DMAs. We use additional information in the NCS to identify respondents who live in 44 smaller DMAs.

We use responses to several sets of NCS questions about television viewing to match aired advertisements to respondents. First, in each survey wave NCS respondents were asked about their viewing habits for a list of about 300 to 400 broadcast television programs and almost as many cable television programs. Second, NCS respondents were asked about their viewing, by time slot, of broadcast television on a typical weekday and typical weekend. Third, NCS respondents were asked about their viewing, by time slot, of specific cable networks. We measure respondents as potentially exposed to: advertisements that aired during specific programs they watched; advertisements that aired on other broadcast programs during time slots they watched; and advertisements that aired during time slots and on specific cable networks they watched.[6] Our measure of advertising exposure capture about 85 percent of aired pharmaceutical advertisements in the TNS data. The degree to which our measure under-states a consumer's exposure to advertising depends upon his or her television-viewing habits. Our measure under-states advertising exposure more for consumers who watch relatively more television programming not included on the NCS lists of program titles or time slots.[7]

Overview of the Data

We analyze exposure to advertisements for pharmaceutical products that treat ten categories of health conditions: adults' allergies; children's allergies; arthritis; asthma;

[6]When we only know that the respondent was watching a broadcast television time slot during which an advertisement appeared, we weight the advertisement by the inverse of an estimate of the number of stations in their DMA. We use the number of stations in each DMA as a proxy for the number of stations a person might watch.

[7]Our measure probably tends to under-state advertising exposure more for consumers with unusual viewing habits. The NCS lists of program titles appear to capture the most popular programs. The NCS lists of time slots do not cover the period from 1 a.m. to 5 a.m. for broadcast television or the period from 1 a.m. to 6 a.m. for cable television.

cholesterol; depression; erectile dysfunction; insomnia; sexually transmitted diseases; and toenail fungus. Table 1 lists the categories and the most heavily advertised products within each category. We chose the categories to include products that treat a range of health conditions as well as more controversial products. For example, Wilkes et al. (2000) use a vignette about a patient asking for a product to treat toenail fungus as an example of one of the drawbacks of DTC advertising. DTC advertisements for a new class of arthritis medications raised serious concerns after Vioxx was withdrawn from the market due to safety concerns (Vogt, 2005). Our categories include many but not all of the most heavily advertised products. Our list includes 16 of the 20 products with the highest DTC advertising spending in 2000 (Frank et al., 2002).

TABLE 1 APPROXIMATELY HERE

Over the time period and categories we analyze, products that treat adults' allergies and arthritis are the most heavily advertised. By our measure, over the course of twelve months the average NCS respondent in our sample was exposed to almost 1,500 advertisements for adults' allergy products and about 750 advertisements for arthritis products. The average NCS respondent was exposed to hundreds of advertisements per year for products in each of most of the remaining categories.

Figure 1 shows the time trend in exposure to television advertisements. We sum advertisements for all products in all ten categories. Average annual advertising exposure more than doubled, from slightly under 2,000 advertisements in 1999 to nearly 5,000 advertisements by 2003. Although they are not shown in Figure 1, the trends for

some of the individual product categories are even more dramatic. As two examples: from 1999 to 2003 average exposure to advertisements for products that treat cholesterol and for products that treat erectile dysfunction increased roughly five-fold. The different trends across product categories probably reflect different market conditions. In the market for erectile dysfunction products, for example, Viagra's launch in March 1998 was just prior to our study period, and it was followed by the launches of Cialis and Levitra in 2003. The sharp increase in advertising for these products is consistent with what appears to be a common strategy firms use to heavily advertise new products (Avery et al., 2007, Donohue et al., 2007). The trend in Figure 1 for total DTC advertising exposure is an average of more variable trends in advertising in the different product categories.

FIGURE 1 APPROXIMATELY HERE

We are not aware of comparable estimates of consumers' exposure to DTC advertisements for pharmaceutical products. Previous surveys of consumers find that exposure to DTC advertisements is "nearly universal," but do not measure the extent of that exposure (Weissman et al., 2003). Other descriptive and econometric research uses data on DTC advertising expenditures. The general trend in exposure in Figure 1 is consistent with general trends DTC advertising expenditures (Donohue et al., 2007).

Although not perfect, our measures of individual consumers' potential exposure to DTC advertisements offer several advantages over data on advertising expenditures. Most importantly for this study, we are able to explore whether consumers of different

socioeconomic status are systematically exposed to different levels of DTC advertising. This set of research questions would be very difficult to address using advertising expenditure data, even dis-aggregated to the market level (DMAs). Average socio-economic characteristics do not vary that much across DMAs. Moreover, advertising exposure varies much less across market-averages than it varies across individuals within markets. For example, in 2000 the highest market-average exposure to arthritis advertising (about 1200 advertisements) was only twice the lowest market-average exposure (about 600 advertisements). In contrast, within some of the largest DMAs, the individual at the 90th percentile of exposure potentially saw over twenty-five times more arthritis advertisements than the individual at the 10th percentile of exposure (around 1800 advertisements compared to around 70 advertisements).

4. Consumer Exposure to DTC Advertisements

Main Results

In this section we report the results of descriptive multiple regression models of consumers' exposure to television advertisements for pharmaceutical products. Each model includes the same set of explanatory variables that measure employment status, age, sex, race/ethnicity, schooling, income, health insurance, region, county size, and survey wave. Table 2 provides the sample means for the explanatory variables. Table 3 presents the results from ten separate regressions, one for each product category. The sample size for the models is 80,615 respondents.

TABLE 2 AND TABLE 3 APPROXIMATELY HERE

In terms of socioeconomic disparities, there are a number of statistically and practically significant results. The results consistently show that consumers not working full-time potentially saw more advertisements in all of the product categories. The disabled are exposed to the most advertisements, followed by the retired and the unemployed. Another consistent and strong pattern is that Blacks are exposed to more DTC advertisements. In contrast, Hispanics appear to be exposed to fewer DTC advertisements. However, an important caveat is that our measure of exposure does not reflect advertisements that appeared on Spanish-language television networks. The college-educated are exposed to fewer advertisements, but the relationship between schooling and exposure is not monotonic for every product category. Exposure across income quintiles does not vary strongly or consistently across all product categories. There is some tendency for low-income consumers to be exposed to more advertisements for some products, for example for asthma and arthritis products. Finally, consumers who lack health insurance are exposed to fewer advertisements for each of the product categories.

Figures 2a and 2b illustrate the magnitude of the difference in predicted exposure of a reference group and Blacks, the unemployed, and the uninsured. To create the Figures, we use the estimated regression coefficients to predict exposure to television advertisements of consumers with different characteristics. The baseline reference group consists of females, aged 35 to 44, employed full-time, white, college-educated, in the highest income quintile, married, no children, in the South, in the largest metropolitan areas, who were surveyed in NCS wave 29. The other bars in the Figures compare the predicted exposure for Blacks, the unemployed, and the uninsured to the reference group,

holding all else constant. The illustrated differences are statistically significant; for the relevant standard errors the reader is referred to Table 3. In practical terms, depending on the product category Blacks and unemployed consumers are usually exposed to about one-third more DTC advertisements than consumers in the reference group. Uninsured consumers are usually exposed to about ten percent fewer DTC advertisements.

FIGURES 2A AND 2B APPROXIMATELY HERE

The patterns in Table 3 for the other demographic variables conform with common sense. For most products older consumers are exposed to more advertisements. Not surprisingly, this pattern is especially strong for advertisements of products that treat arthritis, and notable exceptions to the pattern include advertisements for products that treat children's allergies and products that treat sexually transmitted diseases. Women are generally exposed to more advertisements, but men are exposed to more advertisements for products that treat erectile dysfunction and for products that treat sexually transmitted diseases.

Discussion and Additional Results

The observed patterns in advertising exposure reflect consumers' television-watching and firms' advertisement-placement decisions. Some of the strongest patterns in Table 3 seem to mainly reflect general differences in television watching. For example, consumers who are not employed have more time available to watch television, so it is not surprising that they are exposed to more DTC advertisements. Similarly, according to Nielsen Media data, in the Fall of 2004 Black households watched 40

percent more television than non-Black households (Steadman 2005). So again, our finding that Blacks are exposed to at least 30 percent more DTC advertisements in most product categories is not surprising.

Although firms' advertisement-placement decisions are not our focus, the results in Table 3 provide some clues. It might be profitable to target advertisements at disadvantaged groups because the marginal returns to providing information are higher.[8] An alternative hypothesis is that while DTC advertisements are mainly targeted at advantaged consumers, they hit bystanders who watch a lot of television, including many members of disadvantaged groups. One way to shed light on the "bystander hypothesis" is to explore whether members of a disadvantaged group are exposed to advertisements for relevant products that treat conditions they actually suffer, or to advertisements for irrelevant products. Because some of the products treat conditions mainly experienced by the elderly, the age of consumers' provides a rough cut at product relevance.

To explore the bystander hypothesis, we re-estimated the model of exposure to advertisements for arthritis products to include interactions between age and race. Figure 3 compares the predicted exposure of Blacks to the reference group, for consumers ages 18 - 24 and for consumers over the age of 65. Young Blacks are exposed to almost 50 percent more advertisement than are the young reference group, while the difference for older Blacks is much smaller. Compared to the older reference group, older Blacks are exposed to only 17 percent more advertisements. The fact that young consumers are exposed to a substantial number of advertisements for arthritis medications, and the fact

[8]Profit-driven targeting could also explain why uninsured consumers are exposed to fewer DTC advertisements, because providing them with information is less likely to result in increased sales of the advertised products.

that young Blacks are exposed more than young whites, lend support to the bystander hypothesis.

FIGURE 3 APPROXIMATELY HERE

The public health implications of DTC advertising depend upon its ultimate impact on medical treatment, health behaviors, and health outcomes. While an analysis of these effects is beyond the scope of this paper, Table 4 presents some intriguing preliminary patterns. The upper panel of Table 4 shows a strong association between exposure to advertisements for cholesterol medications and several cholesterol-related outcomes. Consumers with the highest quintile of advertising exposure are much more likely to report a diagnosis of high cholesterol and report using a cholesterol prescription medication. In addition, they are more likely to report exercising and being on a diet. These patterns could suggest that DTC advertisements prompt consumers to have their cholesterol measured, and are then given a combination of lifestyle advice and prescription drugs. However, the results in the lower panel of Table 4 suggest other forces may be at work. There is an equally strong association between exposure to advertisements for arthritis medications and cholesterol-related outcomes. As might be suspected based on the similarity of the patterns in the upper and lower panels of Table 4, exposure to cholesterol advertisements is highly correlated ($r = 0.91$) with exposure to arthritis advertisements. Instead of advertising exposure causing all of the differences in cholesterol outcomes, the strong associations in Table 4 also appear to reflect some

combination of individual television-watching habits and producer targeting of advertisements at certain consumer groups.

TABLE 4 APPROXIMATELY HERE

Conclusions

We find that some disadvantaged groups, most notably Blacks, are exposed to substantially more DTC advertisements. Unemployed consumers and others who do not work full time are also exposed to substantially more DTC advertisements. Weaker patterns suggest that consumers with less schooling and lower incomes also tend to be exposed to more DTC advertisements for some products. On the other hand, uninsured consumers are exposed to fewer DTC advertisements, but the magnitude of the difference is relatively small.

Just as it is difficult to determine the causes of health disparities in general, the results of our descriptive models do not allow us to determine the causes of the observed differences in advertising exposure. To some extent, socio-economically disadvantaged consumers are probably bystanders who see advertisements targeted at advantaged consumers. Nevertheless, if DTC advertisements provide useful information to disadvantaged consumers, it might not matter too much whether it is by design or by accident. One reason it might matter is if the content of advertisements targeted at advantaged consumers is more effective at appealing to and informing the target audience. For example, Kaphingst and DeJong (2004) report that a sample of adults with limited literacy showed poor comprehension of DTC television advertisements for

Nasacort (for asthma) and Zocor (for high cholesterol). Based on several studies, Kaphingst and DeJong make a set of recommendations to improve the educational quality of DTC advertisements.

The policy implications of the observed differences in advertising exposure across socio-economic and racial groups are related to more general questions about the desirability of DTC advertising. For some of the product categories we study, DTC advertisements seem to have potential to address important health disparities. For example, as discussed above in section 2, research suggests that Blacks are less likely to receive prescription drug treatment for high cholesterol. Morris et al. (2007, p. 293) report a survey of members of the National Medical Association, the largest association of Black physicians in the U.S. They conclude that "our survey reveals that [DTC advertising] has a positive impact on both African-American physicians and patients, and, notably, underserved populations…. In particular, we were pleased to see that DTC advertising continues to drive patients to visit their doctors. This is very important within the African-American population…." The NMA's recommendations recognize the educational benefit of DTC advertisements while stressing the importance of the patient-physician relationship and the physician's role as gatekeeper.

Pharmaceutical industry studies suggest that many important health conditions are under-treated more generally. For example, Pfizer estimates that only 20 percent of people with dyslipidemia are treated with prescription pharmaceuticals. Moreover, of those patients prescribed a medication for high cholesterol, about half do not take the medication properly or fail to remain on the therapy after 18 months (Manning, 2006). In

this light, DTC advertising for products that treat cholesterol appear to have the potential to improve Americans' health in general and African-Americans' health in particular.

However, others see DTC advertising is a less favorable light. Critics of advertisements for Lamisil (for toenail fungus) or Vioxx (withdrawn from the market for safety concerns) will not be re-assured by our finding that Blacks saw more advertisements for these products. In December 2004 the FDA requested, and Pfizer agreed to, a voluntary suspension of DTC advertising on Celebrex, an arthritis product in the same class of anti-inflammatory drugs as Vioxx (Vogt 2005). Also influenced by the heavy advertising and subsequent withdrawal of Vioxx, a recent Institute of Medicine report recommends that the FDA should restrict DTC advertising of new products for their first two years (Baciu et al., 2006). One notable critic of the pharmaceutical industry goes much further and claims: "The great majority of DTC ads are for very expensive me-too drugs that require a lot of pushing because there is no good reason to think they are any better than drugs already on the market." Angell (2005, p. 124). Angell (p. 252) recommends a complete ban on DTC advertising.

If DTC advertising is more heavily regulated or banned, the pharmaceutical industry might replace it with advertising and promotion that is more targeted at socio-economically advantaged consumers. Despite the rapid growth in DTC advertising, in 2005 expenditures on DTC advertising were only 14 percent of the pharmaceutical industry's expenditures on advertising and promotion (Donohue et al., 2007). Expenditures on free samples and physician detailing accounted for 62 percent and 23 percent of total advertising and promotion expenditures, respectively. A recent study suggests that free samples tend to be targeted away from disadvantaged groups. Using

data from the 2003 Medical Expenditure Panel Survey, Cutrona et al. (2008) find that low–income and uninsured consumers were less likely to have received at least one free sample. Unless these patterns change, moving away from DTC advertising towards free samples could worsen disparities.

A growing body of research suggests that direct-to-consumer advertising increases consumer demand for pharmaceutical products including smoking cessation products, anti-ulcer drugs, and cholesterol-lowering drugs (Avery et al., 2007b; Berndt. et al., 1995; Ling et al., 2002; Wosinska 2005). Avery et al.(2007b) emphasize the difficult challenge of identifying the causal effect of advertising on consumption when there is also potential reverse causality if firms target advertisements at markets with many consumers. Above we report intriguing evidence of a strong association between exposure to DTC advertisements for cholesterol products and cholesterol outcomes. However, our preliminary results also reinforce the message that identifying causality will be challenging. Future work needs to isolate suitable sources of variation in advertising exposure that can identify the causal effect of DTC advertising on pharmaceutical use.

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