



**Can you refuse these discounts? An analysis of price-related promotions by U.S. cigarette companies**

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3 Can you refuse these discounts? An analysis of price-related promotions by U.S. cigarette  
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49 The findings and conclusions in this report are those of the authors and do not necessarily  
50 represent the official position of the Centers for Disease Control and Prevention  
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21 references (25 allowed)

2 tables and 1 figure (5 total allowed)

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3 **ABSTRACT** (word limit 294/300):  
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5 **Objectives:** Raising unit price of cigarette has been shown to be one of the most effective ways  
6 of reducing cigarette consumption and increase rates of successful quitting. However, researches  
7 have shown that price-sensitive smokers have used a variety of strategies to mitigate the effect of  
8 rising price of cigarettes on their smoking habits. In particular, 23%-34% of adult smokers in the  
9 U.S. use cheaper brands, and 18%-55% use coupons or promotions. Although some studies have  
10 assessed smokers' social-demographic characteristics by their preferences to generic brands or  
11 premium brands, little is known about the discount use by type of brands. As such, the main  
12 purpose of this analysis is to evaluate the uses and effects of these price-related discounts by  
13 manufacturer and major brand.  
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26 **Setting:** An analysis based on the cross-sectional 2009-2010 National Adult Tobacco Survey  
27 (NATS).  
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31 **Participants:** 11,766 current smokers aged 18 or above in the U.S.  
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34 **Primary outcome measures:** Price-related discount was defined as smokers who used coupons,  
35 rebates, buy 1 get 1 free, 2 for 1, or any other special promotions for their last cigarettes  
36 purchase.  
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40 **Results:** The use of price-related discounts and associated price impact vary widely by cigarette  
41 manufacturer and brand. Approximately 1 of 3 Camel, 1 of 4 Marlboro, and 1 of 8 Newport  
42 smokers used price-related discounts in their last cigarette purchases. The average price  
43 reductions of discounts offered by Philip Morris (PM) or R.J. Reynolds (RJR) were around 29  
44 cents per pack while that of Lorillard (only Newport brand) was 24 cents per pack. Cigarette  
45 brands that provided significant per pack price reductions include: PM Marlboro (28 cents), RJR  
46 brands Camel (41 cents), Doral (50 cents), Kool (73 cents), and Salem (80 cents), and Lorillard  
47 Newport (24 cents).  
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3 **Conclusion:** Policies that decrease price-minimization strategies will benefit public health.  
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8 **Strengths and limitations of this study:**  
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10 Strengths:

- 11 • Research has shown that increasing the unit price of cigarettes is among the most  
12 effective public health interventions to reduce cigarette consumption, prevent smoking  
13 initiation, and increase rates of successful quitting. This is the first national study in the  
14 United States to evaluate the uses and effects of price-related discounts (coupons, rebates,  
15 buy 1 get 1 free, 2 for 1, or any other special promotions for the last pack of cigarettes  
16 purchased) by U.S. cigarette manufacturer and specific cigarette brand.
- 17 • The U.S. national study consisted of an analysis of telephone and cell phone cross  
18 sectional data (2009-2010) of 11,766 current cigarette smokers aged 18 or above.
- 19 • Price paid for last pack of cigarettes during the past 30 days was collected. Because of  
20 recent (last pack bought in past 30 days and most smokers are daily smokers), recall bias  
21 should not be a major problem in this study.  
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26 Limitations:  
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- 28 • The study design is cross-sectional. Therefore, the study findings may be specific only to  
29 the period October 2009–June 2010.
- 30 • 4,008 respondents were excluded from the analysis because they failed to provide price  
31 paid for their latest purchase, did not report the number of cigarettes smoked per day on  
32 smoking days, or failed to report using price minimization strategies.
- 33 • The 2009-2010 NATS does not collect information for all price minimization strategies,  
34 including cigarette purchases from states with lower price  
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3 Cigarette use is the most preventable cause of death and disease in the United States and  
4 presents a significant public health burden.<sup>1</sup> Research has shown that increasing the unit price of  
5 cigarettes is among the most effective public health interventions to reduce cigarette  
6 consumption, prevent smoking initiation, and increase rates of successful quitting.<sup>2-7</sup> In addition,  
7 recent evidence shows that the 2009 federal tobacco excise tax increases have been one of the  
8 strategies that have substantially reduced the number of cigarette and smokeless tobacco users  
9 among U.S. middle and high school students.<sup>8</sup>

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21 Internal documents from cigarette companies have shown that cigarette companies are  
22 aware of the potential impacts that price increases have on their sales and profits. Cigarette  
23 companies have developed a variety of price-reduction marketing efforts to promote cigarette  
24 sales, such as multipack discounts, rebates, and coupons.<sup>9</sup> According to the most recent cigarette  
25 report from the Federal Trade Commission, in addition to giving away 50 million cigarettes for  
26 free in 2010, the major cigarette manufactures spent approximately \$8.05 billion marketing their  
27 products. More than 80% of the marketing expenditures (6.49 billion) went to price-related  
28 discounts and promotional allowances used to reduce the retail price of cigarettes.<sup>10</sup>

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40 These cigarette companies' price-related discounts may diminish the public health benefit  
41 associated with increased cigarette prices among some smokers even after federal law has raised  
42 the unit price of cigarettes. Several recent studies have shown that a large portion of U.S. adult  
43 smokers (18%–55%) have taken advantage of these price-related discounts offered by some  
44 cigarette companies.<sup>11-16</sup> In addition, evidence from other studies has shown that smokers who  
45 used these price-related discounts were less likely to make quit attempts or to successfully quit in  
46 the future.<sup>17,18</sup> Although studies have previously investigated demographics and socioeconomic  
47 characteristics of smokers who used price minimization strategies, including using coupons or  
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3 other types of discounts from cigarette companies,<sup>11-15</sup> little is known about how these price-  
4 related discounts affect the average price paid per cigarette when factoring in discounts offered  
5 by specific cigarette companies or when looking at specific cigarette brands. Cigarette  
6 companies may be directly influencing the prices of their products by using these types of  
7 marketing strategies.  
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11 Using unique data from the 2009–2010 National Adult Tobacco Survey (NATS) about  
12 cigarette brands and price-related discounts used by adult smokers, we evaluated the uses and  
13 effects of these price-minimization strategies by cigarette manufacturer and major brand. To the  
14 best of our knowledge, this is the first study to provide these estimates from a national  
15 representative sample of U.S. adult smokers. The findings of the analysis may help policy and  
16 public health stakeholders to further understand the promotion strategies of leading U.S. cigarette  
17 companies.  
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## 34 **METHODS**

### 35 **Data source**

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37 The 2009–2010 NATS is a stratified, national, landline and cell phone survey conducted  
38 during October 2009–June 2010. The survey population is a representative sample of non-  
39 institutionalized adults aged 18 years or older at both state and national levels. The survey was  
40 developed by the Office on Smoking and Health at the Centers for Disease Control and  
41 Prevention and was designed primarily to assess the prevalence of tobacco use and the factors  
42 related to tobacco use among U.S. adults. The survey has 130 questions that provide information  
43 about demographics, health status, cigarette smoking behaviors, price minimization behaviors,  
44 cigarette brands preference, the use of other tobacco products, and smoking quit attempts. The  
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3 2009–2010 NATS completed a total of 118,581 interviews, including 110,634 by landline and  
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5 7,947 by cell phone. Because samples used for this analysis contain only de-identified  
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7 observations, this research did not involve human subjects, as defined by Title 45 Code of  
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9 Federal Regulations, Part 46, and institutional review board (IRB) approval was not required.  
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13 This analysis is restricted to current smokers who reported the cigarette brand name that  
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15 they smoked most often during the past 30 days (n=16,015). Current smokers were defined as  
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17 those who reported smoking at least 100 cigarettes in their lifetime and currently smoked every  
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19 day or some days (n=16,542). Among them, respondents who failed to report a brand name were  
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21 excluded (n=523). Because of the concern of small sample size (n=4), respondents who smoked  
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23 Forsyth, which is a private brand label, were also excluded from the analysis.  
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28 In addition, respondents who failed to provide information on price paid for their latest  
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30 purchase (n=978), the use of price-minimization strategies (n=2,794), demographic  
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32 characteristics (age, race/ethnicity, gender, education, marital status, or employment status)  
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34 (n=477), or time to first cigarette since wake up, were also excluded. The final sample size is  
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36 11,766.  
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#### 41 **Measures of brands and companies**

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43 In the survey, respondents were asked about the cigarette brand that they used most often  
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45 during the past 30 days. A total of 17 brand choices were listed. Except Forsyth and the choice of  
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47 other brands (n=3,299), the remaining 15 brand names are categorized as premium brands or  
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49 generic brands. Premium brand names include Camel, Kool, Marlboro, Newport, Pall Mall,  
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51 Parliament, Salem, Virginia Slims and Winston, and generic brands include Basic, Doral, GPC,  
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53 Misty, Sonoma, and USA Gold.  
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3 To evaluate price-related discounts and promotions used by major companies, three  
4 major cigarette companies were identified on the basis of the 15 brand names above. They are  
5 Philip Morris (PM), R.J. Reynolds (RJR), and Lorillard. These companies jointly represented  
6 approximately 85% of total U.S. cigarette sales in 2010.<sup>19</sup> PM's brand names include Basic,  
7 Marlboro, Parliament, and Virginia Slims. Camel, Doral, GPC, Kool, Misty, Pall Mall, Salem,  
8 and Winston are brand manufactured by RJR. Lorillard has the brand Newport. The remaining  
9 brands, including Sonoma, USA Gold, and the choice of others brands, are included for other  
10 cigarette companies.  
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### 23 **Measures of prices and discounts from the industry**

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25 The 2009–2010 NATS contains two types of price data. Current smokers who bought  
26 cigarettes by packs in their latest purchases were asked to report price paid per pack (after  
27 discounts or coupons) in dollars. Those who bought cigarettes by cartons were asked to report  
28 price paid per carton. Consequently, price per carton was divided by 10 to obtain a consistent  
29 measure of price paid per pack.  
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37 In the survey, current smokers were also asked whether they had taken advantage of  
38 coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes during  
39 the most recent purchase. These coupon and other discount offers were defined in the analysis as  
40 coupons and price-related discounts from the industry. Positive responses to this question were  
41 used to estimate the prevalence of usage of price-related discounts and promotions by  
42 manufacturer and brand name.  
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## Statistical analysis

Cigarette prices reported in the 2009–2010 NATS may reflect the price paid by a smoker after using multiple price minimization strategies. To assess the independent price reduction associated with coupons and other price-related discounts directly from the industry, regression analysis was used to obtain adjusted average prices per pack. The dependent variable in the analysis is the price paid per pack of cigarettes. In addition to the variable of the use of a coupon and other price-related discounts during the most recent purchase, other covariates included the use of premium or generic brands in the past 30 days, purchase of latest cigarette by carton or by pack, purchase on Indian reservations during the previous year, and purchase through the Internet during the previous year.

Daily smoking and time to first cigarette of the day were included in regression analysis as measures of smoking intensity and nicotine dependence so as to control for other price minimization strategies that are not included in the survey, because heavy or more addicted smokers are more likely to use price minimization strategies.<sup>11,12,14,15</sup> Gender, age, race/ethnicity, education, marital and employment status, and state dummy indicators were also included to account for individual differences and policy variations across states. Thus, the constant in the regression analysis presents the adjusted average per pack price before using any price minimization strategies, and the coefficient reflects the price reduction associated with price-related discounts directly from the industry. All analyses were performed using STATA (version 13) and weighted using national NATS weights.

## RESULTS

Overall, among 11,766 adult current smokers, 38.4% identified Marlboro as the brand they used most often (Figure 1), followed by Newport (15.1%) and Camel (8.7%). The percentage of users of other identified brand names were all less than 5%, respectively, ranging from Pall Mall (4.9%) to GPC (0.5%). The combined remaining 15.2% of smokers usually smoked cigarette brands (classified as other brands) that were not identified in the 2009–2010 NATS.

Table 1 presents the use of coupons or other price-related discounts among adult smokers by cigarette manufacturer. Specifically, 43.4% (4,850) reported usually smoking cigarettes produced by PM, 23.9% (3,274) usually smoked cigarettes from RJR, and 15.0% (960) usually smoked Newport cigarettes (Lorillard) (Table 1). The remaining 17.7% (2,682) smoked cigarettes from other companies, including Sonoma and USA Gold, which do not belong to the three major cigarette companies identified in the analysis. Approximately 24.4% of U.S. adult smokers who smoked PM brands used coupons or other price-related discount offers from the company during their most recent cigarette purchase, compared with 21.0% of those who smoked RJR brands, 13.7% of those who smoked Newport (Lorillard), and 11.1% of those who smoked brands from other cigarette companies.

After adjusting for the use of multiple price minimization strategies, respondents' demographic characteristics, smoking intensity, and state policy variations, the average per pack prices paid for cigarettes from PM, RJR, Newport (Lorillard), and other companies were \$5.06, \$4.63, \$4.75, and \$3.94, respectively. The average price reductions of coupons or other discounts offered by PM or RJR were statistically significant and similar in magnitude, 29 cents per pack. That of Newport (Lorillard) cigarettes was 24 cents per pack and was marginally significant.

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Table 2 presents the use of coupons or other price-related discounts by specific brand (10 self-reported leading brands only) from the 3 leading cigarette manufacturing companies in the United States. Table 2 is ordered by PM brands first, followed by RJR brands, and last by Newport, the only Lorillard brand listed. The prevalence of using coupons or other price-related discounts varied from 33.9% (Camel, RJR), to 25.6% (Marlboro, PM), 13.7% (Newport, Lorillard), and 10.5% the lowest (Salem, RJR). Thus, about 1 of 3 Camel smokers used these strategies during the last time they bought their cigarettes, compared to about 1 of 4 Marlboro smokers, and about 1 of 8 Newport smokers. The percent price reductions due to use of coupons or discounts ranged from 1.1% (Basic) to 17.3% (Kool). Among these 10 leading U.S. cigarette brands, the average price paid per pack not using any price minimization strategies ranged from paying \$3.19 (Pall Mall, RJR) to \$6.49 (Virginia Slims, PM). After using coupons or other price-related discounts, the average prices paid for a pack of cigarettes of the top 3 selling brands were 28 cents less for Marlboro (\$4.72 instead of \$5.00), 41 cents less for Camel (\$4.83 instead of \$5.24) and 24 cents less for Newport (\$4.51 instead of \$4.75). Also, those who smoked Salem and used coupons or other price-related discounts saved 80 cents the last time they purchased it. Finally, among these 10 leading U.S. brands, users of Camel (RJR), Marlboro (PM), and Basic (PM) used price minimization strategies the most.

#### Discussion:

Coupons or other price-related discounts from PM, RJR, and Lorillard were used by 14%-25% of their consumers and have provided price reductions for the smokers who used specific brands. Coupons or other price-related discounts from other companies did not result in statistically significant price per pack reductions for their consumers. To put the range of price reductions associated with coupons or other price-related discounts into context, the cigarette

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3 federal tax was \$1.01 per pack starting April 1<sup>st</sup>, 2009, and the weighted average state cigarette  
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5 excise tax rate was \$ 1.17 per pack in 2010. These numbers imply that the coupon discounts  
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7 from the three leading cigarette companies (about 24–29 cents) offset 23.8%–28.7% of public  
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9 health impacts from the federal tax or 11.0%–13.3% of the impacts from the federal and state  
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11 excise taxes combined to the smokers of cigarettes produced by these manufactures. As a result,  
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13 these offers brought actual average prices down for users of specific brands. Therefore, after  
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15 controlling for the use of other price minimization strategies and respondents' smoking intensity  
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17 and nicotine addition, the 3 leading cigarette companies provided price reductions for their  
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19 products through coupons or other price-related discounts.  
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25 Although it is true that statistically significant or marginally statistically significant price  
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27 reductions were observed for the 3 leading U.S. cigarette companies, significant reductions are  
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29 brand specific. The significant reductions were observed only for Marlboro (U.S. leading brand),  
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31 Camel (second U.S. leading brand), Kool, Doral and Salem, while marginally for Newport (third  
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33 U.S. leading brand). Thus, PM, RJR, and Lorillard have concentrated their efforts to provide  
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35 price discounts mainly to their bestselling brands. This might be one of the reasons that a  
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37 previous analysis failed to identify significant price reductions associated with promotional  
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39 offers.<sup>12</sup>  
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44 This study has some limitations. First, the study design is cross-sectional. Therefore, the  
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46 study findings may be specific only to the period October 2009–June 2010. However, the study  
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48 covers the entire United States, and there is a variety of prices as a function of brand smoked and  
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50 other factors. Second, most variables in the analysis are collected from recent purchases (i.e.,  
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52 price paid, coupon and other price-related discounts, and carton purchase are for the latest  
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54 purchase; premium or generic brands are for the last 30 days), but others are collected with a  
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3 time frame of 1 year (i.e., purchase on Indian reservations, purchase through Internet). However,  
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5 when we excluded Indian reservation and Internet purchases from the analysis, the adjusted  
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7 average prices and price discounts associated with coupons did not change much. Third, 4,008  
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9 respondents were excluded from the analysis because they failed to provide price paid for their  
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11 latest purchase, did not report the number of cigarettes smoked per day on smoking days, or  
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13 failed to report using price minimization strategies. Only approximately 20% of respondents  
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15 interviewed during the first 2 months of the survey were asked if purchases had been made on an  
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17 Indian reservation anytime during the past year. However, another study has shown that  
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19 dropping these observations does not significantly affect the results.<sup>16</sup> Fourth, as noted above,  
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21 the 2009-2010 NATS does not collect information for all price minimization strategies, including  
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23 cigarette purchases from states with lower price. Although the cross-border purchase is an issue  
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25 in tobacco control, the prevalence of this behavior was quite low in the United States compared  
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27 to other forms of price minimization strategies. For example, data from the 2003 and 2006-2007  
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29 Tobacco Use Supplement to the Current Population Survey (TUS-CPS) suggests that about 5%  
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31 of smokers made purchase across a state border,<sup>20</sup> while in the 2010-2011 TUS-CPS,  
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33 approximately 3.0% of smokers purchased cigarettes from non-tribal land in lower-taxed and  
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35 non-residential states (estimates not shown). In order to account for unmeasured price  
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37 minimization strategies, we controlled for smoking intensity and level of nicotine addiction in  
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39 the analysis since the literature suggests that these are important risk factors of using any price  
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41 minimization strategies. Finally, the paid prices were determined by using self-reported  
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43 information from the smoker, which may be subject to recall bias. However, existing evidence  
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45 indicates that the average of self-reported prices per pack in the 2009-2010 NATS was very  
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47 consistent with the corresponding 2009 national average price reported in the Tax Burden on  
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3 Tobacco (TBOT).<sup>16</sup> Another benefit of using self-reported price in this analysis is that we are  
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5 able to control for the corresponding smoking intensity of each smoker, which is not available in  
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7 market scanned data but closely related to potential use of unmeasured price minimization  
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9 strategies.  
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13 In addition to cigarette companies directly influencing cigarette retail prices by providing  
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15 coupons or other price-related discounts, cigarette companies may also indirectly affect cigarette  
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17 prices by offering discounts to retailers and by promoting cigars or pipe tobacco that can be used  
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19 in roll-your-own cigarettes.<sup>21</sup> Although these indirect influences are critical in tobacco control  
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21 and certainly warrant additional studies, the NATS survey did not collect such information thus  
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23 they are not within the scope of this analysis.  
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28 Our results show that the three leading cigarette companies in the United States continue  
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30 to offer price discounts to smokers of their brands, although these promotions appear to be  
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32 concentrated among their top-selling cigarette brands. As pointed out earlier, smokers who use  
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34 price-related discounts are less likely to make quit attempts or to successfully quit in the future.  
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36 The length (duration) of smoking and the amount of cigarettes smoked per day on days the  
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38 person smoked is strongly associated with a higher likelihood of developing and dying from a  
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40 smoking-related disease, such as lung cancer, COPD, or heart attacks.<sup>1</sup> Therefore, even though  
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42 price minimization strategies may increase sales and profits for cigarette companies, these price  
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44 discounts are likely preventing or delaying some smokers from permanent cessation. Policies  
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46 that decrease price-minimization strategies will benefit public health.  
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### **Contributorship Statement**

All 3 authors meet the authorship criteria:

Ralph Caraballo participated in 1)the conception and design of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

Xu Wang participated in 1) the conception and analysis and interpretation of data; 2) revising it critically for important intellectual content; and 3) final approval of the version to be published.

Xin Xu participated in 1)the conception and design of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

### **Competing Interests**

None

### **Data Sharing Statement**

The raw and weighted data set are available to the public. A request can be made to the authors

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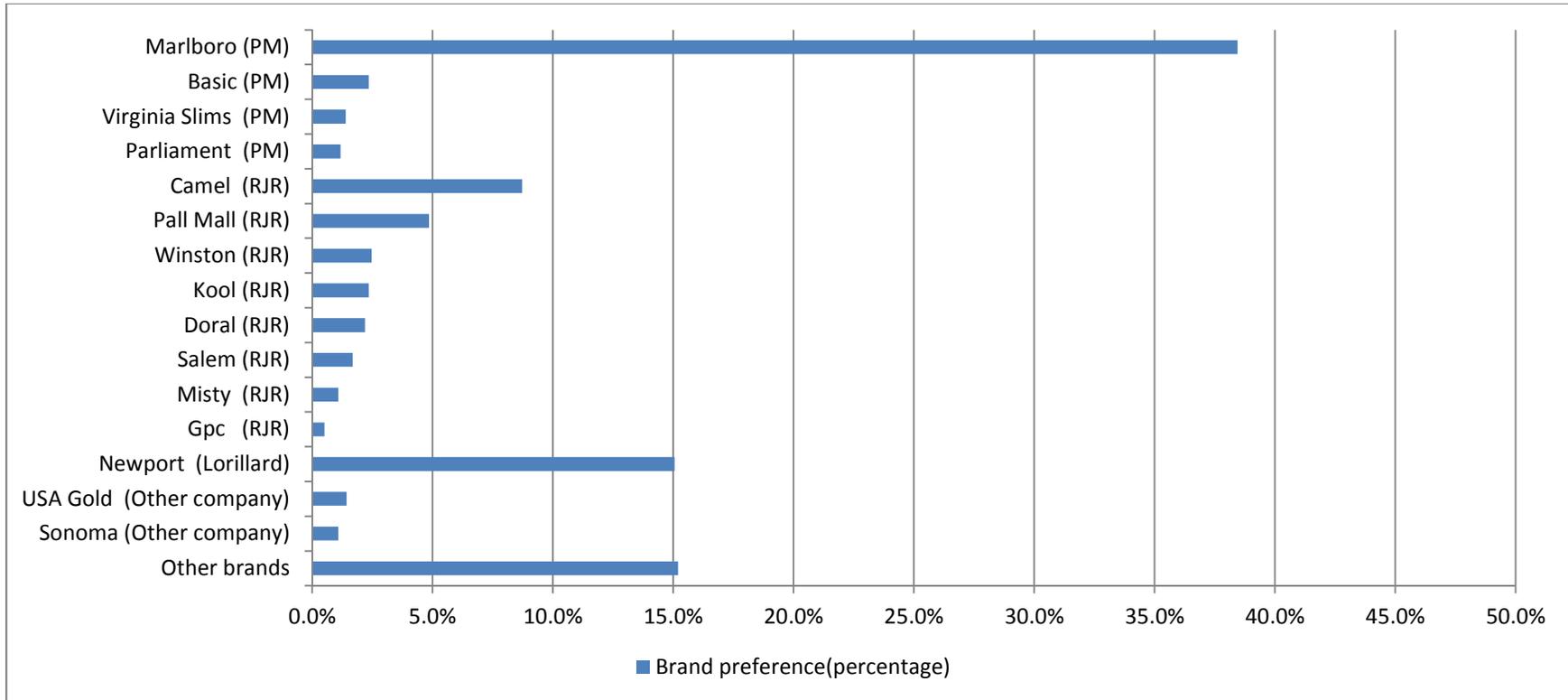
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Figure 1. Brand preference among U.S. adult smokers (2009-2010 NATS)



only

**Table 1. The use of coupons or other price-related discounts by major cigarette manufactures**

	PM	RJR	LORILLARD (Newport only)	Other Companies <sup>a</sup>
Prevalence of brand use	43.4%	23.9%	15.0%	17.7%
Prevalence of coupons or discounts used by smokers of that manufacture	24.4%	21.0%	13.7%	11.1%
Price reduction per pack for smokers of that manufacture(\$)	-0.29**	-0.29**	-0.24*	-0.23
Average price per pack for smokers of that manufacture (\$)	5.06	4.63	4.75	3.94
Percentage of discount rendered to smokers of that manufacture	5.7%	6.3%	5.1%	5.8%
N	4,850	3,274	960	2,682

Notes: N represents un-weighted sample size. All estimates were obtained with national weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>a</sup> Users of Sonoma, USA Gold brands, and other brand names which not listed in the survey.

\*\*Statistically significant at 5% level; \* statistically significant at 10% level.

**Table 2. The use of coupons or other price-related discounts by cigarette manufacturer and by top 10 leading U.S. brands**

		Prevalence of coupon use	% of discount	Average price	Price after discount	Rank <sup>a</sup>
PM	Basic	22.2%	1.1%	\$4.41	\$4.36	3
	Marlboro	25.6%	5.6%	\$5.00	\$4.72**	2
	Virginia Slims	10.6%	3.4%	\$6.49	\$6.27	9
RJR	Camel	33.9%	7.8%	\$5.24	\$4.83**	1
	Doral	15.6%	12.7%	\$3.93	\$3.43**	6
	Kool	11.6%	17.3%	\$4.23	\$3.50**	8
	Pall Mall	15.9%	1.3%	\$3.19	\$3.15	5
	Salem	10.5%	15.7%	\$5.11	\$4.31**	10
	Winston	17.1%	3.7%	\$4.07	\$3.92	4
Lorillard	Newport	13.7%	5.1%	\$4.75	\$4.51*	7

<sup>a</sup>Based on prevalence of coupon use.

\*\*Price reduction associated with coupons and other price-related discounts is statistically significant at 5% level, \* statistically significant at 10% level.

# BMJ Open

## Can you refuse these discounts? An analysis of price-related promotions by U.S. cigarette companies

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3 Can you refuse these discounts? An analysis of price-related promotions by U.S. cigarette  
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49 The findings and conclusions in this report are those of the authors and do not necessarily  
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Abstract: Word count: (journal-recommended maximum of 300 words) is 296

Word count: (journal-recommended maximum of 4,000 words) is 3,035

25 references (25 allowed)

2 tables and 1 figure (5 total allowed)

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2  
3 **ABSTRACT** (word limit 300/300):  
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5 **Objectives:** Raising unit price of cigarette has been shown to be one of the most effective ways  
6  
7 of reducing cigarette consumption and increase rates of successful quitting. However, researches  
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9 have shown that price-sensitive smokers have used a variety of strategies to mitigate the effect of  
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11 rising price of cigarettes on their smoking habits. In particular, 23%-34% of adult smokers in the  
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13 U.S. use cheaper brands, and 18%-55% use coupons or promotions. Although some studies have  
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15 assessed smokers' social-demographic characteristics by their preferences to generic brands or  
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17 premium brands, little is known about the discount use by type of brands. As such, the main  
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19 purpose of this analysis is to evaluate the uses and price discount effects of these price-related  
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21 discounts by manufacturer and major brand.  
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27 **Setting:** An analysis based on the cross-sectional 2009-2010 National Adult Tobacco Survey  
28  
29 (NATS).  
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32 **Participants:** 11,766 current smokers aged 18 or above in the U.S.  
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34 **Primary outcome measures:** Price-related discount was defined as smokers who used coupons,  
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36 rebates, buy 1 get 1 free, 2 for 1, or any other special promotions for their last cigarettes  
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38 purchase.  
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41 **Results:** The use of price-related discounts and associated price impact vary widely by cigarette  
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43 manufacturer and brand. Approximately 1 of 3 Camel, 1 of 4 Marlboro, and 1 of 8 Newport  
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45 smokers used price-related discounts in their latest cigarette purchases. The average price  
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47 reductions of discounts offered by Philip Morris (PM) or R.J. Reynolds (RJR) were around 29  
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49 cents per pack while that of Lorillard (Newport only) was 24 cents per pack. Cigarette brands  
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51 that provided significant per pack price reductions include: PM Marlboro (28 cents), RJR brands  
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53 Camel (41 cents), Doral (50 cents), Kool (73 cents), and Salem (80 cents), and Lorillard Newport  
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55 (24 cents).  
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3 **Conclusion:** Policies that decrease price-minimization strategies will benefit public health.  
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6 Strengths and limitations of this study:  
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8 Strengths:  
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- 10 • Research has shown that increasing the unit price of cigarettes is among the most  
11 effective public health interventions to reduce cigarette consumption, prevent smoking initiation,  
12 and increase rates of successful quitting. This is the first national study in the United States to  
13 evaluate the uses and effects of price-related discounts (coupons, rebates, buy 1 get 1 free, 2 for  
14 1, or any other special promotions for the last pack of cigarettes purchased) by U.S. cigarette  
15 manufacturer and specific cigarette brand.  
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17 • The U.S. national study consisted of an analysis of telephone and cell phone cross  
18 sectional data (2009-2010) of 11,766 current cigarette smokers aged 18 or above.  
19  
20 • Price paid for last pack of cigarettes during the past 30 days was collected. Because of  
21 recent (last pack bought in past 30 days and most smokers are daily smokers), recall bias should  
22 not be a major problem in this study.  
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28 Limitations:  
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- 30 • The study design is cross-sectional. Therefore, the study findings may be specific only to  
31 the period October 2009–June 2010.  
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33 • 4,008 respondents were excluded from the analysis because they failed to provide price  
34 paid for their latest purchase, did not report the number of cigarettes smoked per day on smoking  
35 days, or failed to report using price minimization strategies.  
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38 • The 2009-2010 NATS does not collect information for all price minimization strategies,  
39 including cigarette purchases from states with lower price  
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3 Cigarette use is the most preventable cause of death and disease in the United States and  
4 presents a significant public health burden.<sup>1</sup> Research has shown that increasing the unit price of  
5 cigarettes is among the most effective public health interventions to reduce cigarette  
6 consumption, prevent smoking initiation, and increase rates of successful quitting.<sup>2-7</sup> In addition,  
7 recent evidence shows that the 2009 federal tobacco excise tax increases have been one of the  
8 strategies that have substantially reduced the number of cigarette and smokeless tobacco users  
9 among U.S. middle and high school students.<sup>8</sup>

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21 Internal documents from cigarette companies have shown that cigarette companies are  
22 aware of the potential impacts that price increases have on their sales and profits. Cigarette  
23 companies have developed a variety of price-reduction marketing efforts to promote cigarette  
24 sales, such as multipack discounts, rebates, and coupons.<sup>9</sup> According to the most recent cigarette  
25 report from the Federal Trade Commission, in addition to giving away 50 million cigarettes for  
26 free in 2010, the major cigarette manufactures spent approximately \$8.05 billion marketing their  
27 products. More than 80% of the marketing expenditures (6.49 billion) went to price-related  
28 discounts and promotional allowances used to reduce the retail price of cigarettes.<sup>10</sup>

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40 These cigarette companies' price-related discounts may diminish the public health benefit  
41 associated with increased cigarette prices among some smokers even after federal law has raised  
42 the unit price of cigarettes. Several recent studies have shown that a large portion of U.S. adult  
43 smokers (18%–55%) have taken advantage of these price-related discounts offered by some  
44 cigarette companies.<sup>11-16</sup> In addition, evidence from other studies has shown that smokers who  
45 used these price-related discounts were less likely to make quit attempts or to successfully quit in  
46 the future.<sup>17-20</sup> Although studies have previously investigated demographics and socioeconomic  
47 characteristics of smokers who used price minimization strategies, including using coupons or  
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3 other types of discounts from cigarette companies,<sup>11-15</sup> little is known about how these price-  
4 related discounts affect the average price paid per cigarette when factoring in discounts offered  
5 by specific cigarette companies or when looking at specific cigarette brands. Cigarette  
6 companies may be directly influencing the prices of their products by using these types of  
7 marketing strategies.  
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11 Using unique data from the 2009–2010 National Adult Tobacco Survey (NATS) about  
12 cigarette brands and price-related discounts used by adult smokers, we evaluated the uses and  
13 price discount effects of these price-minimization strategies by cigarette manufacturer and major  
14 brand. To the best of our knowledge, this is the first study to provide these estimates from a  
15 national representative sample of U.S. adult smokers. The findings of the analysis may help  
16 policy and public health stakeholders to further understand the promotion strategies of leading  
17 U.S. cigarette companies.  
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## 34 **METHODS**

### 35 **Data source**

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37 The 2009–2010 NATS is a stratified, national, landline and cell phone survey conducted  
38 during October 2009–June 2010. The survey population is a representative sample of non-  
39 institutionalized adults aged 18 years or older at both state and national levels. The survey was  
40 developed by the Office on Smoking and Health at the Centers for Disease Control and  
41 Prevention and was designed primarily to assess the prevalence of tobacco use and the factors  
42 related to tobacco use among U.S. adults. The survey has 130 questions that provide information  
43 about demographics, health status, cigarette smoking behaviors, price minimization behaviors,  
44 cigarette brands preference, the use of other tobacco products, and smoking quit attempts. The  
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3 2009–2010 NATS completed a total of 118,581 interviews, including 110,634 by landline and  
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5 7,947 by cell phone. Because samples used for this analysis contain only de-identified  
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7 observations, this research did not involve human subjects, as defined by Title 45 Code of  
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9 Federal Regulations, Part 46, and institutional review board (IRB) approval was not required.  
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13 This analysis is restricted to current smokers who reported the cigarette brand name that  
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15 they smoked most often during the past 30 days (n=16,015). Current smokers were defined as  
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17 those who reported smoking at least 100 cigarettes in their lifetime and currently smoked every  
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19 day or some days (n=16,542). Among them, respondents who failed to report a brand name were  
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21 excluded (n=523). Because of the concern of small sample size (n=4), respondents who smoked  
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23 Forsyth, which is a private brand label, were also excluded from the analysis.  
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28 In addition, respondents who failed to provide information on price paid for their latest  
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30 purchase (n=978), the use of price-minimization strategies (n=2,794), demographic  
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32 characteristics (age, race/ethnicity, gender, education, marital status, or employment status)  
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34 (n=477), or time to first cigarette since wake up, were also excluded. The final sample size is  
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36 11,766.  
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#### 40 41 **Measures of brands and companies**

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43 In the survey, respondents were asked about the cigarette brand that they used most often  
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45 during the past 30 days. A total of 17 brand choices were listed. Except Forsyth and the choice of  
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47 other brands (n=3,299), the remaining 15 brand names are categorized as premium brands or  
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49 generic brands. Premium brand names include Camel, Kool, Marlboro, Newport, Pall Mall,  
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51 Parliament, Salem, Virginia Slims and Winston, and generic brands include Basic, Doral, GPC,  
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53 Misty, Sonoma, and USA Gold.  
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3 To evaluate price-related discounts and promotions used by major companies, three  
4 major cigarette companies were identified on the basis of the 15 brand names above. They are  
5 Philip Morris (PM), R.J. Reynolds (RJR), and Lorillard. These companies jointly represented  
6 approximately 85% of total U.S. cigarette sales in 2010.<sup>21</sup> PM's brand names include Basic,  
7 Marlboro, Parliament, and Virginia Slims. Camel, Doral, GPC, Kool, Misty, Pall Mall, Salem,  
8 and Winston are brand manufactured by RJR. Lorillard has the brand Newport. The remaining  
9 brands, including Sonoma, USA Gold, and the choice of others brands, are included for other  
10 cigarette companies.  
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### 23 **Measures of prices and discounts from the industry**

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25 The 2009–2010 NATS contains two types of price data. Current smokers who bought  
26 cigarettes by packs in their latest purchases were asked to report price paid per pack (after  
27 discounts or coupons) in dollars. Those who bought cigarettes by cartons were asked to report  
28 price paid per carton. Consequently, price per carton was divided by 10 to obtain a consistent  
29 measure of price paid per pack.  
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37 In the survey, current smokers were also asked whether they had taken advantage of  
38 coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes during  
39 the most recent purchase. These coupon and other discount offers were defined in the analysis as  
40 coupons and price-related discounts from the industry. Positive responses to this question were  
41 used to estimate the prevalence of usage of price-related discounts and promotions by  
42 manufacturer and brand name.  
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## Statistical analysis

Cigarette prices reported in the 2009–2010 NATS may reflect the price paid by a smoker after using multiple price minimization strategies. To assess the independent price reduction associated with coupons and other price-related discounts directly from the industry, for each cigarette company or brand, regression analysis with the following specification was used to obtain adjusted average prices per pack.

$$\text{Per pack price paid} = \beta_1 + \beta_2 \text{discounts} + \beta_3 \text{OtherPMS} + \beta_4 \text{Ciguse} + \beta_5 \text{Demographics} + \beta_6 \text{state}$$

The dependent variable was per pack price paid for cigarettes. The key independent variable was the dichotomous indicator of using a coupon and other price-related discounts during the most recent purchase (discounts). The covariates of other price minimization strategies (OtherPMS) included the use of premium or generic brands in the past 30 days, purchase of latest cigarette by carton or by pack, purchase on Indian reservations during the previous year, and purchase through the Internet during the previous year. Daily smoking and time to first cigarette of the day (ciguse) were included in regression analysis as measures of smoking intensity and nicotine dependence so as to control for other price minimization strategies that are not included in the survey, because heavy or more addicted smokers are more likely to use price minimization strategies.<sup>11,12,14,15</sup> Gender, age, race/ethnicity, education, marital and employment status (demographics), and state dummy indicators (state) were also included to account for individual differences and policy variations across states.

Thus, the constant,  $\beta_1$ , presents the adjusted average per pack price before using any price minimization strategies, and the coefficient,  $\beta_2$  reflects the price reduction associated with price-related discounts directly from the industry. All analyses were performed using STATA

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3 (version 13). Post-stratification sampling weights were incorporated in all analyses to account for  
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5 the complex survey design of the 2009-2010 NATS and nonresponse.  
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## 10 11 12 13 **RESULTS**

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15 Overall, among 11,766 adult current smokers, 38.4% identified Marlboro as the brand  
16 they used most often (Figure 1), followed by Newport (15.1%) and Camel (8.7%). The  
17 percentage of users of other identified brand names were all less than 5%, respectively, ranging  
18 from Pall Mall (4.9%) to GPC (0.5%). The combined remaining 15.2% of smokers usually  
19 smoked cigarette brands (classified as other brands) that were not identified in the 2009–2010  
20 NATS.  
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29 Table 1 presents the use of coupons or other price-related discounts among adult smokers  
30 by cigarette manufacturer. Specifically, 43.4% (4,850) reported usually smoking cigarettes  
31 produced by PM, 23.9% (3,274) usually smoked cigarettes from RJR, and 15.0% (960) usually  
32 smoked Newport cigarettes (Lorillard) (Table 1). The remaining 17.7% (2,682) smoked  
33 cigarettes from other companies, including Sonoma and USA Gold, which do not belong to the  
34 three major cigarette companies identified in the analysis. Approximately 24.4% of U.S. adult  
35 smokers who smoked PM brands used coupons or other price-related discount offers from the  
36 company during their most recent cigarette purchase, compared with 21.0% of those who  
37 smoked RJR brands, 13.7% of those who smoked Newport (Lorillard), and 11.1% of those who  
38 smoked brands from other cigarette companies.  
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53 After adjusting for the use of multiple price minimization strategies, respondents'  
54 demographic characteristics, smoking intensity, and state policy variations, the average per pack  
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3 prices paid for cigarettes from PM, RJR, Newport (Lorillard), and other companies were \$5.06,  
4 \$4.63, \$4.75, and \$3.94, respectively. The average price reductions of coupons or other discounts  
5 offered by PM or RJR were statistically significant and similar in magnitude, 29 cents per pack.  
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8 That of Newport (Lorillard) cigarettes was 24 cents per pack and was marginally significant.  
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12 Table 2 presents the use of coupons or other price-related discounts by specific brand (10  
13 self-reported leading brands only) from the 3 leading cigarette manufacturing companies in the  
14 United States. Table 2 is ordered by PM brands first, followed by RJR brands, and last by  
15 Newport, the only Lorillard brand listed. The prevalence of using coupons or other price-related  
16 discounts varied from 33.9% (Camel, RJR), to 25.6% (Marlboro, PM), 13.7% (Newport,  
17 Lorillard), and 10.5% the lowest (Salem, RJR). Thus, about 1 of 3 Camel smokers used these  
18 strategies during the last time they bought their cigarettes, compared to about 1 of 4 Marlboro  
19 smokers, and about 1 of 8 Newport smokers. The percent price reductions due to use of coupons  
20 or discounts ranged from 1.1% (Basic) to 17.3% (Kool). Among these 10 leading U.S. cigarette  
21 brands, the average price paid per pack not using any price minimization strategies ranged from  
22 paying \$3.19 (Pall Mall, RJR) to \$6.49 (Virginia Slims, PM). After using coupons or other price-  
23 related discounts, the average prices paid for a pack of cigarettes of the top 3 selling brands were  
24 28 cents less for Marlboro (\$4.72 instead of \$5.00), 41 cents less for Camel (\$4.83 instead of  
25 \$5.24) and 24 cents less for Newport (\$4.51 instead of \$4.75). Also, those who smoked Salem  
26 and used coupons or other price-related discounts saved 80 cents the last time they purchased it.  
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28 Finally, among these 10 leading U.S. brands, users of Camel (RJR), Marlboro (PM), and Basic  
29 (PM) used price minimization strategies the most.  
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**Discussion:**

Coupons or other price-related discounts from PM, RJR, and Lorillard were used by 14%-25% of their consumers and have provided price reductions for the smokers who used specific brands. Coupons or other price-related discounts from other companies did not result in statistically significant price per pack reductions for their consumers. Therefore, after controlling for the use of other price minimization strategies and respondents' smoking intensity and nicotine addition, the 3 leading cigarette companies provided price reductions for their products through coupons or other price-related discounts.

To put the range of price reductions associated with coupons or other price-related discounts into context, the cigarette federal tax was \$1.01 per pack starting April 1<sup>st</sup>, 2009, and the weighted average state cigarette excise tax rate was \$ 1.17 per pack in 2010. These numbers imply that the coupon discounts from the three leading cigarette companies (about 24–29 cents) offset 23.8%–28.7% of the price impacts from the federal tax or 11.0%–13.3% of the price impacts from the federal and state excise taxes combined to the smokers of cigarettes produced by these manufactures. As a result, these offers brought actual average prices down for users of specific brands, while the price reductions associated with these discounts were likely to increase the sales in these companies. For example, with a price elasticity of overall demand for cigarettes among adults at somewhere between -0.3 and -0.7,<sup>22</sup> ceteris paribus, these price discounts can be translated into 10.2-23.9 million packs of cigarette sales in 2010 for Marlboro, 3.0-6.6 million packs for Newport, and 1.8-4.1 million packs for Camel.<sup>21</sup>

Although it is true that statistically significant or marginally statistically significant price reductions were observed for the 3 leading U.S. cigarette companies, significant reductions are brand specific. The significant reductions were observed only for Marlboro (U.S. leading brand), Camel (second U.S. leading brand), Kool, Doral and Salem, while marginally for Newport (third

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3 U.S. leading brand). Thus, PM, RJR, and Lorillard have concentrated their efforts to provide  
4 price discounts mainly to their bestselling brands. This might be one of the reasons that a  
5 previous analysis failed to identify significant price reductions associated with promotional  
6 offers.<sup>12</sup>  
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12 This study has some limitations. First, the study design is cross-sectional. Therefore, the  
13 study findings may be specific only to the period October 2009–June 2010. However, the study  
14 covers the entire United States, and there is a variety of prices as a function of brand smoked and  
15 other factors. Second, most variables in the analysis are collected from recent purchases (i.e.,  
16 price paid, coupon and other price-related discounts, and carton purchase are for the latest  
17 purchase; premium or generic brands are for the last 30 days), but others are collected with a  
18 time frame of 1 year (i.e., purchase on Indian reservations, purchase through Internet). However,  
19 when we excluded Indian reservation and Internet purchases from the analysis, the adjusted  
20 average prices and price discounts associated with coupons did not change much. Third, because  
21 of an approval delay, only approximately 20% of respondents interviewed during the first 2  
22 months of the survey were asked if purchases had been made on an Indian reservation anytime  
23 during the past year. In subsequent months, this question was asked of more than 90% of  
24 respondents. In the full sample, total missing responses for this question were 18.4% (3,503).  
25 However, sensitivity analysis has shown that dropping these observations does not significantly  
26 affect the results.<sup>16</sup> As noted in the method section, we also excluded respondents who failed to  
27 report price paid for their latest purchase, the brand name they used most often in the last 30  
28 days, or some of their demographic characteristics. We compared smoking and social-  
29 demographic characteristics between individuals with incomplete information and individuals  
30 with complete information and have found little differences at the mean level. Fourth, as noted  
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3 above, the 2009-2010 NATS does not collect information for all price minimization strategies,  
4 including cigarette purchases from states with lower price. Although the cross-border purchase is  
5 an issue in tobacco control, the prevalence of this behavior was quite low in the United States  
6 compared to other forms of price minimization strategies. For example, data from the 2003 and  
7 2006-2007 Tobacco Use Supplement to the Current Population Survey (TUS-CPS) suggests that  
8 about 5% of smokers made purchase across a state border,<sup>23</sup> while in the 2010-2011 TUS-CPS,  
9 approximately 3.0% of smokers purchased cigarettes from non-tribal land in lower-taxed and  
10 non-residential states (estimates not shown). In order to account for unmeasured price  
11 minimization strategies, we controlled for smoking intensity and level of nicotine addiction in  
12 the analysis since the literature suggests that these are important risk factors of using any price  
13 minimization strategies. Finally, the paid prices were determined by using self-reported  
14 information from the smoker, which may be subject to recall bias. However, existing evidence  
15 indicates that the average of self-reported prices per pack in the 2009-2010 NATS was very  
16 consistent with the corresponding 2009 national average price reported in the Tax Burden on  
17 Tobacco (TBOT).<sup>16</sup> Another benefit of using self-reported price in this analysis is that we are  
18 able to control for the corresponding smoking intensity of each smoker, which is not available in  
19 market scanned data but closely related to potential use of unmeasured price minimization  
20 strategies.

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46 In addition to cigarette companies directly influencing cigarette retail prices by providing  
47 coupons or other price-related discounts, cigarette companies may also indirectly affect cigarette  
48 prices by offering discounts to retailers and by promoting cigars or pipe tobacco that can be used  
49 in roll-your-own cigarettes.<sup>24</sup> Although these indirect influences are critical in tobacco control  
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3 and certainly warrant additional studies, the NATS survey did not collect such information thus  
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5 they are not within the scope of this analysis.  
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8 Our results show that the three leading cigarette companies in the United States continue  
9  
10 to offer price discounts to smokers of their brands, although these promotions appear to be  
11  
12 concentrated among their top-selling cigarette brands. Cigarette companies can be strategic when  
13  
14 offering price discounts. For example, existing literature suggests that young adults, females, and  
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16 heavy smokers are more frequently targeted for these promotions.<sup>19</sup> Other study have shown that  
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18 cigarette brands with low market share target young adults with the goal of encouraging brand  
19  
20 switching, while major brands target older smokers to facilitate brand loyalty.<sup>25</sup> As pointed out  
21  
22 earlier, smokers who use price-related discounts are less likely to make quit attempts or to  
23  
24 successfully quit in the future. The length (duration) of smoking and the amount of cigarettes  
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26 smoked per day on days the person smoked is strongly associated with a higher likelihood of  
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28 developing and dying from a smoking-related disease, such as lung cancer, COPD, or heart  
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30 attacks.<sup>1</sup> Therefore, even though price minimization strategies may increase sales and profits for  
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32 cigarette companies, these price discounts are likely preventing or delaying some smokers from  
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34 permanent cessation. Policies that decrease price-minimization strategies will benefit public  
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36 health.  
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3 Contributorship Statement  
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6 All 3 authors meet the authorship criteria:  
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8  
9 Ralph Caraballo participated in 1)the conception and design of data; 2) drafting the article or  
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11 revising it critically for important intellectual content; and 3) final approval of the version to be  
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13 published.  
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17 Xu Wang participated in 1) the conception and analysis and interpretation of data; 2) revising it  
18  
19 critically for important intellectual content; and 3) final approval of the version to be published.  
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23 Xin Xu participated in 1)the conception and design of data; 2) drafting the article or revising it  
24  
25 critically for important intellectual content; and 3) final approval of the version to be published.  
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28 Competing Interests  
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31 None  
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34 Data Sharing Statement  
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38 The raw and weighted data set are available to the public. A request can be made to the authors  
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**Table 1. The use of in-store coupons or other price-related discounts by major cigarette manufactures<sup>†</sup>**

	PM	RJR	LORILLARD (Newport only)	Other Companies <sup>a</sup>
Prevalence of brand use	43.4%	23.9%	15.0%	17.7%
Prevalence of coupons or discounts used by smokers of that manufacture	24.4%	21.0%	13.7%	11.1%
Price reduction per pack for smokers of that manufacture(\$)	-0.29**	-0.29**	-0.24*	-0.23
Average price per pack for smokers of that manufacture (\$)	5.06	4.63	4.75	3.94
Percentage of discount rendered to smokers of that manufacture	5.7%	6.3%	5.1%	5.8%
N	4,850	3,274	960	2,682

Notes: N represents un-weighted sample size. All estimates were obtained with post-stratification weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry's promotional allowances directly paid to retailers include or wholesalers are not included.

<sup>a</sup> Users of Sonoma, USA Gold brands, and other brand names which not listed in the survey.

\*\*Statistically significant at 5% level; \* statistically significant at 10% level.

**Table 2. The use of in-store coupons or other price-related discounts by cigarette manufacturer and by top 10 leading U.S. brands<sup>†</sup>**

		Prevalence of coupon use	% of discount	Average price	Price after discount	Rank <sup>a</sup>
PM	Basic	22.2%	1.1%	\$4.41	\$4.36	3
	Marlboro	25.6%	5.6%	\$5.00	\$4.72**	2
	Virginia Slims	10.6%	3.4%	\$6.49	\$6.27	9
RJR	Camel	33.9%	7.8%	\$5.24	\$4.83**	1
	Doral	15.6%	12.7%	\$3.93	\$3.43**	6
	Kool	11.6%	17.3%	\$4.23	\$3.50**	8
	Pall Mall	15.9%	1.3%	\$3.19	\$3.15	5
	Salem	10.5%	15.7%	\$5.11	\$4.31**	10
	Winston	17.1%	3.7%	\$4.07	\$3.92	4
Lorillard	Newport	13.7%	5.1%	\$4.75	\$4.51*	7

Notes: N represents un-weighted sample size. All estimates were obtained with post-stratification weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry's promotional allowances directly paid to retailers include or wholesalers are not included.

<sup>a</sup>Based on prevalence of coupon use.

\*\*Price reduction associated with coupons and other price-related discounts is statistically significant at 5% level, \* statistically significant at 10% level.

### Figure 1. Brand preference among U.S. adult smokers (2009-2010 NATS)

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9 Can you refuse these discounts? An analysis of price-related promotions by U.S. cigarette  
10 companies

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12 Ralph S. Caraballo, PhD<sup>1</sup>, Xu Wang, PhD<sup>1</sup>, Xin Xu, PhD<sup>1</sup>

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38 The findings and conclusions in this report are those of the authors and do not necessarily  
39 represent the official position of the Centers for Disease Control and Prevention  
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45 Targeted journal: **British Medical Journal (BMJ) Open Access**

46 Abstract: Word count: (journal-recommended maximum of 300 words) is ~~294~~296

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9 | **ABSTRACT** (word limit 294296/300):

10 | **Objectives:** Raising unit price of cigarette has been shown to be one of the most effective ways  
11 of reducing cigarette consumption and increase rates of successful quitting. However, researches  
12 have shown that price-sensitive smokers have used a variety of strategies to mitigate the effect of  
13 rising price of cigarettes on their smoking habits. In particular, 23%-34% of adult smokers in the  
14 U.S. use cheaper brands, and 18%-55% use coupons or promotions. Although some studies have  
15 assessed smokers' social-demographic characteristics by their preferences to generic brands or  
16 premium brands, little is known about the discount use by type of brands. As such, the main  
17 purpose of this analysis is to evaluate the uses and price discount effects of these price-related  
18 discounts by manufacturer and major brand.  
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20 | **Setting:** An analysis based on the cross-sectional 2009-2010 National Adult Tobacco Survey  
21 (NATS).  
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23 | **Participants:** 11,766 current smokers aged 18 or above in the U.S.  
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25 | **Primary outcome measures:** Price-related discount was defined as smokers who used coupons,  
26 rebates, buy 1 get 1 free, 2 for 1, or any other special promotions for their last cigarettes  
27 purchase.  
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29 | **Results:** The use of price-related discounts and associated price impact vary widely by cigarette  
30 manufacturer and brand. Approximately 1 of 3 Camel, 1 of 4 Marlboro, and 1 of 8 Newport  
31 smokers used price-related discounts in their latest cigarette purchases. The average price  
32 reductions of discounts offered by Philip Morris (PM) or R.J. Reynolds (RJR) were around 29  
33 cents per pack while that of Lorillard (Newport only) was 24 cents per pack. Cigarette brands  
34 that provided significant per pack price reductions include: PM Marlboro (28 cents), RJR brands  
35 Camel (41 cents), Doral (50 cents), Kool (73 cents), and Salem (80 cents), and Lorillard Newport  
36 (24 cents).  
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9 **Conclusion:** Policies that decrease price-minimization strategies will benefit public health.  
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Cigarette use is the most preventable cause of death and disease in the United States and presents a significant public health burden.<sup>1</sup> Research has shown that increasing the unit price of cigarettes is among the most effective public health interventions to reduce cigarette consumption, prevent smoking initiation, and increase rates of successful quitting.<sup>2-7</sup> In addition, recent evidence shows that the 2009 federal tobacco excise tax increases have been one of the strategies that have substantially reduced the number of cigarette and smokeless tobacco users among U.S. middle and high school students.<sup>8</sup>

Internal documents from cigarette companies have shown that cigarette companies are aware of the potential impacts that price increases have on their sales and profits. Cigarette companies have developed a variety of price-reduction marketing efforts to promote cigarette sales, such as multipack discounts, rebates, and coupons.<sup>9</sup> According to the most recent cigarette report from the Federal Trade Commission, in addition to giving away 50 million cigarettes for free in 2010, the major cigarette manufacturers spent approximately \$8.05 billion marketing their products. More than 80% of the marketing expenditures (6.49 billion) went to price-related discounts and promotional allowances used to reduce the retail price of cigarettes.<sup>10</sup>

These cigarette companies' price-related discounts may diminish the public health benefit associated with increased cigarette prices among some smokers even after federal law has raised the unit price of cigarettes. Several recent studies have shown that a large portion of U.S. adult smokers (18%–55%) have taken advantage of these price-related discounts offered by some cigarette companies.<sup>11-16</sup> In addition, evidence from other studies has shown that smokers who used these price-related discounts were less likely to make quit attempts or to successfully quit in the future.<sup>17-20</sup> Although studies have previously investigated demographics and socioeconomic characteristics of smokers who used price minimization strategies, including using coupons or

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9 other types of discounts from cigarette companies,<sup>11-15</sup> little is known about how these price-  
10 related discounts affect the average price paid per cigarette when factoring in discounts offered  
11 by specific cigarette companies or when looking at specific cigarette brands. Cigarette  
12 companies may be directly influencing the prices of their products by using these types of  
13 marketing strategies.  
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18 Using unique data from the 2009–2010 National Adult Tobacco Survey (NATS) about  
19 cigarette brands and price-related discounts used by adult smokers, we evaluated the uses and  
20 price discount effects of these price-minimization strategies by cigarette manufacturer and major  
21 brand. To the best of our knowledge, this is the first study to provide these estimates from a  
22 national representative sample of U.S. adult smokers. The findings of the analysis may help  
23 policy and public health stakeholders to further understand the promotion strategies of leading  
24 U.S. cigarette companies.  
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## 33 **METHODS**

### 34 **Data source**

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37 The 2009–2010 NATS is a stratified, national, landline and cell phone survey conducted  
38 during October 2009–June 2010. The survey population is a representative sample of non-  
39 institutionalized adults aged 18 years or older at both state and national levels. The survey was  
40 developed by the Office on Smoking and Health at the Centers for Disease Control and  
41 Prevention and was designed primarily to assess the prevalence of tobacco use and the factors  
42 related to tobacco use among U.S. adults. The survey has 130 questions that provide information  
43 about demographics, health status, cigarette smoking behaviors, price minimization behaviors,  
44 cigarette brands preference, the use of other tobacco products, and smoking quit attempts. The  
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9 2009–2010 NATS completed a total of 118,581 interviews, including 110,634 by landline and  
10 7,947 by cell phone. Because samples used for this analysis contain only de-identified  
11 observations, this research did not involve human subjects, as defined by Title 45 Code of  
12 Federal Regulations, Part 46, and institutional review board (IRB) approval was not required.  
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17 This analysis is restricted to current smokers who reported the cigarette brand name that  
18 they smoked most often during the past 30 days (n=16,015). Current smokers were defined as  
19 those who reported smoking at least 100 cigarettes in their lifetime and currently smoked every  
20 day or some days (n=16,542). Among them, respondents who failed to report a brand name were  
21 excluded (n=523). Because of the concern of small sample size (n=4), respondents who smoked  
22 Forsyth, which is a private brand label, were also excluded from the analysis.  
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29 In addition, respondents who failed to provide information on price paid for their latest  
30 purchase (n=978), the use of price-minimization strategies (n=2,794), demographic  
31 characteristics (age, race/ethnicity, gender, education, marital status, or employment status)  
32 (n=477), or time to first cigarette since wake up, were also excluded. The final sample size is  
33 11,766.  
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### 39 **Measures of brands and companies**

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41 In the survey, respondents were asked about the cigarette brand that they used most often  
42 during the past 30 days. A total of 17 brand choices were listed. Except Forsyth and the choice of  
43 other brands (n=3,299), the remaining 15 brand names are categorized as premium brands or  
44 generic brands. Premium brand names include Camel, Kool, Marlboro, Newport, Pall Mall,  
45 Parliament, Salem, Virginia Slims and Winston, and generic brands include Basic, Doral, GPC,  
46 Misty, Sonoma, and USA Gold.  
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9 To evaluate price-related discounts and promotions used by major companies, three  
10 major cigarette companies were identified on the basis of the 15 brand names above. They are  
11 Philip Morris (PM), R.J. Reynolds (RJR), and Lorillard. These companies jointly represented  
12 approximately 85% of total U.S. cigarette sales in 2010.<sup>21</sup> PM's brand names include Basic,  
13 Marlboro, Parliament, and Virginia Slims. Camel, Doral, GPC, Kool, Misty, Pall Mall, Salem,  
14 and Winston are brand manufactured by RJR. Lorillard has the brand Newport. The remaining  
15 brands, including Sonoma, USA Gold, and the choice of others brands, are included for other  
16 cigarette companies.  
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#### 24 **Measures of prices and discounts from the industry**

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26 The 2009–2010 NATS contains two types of price data. Current smokers who bought  
27 cigarettes by packs in their latest purchases were asked to report price paid per pack (after  
28 discounts or coupons) in dollars. Those who bought cigarettes by cartons were asked to report  
29 price paid per carton. Consequently, price per carton was divided by 10 to obtain a consistent  
30 measure of price paid per pack.  
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36 In the survey, current smokers were also asked whether they had taken advantage of  
37 coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes during  
38 the most recent purchase. These coupon and other discount offers were defined in the analysis as  
39 coupons and price-related discounts from the industry. Positive responses to this question were  
40 used to estimate the prevalence of usage of price-related discounts and promotions by  
41 manufacturer and brand name.  
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## Statistical analysis

Cigarette prices reported in the 2009–2010 NATS may reflect the price paid by a smoker after using multiple price minimization strategies. To assess the independent price reduction associated with coupons and other price-related discounts directly from the industry, for each cigarette company or brand, regression analysis with the following specification was used to obtain adjusted average prices per pack.

$$\text{Per pack price paid} = \beta_1 + \beta_2 \text{discounts} + \beta_3 \text{OtherPMS} + \beta_4 \text{Ciguse} + \beta_5 \text{Demographics} + \beta_6 \text{state}$$

The dependent variable was per pack price paid for cigarettes. The key independent variable was the dichotomous indicator of using a coupon and other price-related discounts during the most recent purchase (discounts). The covariates of other price minimization strategies (otherPMS) included the use of premium or generic brands in the past 30 days, purchase of latest cigarette by carton or by pack, purchase on Indian reservations during the previous year, and purchase through the Internet during the previous year. Daily smoking and time to first cigarette of the day (ciguse) were included in regression analysis as measures of smoking intensity and nicotine dependence so as to control for other price minimization strategies that are not included in the survey, because heavy or more addicted smokers are more likely to use price minimization strategies.<sup>11,12,14,15</sup> Gender, age, race/ethnicity, education, marital and employment status (demographics), and state dummy indicators (state) were also included to account for individual differences and policy variations across states.

Thus, the constant,  $\beta_1$ , presents the adjusted average per pack price before using any price minimization strategies, and the coefficient,  $\beta_2$ , reflects the price reduction associated with price-related discounts directly from the industry. All analyses were performed using STATA

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(version 13). ~~and Poststratified sampling weights were incorporated in all analyses to account for the complex survey design of the 2009-2010 NATS and nonresponse weighted using national NATS weights.~~

## RESULTS

Overall, among 11,766 adult current smokers, 38.4% identified Marlboro as the brand they used most often (Figure 1), followed by Newport (15.1%) and Camel (8.7%). The percentage of users of other identified brand names were all less than 5%, respectively, ranging from Pall Mall (4.9%) to GPC (0.5%). The combined remaining 15.2% of smokers usually smoked cigarette brands (classified as other brands) that were not identified in the 2009–2010 NATS.

Table 1 presents the use of coupons or other price-related discounts among adult smokers by cigarette manufacturer. Specifically, 43.4% (4,850) reported usually smoking cigarettes produced by PM, 23.9% (3,274) usually smoked cigarettes from RJR, and 15.0% (960) usually smoked Newport cigarettes (Lorillard) (Table 1). The remaining 17.7% (2,682) smoked cigarettes from other companies, including Sonoma and USA Gold, which do not belong to the three major cigarette companies identified in the analysis. Approximately 24.4% of U.S. adult smokers who smoked PM brands used coupons or other price-related discount offers from the company during their most recent cigarette purchase, compared with 21.0% of those who smoked RJR brands, 13.7% of those who smoked Newport (Lorillard), and 11.1% of those who smoked brands from other cigarette companies.

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After adjusting for the use of multiple price minimization strategies, respondents' demographic characteristics, smoking intensity, and state policy variations, the average per pack prices paid for cigarettes from PM, RJR, Newport (Lorillard), and other companies were \$5.06, \$4.63, \$4.75, and \$3.94, respectively. The average price reductions of coupons or other discounts offered by PM or RJR were statistically significant and similar in magnitude, 29 cents per pack. That of Newport (Lorillard) cigarettes was 24 cents per pack and was marginally significant.

Table 2 presents the use of coupons or other price-related discounts by specific brand (10 self-reported leading brands only) from the 3 leading cigarette manufacturing companies in the United States. Table 2 is ordered by PM brands first, followed by RJR brands, and last by Newport, the only Lorillard brand listed. The prevalence of using coupons or other price-related discounts varied from 33.9% (Camel, RJR), to 25.6% (Marlboro, PM), 13.7% (Newport, Lorillard), and 10.5% the lowest (Salem, RJR). Thus, about 1 of 3 Camel smokers used these strategies during the last time they bought their cigarettes, compared to about 1 of 4 Marlboro smokers, and about 1 of 8 Newport smokers. The percent price reductions due to use of coupons or discounts ranged from 1.1% (Basic) to 17.3% (Kool). Among these 10 leading U.S. cigarette brands, the average price paid per pack not using any price minimization strategies ranged from paying \$3.19 (Pall Mall, RJR) to \$6.49 (Virginia Slims, PM). After using coupons or other price-related discounts, the average prices paid for a pack of cigarettes of the top 3 selling brands were 28 cents less for Marlboro (\$4.72 instead of \$5.00), 41 cents less for Camel (\$4.83 instead of \$5.24) and 24 cents less for Newport (\$4.51 instead of \$4.75). Also, those who smoked Salem and used coupons or other price-related discounts saved 80 cents the last time they purchased it. Finally, among these 10 leading U.S. brands, users of Camel (RJR), Marlboro (PM), and Basic (PM) used price minimization strategies the most.

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11 **Discussion:**

12       Coupons or other price-related discounts from PM, RJR, and Lorillard were used by  
13 14%-25% of their consumers and have provided price reductions for the smokers who used  
14 specific brands. Coupons or other price-related discounts from other companies did not result in  
15 statistically significant price per pack reductions for their consumers. Therefore, after controlling  
16 for the use of other price minimization strategies and respondents' smoking intensity and  
17 nicotine addition, the 3 leading cigarette companies provided price reductions for their products  
18 through coupons or other price-related discounts.

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26       To put the range of price reductions associated with coupons or other price-related  
27 discounts into context, the cigarette federal tax was \$1.01 per pack starting April 1<sup>st</sup>, 2009, and  
28 the weighted average state cigarette excise tax rate was \$ 1.17 per pack in 2010. These numbers  
29 imply that the coupon discounts from the three leading cigarette companies (about 24–29 cents)  
30 offset 23.8%–28.7% of the public health price impacts from the federal tax or 11.0%–13.3% of  
31 the price impacts from the federal and state excise taxes combined to the smokers of cigarettes  
32 produced by these manufactures. As a result, these offers brought actual average prices down for  
33 users of specific brands. while– the price reductions associated with these discounts were likely  
34 to increase the sales in these companies. For example, with a price elasticity of overall demand  
35 for cigarettes among adults at somewhere between -0.3 and -0.7,<sup>22</sup> ceteris paribus, these price  
36 discounts can be translated into 10.2-23.9 million packs of cigarette sales in 2010 for Marlboro,  
37 3.0-6.6 million packs for Newport, and 1.8-4.1 million packs for Camel.<sup>21</sup>

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48 Therefore, after controlling for the use of other price minimization strategies and  
49 respondents' smoking intensity and nicotine addition, the 3 leading cigarette companies provided  
50 price reductions for their products through coupons or other price related discounts.  
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9 Although it is true that statistically significant or marginally statistically significant price  
10 reductions were observed for the 3 leading U.S. cigarette companies, significant reductions are  
11 brand specific. The significant reductions were observed only for Marlboro (U.S. leading brand),  
12 Camel (second U.S. leading brand), Kool, Doral and Salem, while marginally for Newport (third  
13 U.S. leading brand). Thus, PM, RJR, and Lorillard have concentrated their efforts to provide  
14 price discounts mainly to their bestselling brands. This might be one of the reasons that a  
15 previous analysis failed to identify significant price reductions associated with promotional  
16 offers.<sup>12</sup>  
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24 This study has some limitations. First, the study design is cross-sectional. Therefore, the  
25 study findings may be specific only to the period October 2009–June 2010. However, the study  
26 covers the entire United States, and there is a variety of prices as a function of brand smoked and  
27 other factors. Second, most variables in the analysis are collected from recent purchases (i.e.,  
28 price paid, coupon and other price-related discounts, and carton purchase are for the latest  
29 purchase; premium or generic brands are for the last 30 days), but others are collected with a  
30 time frame of 1 year (i.e., purchase on Indian reservations, purchase through Internet). However,  
31 when we excluded Indian reservation and Internet purchases from the analysis, the adjusted  
32 average prices and price discounts associated with coupons did not change much. Third, because  
33 of an approval delay, only approximately 20% of respondents interviewed during the first 2  
34 months of the survey were asked if purchases had been made on an Indian reservation anytime  
35 during the past year. In subsequent months, this question was asked of more than 90% of  
36 respondents. In the full sample, total missing responses for this question were 18.4% (2,770).  
37 However, sensitivity analysis has shown that dropping these observations does not significantly  
38 affect the results.<sup>16</sup> As noted in the method section, we also excluded respondents who failed to  
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9 report price paid for their latest purchase, the brand name they used most often in the last 30  
10 days, or some of their demographic characteristics. We compared smoking and social-  
11 demographic characteristics between individuals with incomplete information and individuals  
12 with complete information and have found little differences at the mean level. 4,008 respondents  
13 were excluded from the analysis because they failed to provide price paid for their latest  
14 purchase, did not report the number of cigarettes smoked per day on smoking days, or failed to  
15 report using price minimization strategies. Only approximately 20% of respondents interviewed  
16 during the first 2 months of the survey were asked if purchases had been made on an Indian  
17 reservation anytime during the past year. However, another study has shown that dropping these  
18 observations does not significantly affect the results.<sup>16</sup> Fourth, as noted above, the 2009-2010

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28 NATS does not collect information for all price minimization strategies, including cigarette  
29 purchases from states with lower price. Although the cross-border purchase is an issue in tobacco  
30 control, the prevalence of this behavior was quite low in the United States compared to other  
31 forms of price minimization strategies. For example, data from the 2003 and 2006-2007 Tobacco  
32 Use Supplement to the Current Population Survey (TUS-CPS) suggests that about 5% of  
33 smokers made purchase across a state border,<sup>22-23</sup> while in the 2010-2011 TUS-CPS,  
34 approximately 3.0% of smokers purchased cigarettes from non-tribal land in lower-taxed and  
35 non-residential states (estimates not shown). In order to account for unmeasured price  
36 minimization strategies, we controlled for smoking intensity and level of nicotine addiction in  
37 the analysis since the literature suggests that these are important risk factors of using any price  
38 minimization strategies. Finally, the paid prices were determined by using self-reported  
39 information from the smoker, which may be subject to recall bias. However, existing evidence  
40 indicates that the average of self-reported prices per pack in the 2009-2010 NATS was very  
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consistent with the corresponding 2009 national average price reported in the Tax Burden on Tobacco (TBOT).<sup>16</sup> Another benefit of using self-reported price in this analysis is that we are able to control for the corresponding smoking intensity of each smoker, which is not available in market scanned data but closely related to potential use of unmeasured price minimization strategies.

In addition to cigarette companies directly influencing cigarette retail prices by providing coupons or other price-related discounts, cigarette companies may also indirectly affect cigarette prices by offering discounts to retailers and by promoting cigars or pipe tobacco that can be used in roll-your-own cigarettes.<sup>23-24</sup> Although these indirect influences are critical in tobacco control and certainly warrant additional studies, the NATS survey did not collect such information thus they are not within the scope of this analysis.

Our results show that the three leading cigarette companies in the United States continue to offer price discounts to smokers of their brands, although these promotions appear to be concentrated among their top-selling cigarette brands. Cigarette companies can be strategic when offering price discounts. For example, existing literature suggests that young adults, females, and heavy smokers are more frequently targeted for these promotions.<sup>19</sup> Other study have shown that cigarette brands with low market share target young adults with the goal of encouraging brand switching, while major brands target older smokers to facilitate brand loyalty.<sup>24-25</sup> As pointed out earlier, smokers who use price-related discounts are less likely to make quit attempts or to successfully quit in the future. The length (duration) of smoking and the amount of cigarettes smoked per day on days the person smoked is strongly associated with a higher likelihood of developing and dying from a smoking-related disease, such as lung cancer, COPD, or heart attacks.<sup>1</sup> Therefore, even though price minimization strategies may increase sales and profits for

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9 cigarette companies, these price discounts are likely preventing or delaying some smokers from  
10 permanent cessation. Policies that decrease price-minimization strategies will benefit public  
11 health.  
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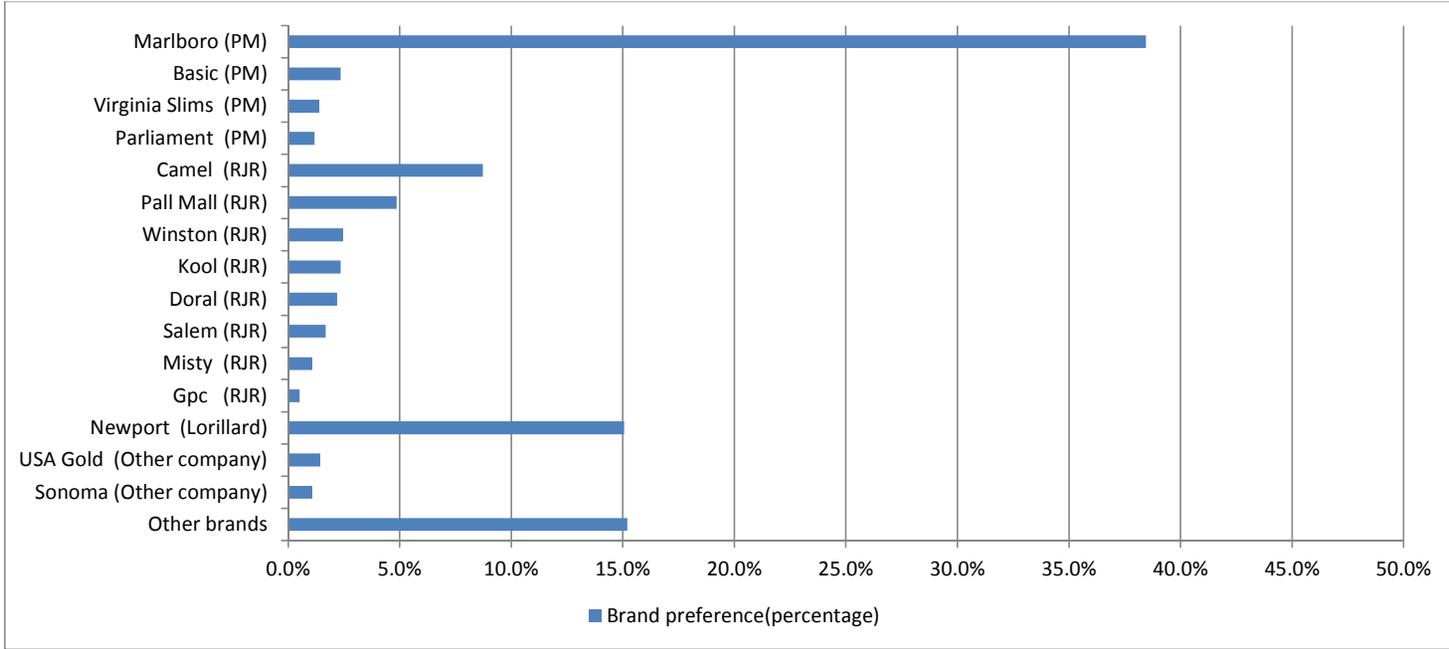
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Figure 1. Brand preference among U.S. adult smokers (2009-2010 NATS)



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**Table 1. The use of in-store coupons or other price-related discounts by major cigarette manufactures<sup>†</sup>**

	PM	RJR	LORILLARD (Newport only)	Other Companies <sup>a</sup>
Prevalence of brand use	43.4%	23.9%	15.0%	17.7%
Prevalence of coupons or discounts used by smokers of that manufacture	24.4%	21.0%	13.7%	11.1%
Price reduction per pack for smokers of that manufacture(\$)	-0.29**	-0.29**	-0.24*	-0.23
Average price per pack for smokers of that manufacture (\$)	5.06	4.63	4.75	3.94
Percentage of discount rendered to smokers of that manufacture	5.7%	6.3%	5.1%	5.8%
N	4,850	3,274	960	2,682

Notes: N represents un-weighted sample size. All estimates were obtained with ~~poststratification~~ weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry's promotional allowances directly paid to retailers include or wholesalers are not included.

<sup>a</sup>Users of Sonoma, USA Gold brands, and other brand names which not listed in the survey.

\*\*Statistically significant at 5% level; \* statistically significant at 10% level.

**Table 2. The use of in-store coupons or other price-related discounts by cigarette manufacturer and by top 10 leading U.S. brands<sup>†</sup>**

		Prevalence of coupon use	% of discount	Average price	Price after discount	Rank <sup>a</sup>
PM	Basic	22.2%	1.1%	\$4.41	\$4.36	3
	Marlboro	25.6%	5.6%	\$5.00	\$4.72**	2
	Virginia Slims	10.6%	3.4%	\$6.49	\$6.27	9
RJR	Camel	33.9%	7.8%	\$5.24	\$4.83**	1
	Doral	15.6%	12.7%	\$3.93	\$3.43**	6
	Kool	11.6%	17.3%	\$4.23	\$3.50**	8
	Pall Mall	15.9%	1.3%	\$3.19	\$3.15	5
	Salem	10.5%	15.7%	\$5.11	\$4.31**	10
	Winston	17.1%	3.7%	\$4.07	\$3.92	4
Lorillard	Newport	13.7%	5.1%	\$4.75	\$4.51*	7

Notes: N represents un-weighted sample size. All estimates were obtained with poststratification weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

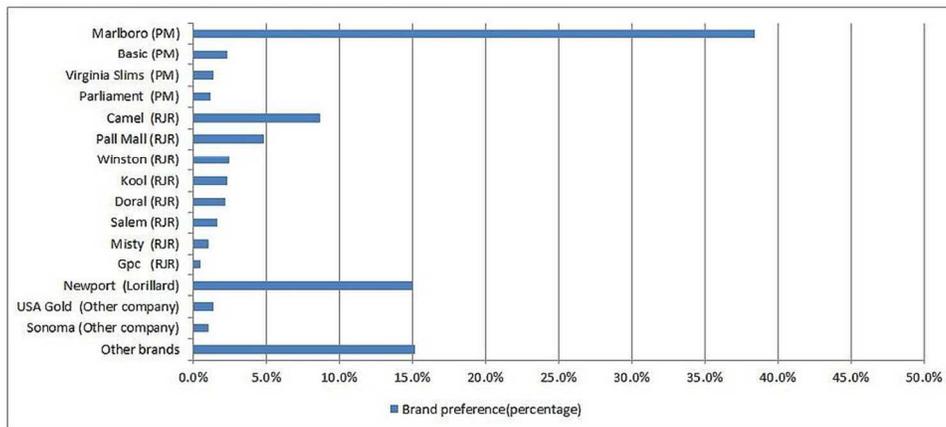
<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry’s promotional allowances directly paid to retailers include or wholesalers are not included.

<sup>a</sup>Based on prevalence of coupon use.

\*\*Price reduction associated with coupons and other price-related discounts is statistically significant at 5% level, \* statistically significant at 10% level.

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Figure 1. Brand preference among U.S. adult smokers (2009-2010 NATS)



90x46mm (300 x 300 DPI)

For peer review only

# BMJ Open

## Can you refuse these discounts? An evaluation of the use and price discount impact of price-related promotions among U.S. adult smokers by cigarette manufacturer

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3 Can you refuse these discounts? An evaluation of the use and price discount impact of price-  
4 related promotions among U.S. adult smokers by cigarette manufacturer  
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50 The findings and conclusions in this report are those of the authors and do not necessarily  
51 represent the official position of the Centers for Disease Control and Prevention  
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25 references (25 allowed)

2 tables and 1 figure (5 total allowed)

1  
2  
3 **ABSTRACT** (word limit 300/300):  
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5 **Objectives:** Raising unit price of cigarette has been shown to be one of the most effective ways  
6  
7 of reducing cigarette consumption and increase rates of successful quitting. However, researches  
8  
9 have shown that price-sensitive smokers have used a variety of strategies to mitigate the effect of  
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11 rising price of cigarettes on their smoking habits. In particular, 23%-34% of adult smokers in the  
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13 U.S. use cheaper brands, and 18%-55% use coupons or promotions. Although some studies have  
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15 assessed smokers' social-demographic characteristics by their preferences to generic brands or  
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17 premium brands, little is known about the discount use by type of brands. As such, the main  
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19 purpose of this analysis is to evaluate the uses and price discount effects of these price-related  
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21 discounts by manufacturer and major brand.  
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27 **Setting:** An analysis based on the cross-sectional 2009-2010 National Adult Tobacco Survey  
28  
29 (NATS).  
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32 **Participants:** 11,766 current smokers aged 18 or above in the U.S.  
33

34 **Primary outcome measures:** Price-related discount was defined as smokers who used coupons,  
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36 rebates, buy 1 get 1 free, 2 for 1, or any other special promotions for their last cigarettes  
37  
38 purchase.  
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41 **Results:** The use of price-related discounts and associated price impact vary widely by cigarette  
42  
43 manufacturer and brand. Approximately 1 of 3 Camel, 1 of 4 Marlboro, and 1 of 8 Newport  
44  
45 smokers used price-related discounts in their latest cigarette purchases. The average price  
46  
47 reductions of discounts offered by Philip Morris (PM) or R.J. Reynolds (RJR) were around 29  
48  
49 cents per pack while that of Lorillard (Newport only) was 24 cents per pack. Cigarette brands  
50  
51 that provided significant per pack price reductions include: PM Marlboro (28 cents), RJR brands  
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53 Camel (41 cents), Doral (50 cents), Kool (73 cents), and Salem (80 cents), and Lorillard Newport  
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55 (24 cents).  
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3 **Conclusion:** Policies that decrease price-minimization strategies will benefit public health.  
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10 Strengths and limitations of this study:  
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12 Strengths:  
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14 • Research has shown that increasing the unit price of cigarettes is among the most  
15 effective public health interventions to reduce cigarette consumption, prevent smoking initiation,  
16 and increase rates of successful quitting. This is the first national study in the United States to  
17 evaluate the uses and effects of price-related discounts (coupons, rebates, buy 1 get 1 free, 2 for  
18 1, or any other special promotions for the last pack of cigarettes purchased) by U.S. cigarette  
19 manufacturer and specific cigarette brand.  
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22 • The U.S. national study consisted of an analysis of telephone and cell phone cross  
23 sectional data (2009-2010) of 11,766 current cigarette smokers aged 18 or above.  
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26 • Price paid for last pack of cigarettes during the past 30 days was collected. Because of  
27 recent (last pack bought in past 30 days and most smokers are daily smokers), recall bias should  
28 not be a major problem in this study.  
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32 Limitations:  
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34 • The study design is cross-sectional. Therefore, the study findings may be specific only to  
35 the period October 2009–June 2010.  
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40 • The 2009-2010 NATS does not collect information for all price minimization strategies,  
41 including cigarette purchases from states with lower price  
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44 • Smokers' self-reported use of coupon or other types of price-related discounts in the  
45 2009-2010 NATS only reflects direct-to-consumer discounts from the industry. As a result, the  
46 discount measure in the analysis does not include tobacco industry's promotional allowances  
47 directly paid to cigarette retailers or wholesalers, as these disaggregated promotional allowances  
48 by cigarette manufacture or by brand have not been disclosed to consumers or to the public.  
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3 Cigarette use is the most preventable cause of death and disease in the United States and  
4 presents a significant public health burden.<sup>1</sup> Research has shown that increasing the unit price of  
5 cigarettes is among the most effective public health interventions to reduce cigarette  
6 consumption, prevent smoking initiation, and increase rates of successful quitting.<sup>2-7</sup> In addition,  
7 recent evidence shows that the 2009 federal tobacco excise tax increases have been one of the  
8 strategies that have substantially reduced the number of cigarette and smokeless tobacco users  
9 among U.S. middle and high school students.<sup>8</sup>

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21 Internal documents from cigarette companies have shown that cigarette companies are  
22 aware of the potential impacts that price increases have on their sales and profits. Cigarette  
23 companies have developed a variety of price-reduction marketing efforts to promote cigarette  
24 sales, such as multipack discounts, rebates, and coupons.<sup>9</sup> According to the most recent cigarette  
25 report from the Federal Trade Commission, in addition to giving away 50 million cigarettes for  
26 free in 2010, the major cigarette manufactures spent approximately \$8.05 billion marketing their  
27 products. More than 80% of the marketing expenditures (6.49 billion) went to price-related  
28 discounts and promotional allowances used to reduce the retail price of cigarettes.<sup>10</sup>

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40 These cigarette companies' price-related discounts may diminish the public health benefit  
41 associated with increased cigarette prices among some smokers even after federal law has raised  
42 the unit price of cigarettes. Several recent studies have shown that a large portion of U.S. adult  
43 smokers (18%–55%) have taken advantage of these price-related discounts offered by some  
44 cigarette companies.<sup>11-16</sup> In addition, evidence from other studies has shown that smokers who  
45 used these price-related discounts were less likely to make quit attempts or to successfully quit in  
46 the future.<sup>17-20</sup> Although studies have previously investigated demographics and socioeconomic  
47 characteristics of smokers who used price minimization strategies, including using coupons or  
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3 other types of discounts from cigarette companies,<sup>11-15</sup> little is known about how these price-  
4 related discounts affect the average price paid per cigarette when factoring in discounts offered  
5 by specific cigarette companies or when looking at specific cigarette brands. Cigarette  
6 companies may be directly influencing the prices of their products by using these types of  
7 marketing strategies.  
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11 Using unique data from the 2009–2010 National Adult Tobacco Survey (NATS) about  
12 cigarette brands and price-related discounts used by adult smokers, we evaluated the uses and  
13 price discount effects of these price-minimization strategies by cigarette manufacturer and major  
14 brand. To the best of our knowledge, this is the first study to provide these estimates from a  
15 national representative sample of U.S. adult smokers. The findings of the analysis may help  
16 policy and public health stakeholders to further understand the promotion strategies of leading  
17 U.S. cigarette companies.  
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## 34 **METHODS**

### 35 **Data source**

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37 The 2009–2010 NATS is a stratified, national, landline and cell phone survey conducted  
38 during October 2009–June 2010. The survey population is a representative sample of non-  
39 institutionalized adults aged 18 years or older at both state and national levels. The survey was  
40 developed by the Office on Smoking and Health at the Centers for Disease Control and  
41 Prevention and was designed primarily to assess the prevalence of tobacco use and the factors  
42 related to tobacco use among U.S. adults. The survey has 130 questions that provide information  
43 about demographics, health status, cigarette smoking behaviors, price minimization behaviors,  
44 cigarette brands preference, the use of other tobacco products, and smoking quit attempts. The  
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3 2009–2010 NATS completed a total of 118,581 interviews, including 110,634 by landline and  
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5 7,947 by cell phone. Because samples used for this analysis contain only de-identified  
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7 observations, this research did not involve human subjects, as defined by Title 45 Code of  
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9 Federal Regulations, Part 46, and institutional review board (IRB) approval was not required.  
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13 This analysis is restricted to current smokers who reported the cigarette brand name that  
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15 they smoked most often during the past 30 days (n=16,015). Current smokers were defined as  
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17 those who reported smoking at least 100 cigarettes in their lifetime and currently smoked every  
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19 day or some days (n=16,542). Among them, respondents who failed to report a brand name were  
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21 excluded (n=523). Because of the concern of small sample size (n=4), respondents who smoked  
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23 Forsyth, which is a private brand label, were also excluded from the analysis.  
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28 In addition, respondents who failed to provide information on price paid for their latest  
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30 purchase (n=978), the use of price-minimization strategies (n=2,794), demographic  
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32 characteristics (age, race/ethnicity, gender, education, marital status, or employment status)  
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34 (n=477), or time to first cigarette since wake up, were also excluded. The final sample size is  
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36 11,766.  
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#### 40 41 **Measures of brands and companies** 42 43

44 In the survey, respondents were asked about the cigarette brand that they used most often  
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46 during the past 30 days. A total of 17 brand choices were listed. Except Forsyth and the choice of  
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48 other brands (n=3,299), the remaining 15 brand names are categorized as premium brands or  
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50 generic brands. Premium brand names include Camel, Kool, Marlboro, Newport, Pall Mall,  
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52 Parliament, Salem, Virginia Slims and Winston, and generic brands include Basic, Doral, GPC,  
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54 Misty, Sonoma, and USA Gold.  
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3 To evaluate price-related discounts and promotions used by major companies, three  
4 major cigarette companies were identified on the basis of the 15 brand names above. They are  
5 Philip Morris (PM), R.J. Reynolds (RJR), and Lorillard. These companies jointly represented  
6 approximately 85% of total U.S. cigarette sales in 2010.<sup>21</sup> PM's brand names include Basic,  
7 Marlboro, Parliament, and Virginia Slims. Camel, Doral, GPC, Kool, Misty, Pall Mall, Salem,  
8 and Winston are brand manufactured by RJR. Lorillard has the brand Newport. The remaining  
9 brands, including Sonoma, USA Gold, and the choice of others brands, are included for other  
10 cigarette companies.  
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### 23 **Measures of prices and discounts from the industry**

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25 The 2009–2010 NATS contains two types of price data. Current smokers who bought  
26 cigarettes by packs in their latest purchases were asked to report price paid per pack (after  
27 discounts or coupons) in dollars. Those who bought cigarettes by cartons were asked to report  
28 price paid per carton. Consequently, price per carton was divided by 10 to obtain a consistent  
29 measure of price paid per pack.  
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37 In the survey, current smokers were also asked whether they had taken advantage of  
38 coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes during  
39 the most recent purchase. These coupon and other discount offers were defined in the analysis as  
40 coupons and price-related discounts from the industry. Positive responses to this question were  
41 used to estimate the prevalence of usage of price-related discounts and promotions by  
42 manufacturer and brand name.  
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## Statistical analysis

Cigarette prices reported in the 2009–2010 NATS may reflect the price paid by a smoker after using multiple price minimization strategies. To assess the independent price reduction associated with coupons and other price-related discounts directly from the industry, for each cigarette company or brand, regression analysis with the following specification was used to obtain adjusted average prices per pack.

$$\text{Per pack price paid} = \beta_1 + \beta_2 \text{discounts} + \beta_3 \text{OtherPMS} + \beta_4 \text{Ciguse} + \beta_5 \text{Demographics} + \beta_6 \text{state}$$

The dependent variable is per pack price paid for cigarettes. The key independent variable is the dichotomous indicator of using a coupon and other price-related discounts during the most recent purchase (discounts). The covariates of other price minimization strategies (OtherPMS) include four separate dichotomous variables, including the use of premium or generic brands in the past 30 days, purchase of latest cigarette by carton or by pack, purchase on Indian reservations during the previous year, and purchase through the Internet during the previous year. These variables are included to control for the possibility of using overlapping strategies during the latest cigarette purchase. Daily smoking and time to first cigarette of the day (ciguse) are included in regression analysis as measures of smoking intensity and nicotine dependence so as to control for other price minimization strategies that were not included in the survey, because heavy or more addicted smokers are more likely to use price minimization strategies.<sup>11,12,14,15</sup> Daily smoking is an indicator of whether or not the respondent was a daily smoker (versus some-daily smoker) at the time of the interview. Time to first cigarette after waking was a categorical variable of four (<5 minutes, 6-30 minutes, 31-60 minutes, and >60 minutes). Respondents' socio-demographic characteristics (demographics) and state dummy

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3 indicators (state) are also included to account for individual difference and state policy variation.  
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5 Assessed respondents' socio-demographics is a vector, which includes: gender (male or female);  
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7 age group (18-25, 26-44, 45-64, and 65+ years); race/ethnicity (non-Hispanic White, non-  
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9 Hispanic Black, Hispanic, non-Hispanic Asian, non-Hispanic Native Hawaiian/Pacific Islander,  
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11 non-Hispanic American Indian/Alaska Native, and non-Hispanic "Other"); education (less than  
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13 high school, high school graduate or equivalent, some college, and college degree or higher);  
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15 marital status (married or cohabitate; widowed, divorced, or separated; and not currently in a  
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17 relationship), and employment status (employed or unemployed).  
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22 Thus, the constant,  $\beta_1$ , presents the adjusted average per pack price before using any  
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24 price minimization strategies, and the coefficient,  $\beta_2$  reflects the price reduction associated with  
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26 price-related discounts directly from the industry. All analyses were performed using STATA  
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28 (version 13). Post-stratification sampling weights were incorporated in all analyses to account for  
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30 the complex survey design of the 2009-2010 NATS and nonresponse.  
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## 39 RESULTS

40 Overall, among 11,766 adult current smokers, 38.4% identified Marlboro as the brand  
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42 they used most often (Figure 1), followed by Newport (15.1%) and Camel (8.7%). The  
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44 percentage of users of other identified brand names were all less than 5%, respectively, ranging  
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46 from Pall Mall (4.9%) to GPC (0.5%). The combined remaining 15.2% of smokers usually  
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48 smoked cigarette brands (classified as other brands) that were not identified in the 2009–2010  
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Table 1 presents the use of coupons or other price-related discounts among adult smokers by cigarette manufacturer. Specifically, 43.4% (4,850) reported usually smoking cigarettes produced by PM, 23.9% (3,274) usually smoked cigarettes from RJR, and 15.0% (960) usually smoked Newport cigarettes (Lorillard) (Table 1). The remaining 17.7% (2,682) smoked cigarettes from other companies, including Sonoma and USA Gold, which do not belong to the three major cigarette companies identified in the analysis. Approximately 24.4% of U.S. adult smokers who smoked PM brands used coupons or other price-related discount offers from the company during their most recent cigarette purchase, compared with 21.0% of those who smoked RJR brands, 13.7% of those who smoked Newport (Lorillard), and 11.1% of those who smoked brands from other cigarette companies.

After adjusting for the use of multiple price minimization strategies, respondents' demographic characteristics, smoking intensity, and state policy variations, the average per pack prices paid for cigarettes from PM, RJR, Newport (Lorillard), and other companies were \$5.06, \$4.63, \$4.75, and \$3.94, respectively. The average price reductions of coupons or other discounts offered by PM or RJR were statistically significant and similar in magnitude, 29 cents per pack. That of Newport (Lorillard) cigarettes was 24 cents per pack and was marginally significant.

Table 2 presents the use of coupons or other price-related discounts by specific brand (10 self-reported leading brands only) from the 3 leading cigarette manufacturing companies in the United States. Table 2 is ordered by PM brands first, followed by RJR brands, and last by Newport, the only Lorillard brand listed. The prevalence of using coupons or other price-related discounts varied from 33.9% (Camel, RJR), to 25.6% (Marlboro, PM), 13.7% (Newport, Lorillard), and 10.5% the lowest (Salem, RJR). Thus, about 1 of 3 Camel smokers used these strategies during the last time they bought their cigarettes, compared to about 1 of 4 Marlboro

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3 smokers, and about 1 of 8 Newport smokers. The percent price reductions due to use of coupons  
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5 or discounts ranged from 1.1% (Basic) to 17.3% (Kool). Among these 10 leading U.S. cigarette  
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7 brands, the average price paid per pack not using any price minimization strategies ranged from  
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9 paying \$3.19 (Pall Mall, RJR) to \$6.49 (Virginia Slims, PM). After using coupons or other price-  
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11 related discounts, the average prices paid for a pack of cigarettes of the top 3 selling brands were  
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13 28 cents less for Marlboro (\$4.72 instead of \$5.00), 41 cents less for Camel (\$4.83 instead of  
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15 \$5.24) and 24 cents less for Newport (\$4.51 instead of \$4.75). Also, those who smoked Salem  
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17 and used coupons or other price-related discounts saved 80 cents the last time they purchased it.  
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19 Finally, among these 10 leading U.S. brands, users of Camel (RJR), Marlboro (PM), and Basic  
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21 (PM) used price minimization strategies the most.  
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### 34 **Discussion:**

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36 Coupons or other price-related discounts from PM, RJR, and Lorillard were used by  
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38 14%-25% of their consumers and have provided price reductions for the smokers who used  
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40 specific brands. Coupons or other price-related discounts from other companies did not result in  
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42 statistically significant price per pack reductions for their consumers. Therefore, after controlling  
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44 for the use of other price minimization strategies and respondents' smoking intensity and  
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46 nicotine addition, the 3 leading cigarette companies provided price reductions for their products  
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48 through coupons or other price-related discounts.  
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52 To put the range of price reductions associated with coupons or other price-related  
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54 discounts into context, the cigarette federal tax was \$1.01 per pack starting April 1<sup>st</sup>, 2009, and  
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56 the weighted average state cigarette excise tax rate was \$ 1.17 per pack in 2010. These numbers  
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3 imply that the coupon discounts from the three leading cigarette companies (about 24–29 cents)  
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5 offset 23.8%–28.7% of the price impacts from the federal tax or 11.0%–13.3% of the price  
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7 impacts from the federal and state excise taxes combined to the smokers of cigarettes produced  
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9 by these manufactures. As a result, these offers brought actual average prices down for users of  
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11 specific brands, while the price reductions associated with these discounts were likely to increase  
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13 the sales in these companies. For example, with a price elasticity of overall demand for cigarettes  
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15 among adults at somewhere between -0.3 and -0.7,<sup>22</sup> ceteris paribus, these price discounts can be  
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17 translated into 10.2-23.9 million packs of cigarette sales in 2010 for Marlboro, 3.0-6.6 million  
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19 packs for Newport, and 1.8-4.1 million packs for Camel.<sup>21</sup>  
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25 Although it is true that statistically significant or marginally statistically significant price  
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27 reductions were observed for the 3 leading U.S. cigarette companies, significant reductions are  
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29 brand specific. The significant reductions were observed only for Marlboro (U.S. leading brand),  
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31 Camel (second U.S. leading brand), Kool, Doral and Salem, while marginally for Newport (third  
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33 U.S. leading brand). Thus, PM, RJR, and Lorillard have concentrated their efforts to provide  
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35 price discounts mainly to their bestselling brands. This might be one of the reasons that a  
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37 previous analysis failed to identify significant price reductions associated with promotional  
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39 offers.<sup>12</sup>  
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44 This study has some limitations. First, the study design is cross-sectional. Therefore, the  
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46 study findings may be specific only to the period October 2009–June 2010. However, the study  
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48 covers the entire United States, and there is a variety of prices as a function of brand smoked and  
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50 other factors. Second, most variables in the analysis are collected from recent purchases (i.e.,  
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52 price paid, coupon and other price-related discounts, and carton purchase are for the latest  
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54 purchase; premium or generic brands are for the last 30 days), but others are collected with a  
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3 time frame of 1 year (i.e., purchase on Indian reservations, purchase through Internet). However,  
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5 when we excluded Indian reservation and Internet purchases from the analysis, the adjusted  
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7 average prices and price discounts associated with coupons did not change much. Third, because  
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9 of an approval delay, only approximately 20% of respondents interviewed during the first 2  
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11 months of the survey were asked if purchases had been made on an Indian reservation anytime  
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13 during the past year. In subsequent months, this question was asked of more than 90% of  
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15 respondents. In the full sample, total missing responses for this question were 18.4% (3,503).  
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17 However, sensitivity analysis has shown that dropping these observations does not significantly  
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19 affect the results.<sup>16</sup> As noted in the method section, we also excluded respondents who failed to  
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21 report price paid for their latest purchase, the brand name they used most often in the last 30  
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23 days, or some of their demographic characteristics. We compared smoking and social-  
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25 demographic characteristics between individuals with incomplete information and individuals  
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27 with complete information and have found little differences at the mean level. Fourth, as noted  
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29 above, the 2009-2010 NATS does not collect information for all price minimization strategies,  
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31 including cigarette purchases from states with lower price. Although the cross-border purchase is  
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33 an issue in tobacco control, the prevalence of this behavior was quite low in the United States  
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35 compared to other forms of price minimization strategies. For example, data from the 2003 and  
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37 2006-2007 Tobacco Use Supplement to the Current Population Survey (TUS-CPS) suggests that  
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39 about 5% of smokers made purchase across a state border,<sup>23</sup> while in the 2010-2011 TUS-CPS,  
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41 approximately 3.0% of smokers purchased cigarettes from non-tribal land in lower-taxed and  
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43 non-residential states (estimates not shown). In order to account for unmeasured price  
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45 minimization strategies, we controlled for smoking intensity and level of nicotine addiction in  
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47 the analysis since the literature suggests that these are important risk factors of using any price  
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3 minimization strategies. Additionally, the paid prices were determined by using self-reported  
4 information from the smoker, which may be subject to recall bias. However, existing evidence  
5 indicates that the average of self-reported prices per pack in the 2009-2010 NATS was very  
6 consistent with the corresponding 2009 national average price reported in the Tax Burden on  
7 Tobacco (TBOT).<sup>16</sup> Another benefit of using self-reported price in this analysis is that we are  
8 able to control for the corresponding smoking intensity of each smoker, which is not available in  
9 market scanned data but closely related to potential use of unmeasured price minimization  
10 strategies. Finally, smokers' self-reported use of coupon or other types of price-related discounts  
11 in the 2009-2010 NATS only reflects direct-to-consumer discounts from the industry. As a  
12 result, the discount measure in the analysis does not include tobacco industry's promotional  
13 allowances directly paid to cigarette retailers or wholesalers, as these disaggregated promotional  
14 allowances by cigarette manufacture or by brand have not been disclosed to consumers or to the  
15 public.  
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34 In addition to cigarette companies directly influencing cigarette retail prices by providing  
35 coupons or other price-related discounts, cigarette companies may also indirectly affect cigarette  
36 prices by offering discounts to retailers and by promoting cigars or pipe tobacco that can be used  
37 in roll-your-own cigarettes.<sup>24</sup> Although these indirect influences are critical in tobacco control  
38 and certainly warrant additional studies, the NATS survey did not collect such information thus  
39 they are not within the scope of this analysis.  
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48 Our results show that the three leading cigarette companies in the United States continue  
49 to offer price discounts to smokers of their brands, although these promotions appear to be  
50 concentrated among their top-selling cigarette brands. Cigarette companies can be strategic when  
51 offering price discounts. For example, existing literature suggests that young adults, females, and  
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3 heavy smokers are more frequently targeted for these promotions.<sup>19</sup> Other study have shown that  
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5 cigarette brands with low market share target young adults with the goal of encouraging brand  
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7 switching, while major brands target older smokers to facilitate brand loyalty.<sup>25</sup> As pointed out  
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9 earlier, smokers who use price-related discounts are less likely to make quit attempts or to  
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11 successfully quit in the future. The length (duration) of smoking and the amount of cigarettes  
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13 smoked per day on days the person smoked is strongly associated with a higher likelihood of  
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15 developing and dying from a smoking-related disease, such as lung cancer, COPD, or heart  
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17 attacks.<sup>1</sup> Therefore, even though price minimization strategies may increase sales and profits for  
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19 cigarette companies, these price discounts are likely preventing or delaying some smokers from  
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21 permanent cessation. Policies that decrease price-minimization strategies will benefit public  
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## Contributorship Statement

All 3 authors meet the authorship criteria:

Ralph Caraballo participated in 1)the conception and design of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

Xu Wang participated in 1) the conception and analysis and interpretation of data; 2) revising it critically for important intellectual content; and 3) final approval of the version to be published.

Xin Xu participated in 1)the conception and design of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

## Competing Interests

None

## Data Sharing Statement

No additional data available

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**Table 1. The use of in-store coupons or other price-related discounts by major cigarette manufactures<sup>†</sup>**

	PM	RJR	LORILLARD (Newport only)	Other Companies <sup>a</sup>
Prevalence of brand use	43.4%	23.9%	15.0%	17.7%
Prevalence of coupons or discounts used by smokers of that manufacture	24.4%	21.0%	13.7%	11.1%
Price reduction per pack for smokers of that manufacture(\$)	-0.29**	-0.29**	-0.24*	-0.23
Average price per pack for smokers of that manufacture (\$)	5.06	4.63	4.75	3.94
Percentage of discount rendered to smokers of that manufacture	5.7%	6.3%	5.1%	5.8%
N	4,850	3,274	960	2,682

Notes: N represents un-weighted sample size. All estimates were obtained with post-stratification weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry's promotional allowances directly paid to retailers include or wholesalers are not included.

<sup>a</sup> Users of Sonoma, USA Gold brands, and other brand names which not listed in the survey.

\*\*Statistically significant at 5% level; \* statistically significant at 10% level.

**Table 2. The use of in-store coupons or other price-related discounts by cigarette manufacturer and by top 10 leading U.S. brands<sup>†</sup>**

		Prevalence of coupon use	% of discount	Average price	Price after discount	Rank <sup>a</sup>
PM	Basic	22.2%	1.1%	\$4.41	\$4.36	3
	Marlboro	25.6%	5.6%	\$5.00	\$4.72**	2
	Virginia Slims	10.6%	3.4%	\$6.49	\$6.27	9
RJR	Camel	33.9%	7.8%	\$5.24	\$4.83**	1
	Doral	15.6%	12.7%	\$3.93	\$3.43**	6
	Kool	11.6%	17.3%	\$4.23	\$3.50**	8
	Pall Mall	15.9%	1.3%	\$3.19	\$3.15	5
	Salem	10.5%	15.7%	\$5.11	\$4.31**	10
	Winston	17.1%	3.7%	\$4.07	\$3.92	4
Lorillard	Newport	13.7%	5.1%	\$4.75	\$4.51*	7

Notes: N represents un-weighted sample size. All estimates were obtained with post-stratification weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry's promotional allowances directly paid to retailers include or wholesalers are not included.

<sup>a</sup>Based on prevalence of coupon use.

\*\*Price reduction associated with coupons and other price-related discounts is statistically significant at 5% level, \* statistically significant at 10% level.

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9 Can you refuse these discounts? An [analysis-evaluation of the uses and price discount](#)  
10 [effects](#) [impact of the](#) price-related promotions [among U.S. adult smokers](#) by [U.S. cigarette](#)  
11 [companies](#) [manufacturer](#)

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13 Ralph S. Caraballo, PhD<sup>1</sup>, Xu Wang, PhD<sup>1</sup>, Xin Xu, PhD<sup>1</sup>

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17 <sup>1</sup>National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and  
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39 The findings and conclusions in this report are those of the authors and do not necessarily  
40 represent the official position of the Centers for Disease Control and Prevention  
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46 Targeted journal: **British Medical Journal (BMJ) Open Access**  
47 Abstract: Word count: (journal-recommended maximum of 300 words) is 296  
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49 25 references (25 allowed)  
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9 **ABSTRACT** (word limit 300/300):

10 **Objectives:** Raising unit price of cigarette has been shown to be one of the most effective ways  
11 of reducing cigarette consumption and increase rates of successful quitting. However, researches  
12 have shown that price-sensitive smokers have used a variety of strategies to mitigate the effect of  
13 rising price of cigarettes on their smoking habits. In particular, 23%-34% of adult smokers in the  
14 U.S. use cheaper brands, and 18%-55% use coupons or promotions. Although some studies have  
15 assessed smokers' social-demographic characteristics by their preferences to generic brands or  
16 premium brands, little is known about the discount use by type of brands. As such, the main  
17 purpose of this analysis is to evaluate the uses and price discount effects of these price-related  
18 discounts by manufacturer and major brand.  
19

20 **Setting:** An analysis based on the cross-sectional 2009-2010 National Adult Tobacco Survey  
21 (NATS).  
22

23 **Participants:** 11,766 current smokers aged 18 or above in the U.S.  
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25 **Primary outcome measures:** Price-related discount was defined as smokers who used coupons,  
26 rebates, buy 1 get 1 free, 2 for 1, or any other special promotions for their last cigarettes  
27 purchase.  
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29 **Results:** The use of price-related discounts and associated price impact vary widely by cigarette  
30 manufacturer and brand. Approximately 1 of 3 Camel, 1 of 4 Marlboro, and 1 of 8 Newport  
31 smokers used price-related discounts in their latest cigarette purchases. The average price  
32 reductions of discounts offered by Philip Morris (PM) or R.J. Reynolds (RJR) were around 29  
33 cents per pack while that of Lorillard (Newport only) was 24 cents per pack. Cigarette brands  
34 that provided significant per pack price reductions include: PM Marlboro (28 cents), RJR brands  
35 Camel (41 cents), Doral (50 cents), Kool (73 cents), and Salem (80 cents), and Lorillard Newport  
36 (24 cents).  
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**Conclusion:** Policies that decrease price-minimization strategies will benefit public health.

**Strengths and limitations of this study:**

**Strengths:**

- Research has shown that increasing the unit price of cigarettes is among the most effective public health interventions to reduce cigarette consumption, prevent smoking initiation, and increase rates of successful quitting. This is the first national study in the United States to evaluate the uses and effects of price-related discounts (coupons, rebates, buy 1 get 1 free, 2 for 1, or any other special promotions for the last pack of cigarettes purchased) by U.S. cigarette manufacturer and specific cigarette brand.
- The U.S. national study consisted of an analysis of telephone and cell phone cross sectional data (2009-2010) of 11,766 current cigarette smokers aged 18 or above.
- Price paid for last pack of cigarettes during the past 30 days was collected. Because of recent (last pack bought in past 30 days and most smokers are daily smokers), recall bias should not be a major problem in this study.

**Limitations:**

- The study design is cross-sectional. Therefore, the study findings may be specific only to the period October 2009–June 2010.
- 4,776,008 respondents were excluded from the analysis because they failed to provide price paid for their latest purchase, did not report the number of cigarettes smoked per day on smoking days, or the brand name they used most often in the last 30 days, failed to report using the use of price minimization strategies, or some of their demographic characteristics.
- The 2009-2010 NATS does not collect information for all price minimization strategies, including cigarette purchases from states with lower price
- Smokers' self-reported use of coupon or other types of price-related discounts in the 2009-2010 NATS only reflects direct-to-consumer discounts from the industry. As a result, the discount measure in the analysis does not include tobacco industry's promotional allowances directly paid to cigarette retailers or wholesalers, as these disaggregated promotional allowances by cigarette manufacture or by brand have not been disclosed to consumers or to the public.

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9 Cigarette use is the most preventable cause of death and disease in the United States and  
10 presents a significant public health burden.<sup>1</sup> Research has shown that increasing the unit price of  
11 cigarettes is among the most effective public health interventions to reduce cigarette  
12 consumption, prevent smoking initiation, and increase rates of successful quitting.<sup>2-7</sup> In addition,  
13 recent evidence shows that the 2009 federal tobacco excise tax increases have been one of the  
14 strategies that have substantially reduced the number of cigarette and smokeless tobacco users  
15 among U.S. middle and high school students.<sup>8</sup>  
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23 Internal documents from cigarette companies have shown that cigarette companies are  
24 aware of the potential impacts that price increases have on their sales and profits. Cigarette  
25 companies have developed a variety of price-reduction marketing efforts to promote cigarette  
26 sales, such as multipack discounts, rebates, and coupons.<sup>9</sup> According to the most recent cigarette  
27 report from the Federal Trade Commission, in addition to giving away 50 million cigarettes for  
28 free in 2010, the major cigarette manufacturers spent approximately \$8.05 billion marketing their  
29 products. More than 80% of the marketing expenditures (6.49 billion) went to price-related  
30 discounts and promotional allowances used to reduce the retail price of cigarettes.<sup>10</sup>  
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38 These cigarette companies' price-related discounts may diminish the public health benefit  
39 associated with increased cigarette prices among some smokers even after federal law has raised  
40 the unit price of cigarettes. Several recent studies have shown that a large portion of U.S. adult  
41 smokers (18%–55%) have taken advantage of these price-related discounts offered by some  
42 cigarette companies.<sup>11-16</sup> In addition, evidence from other studies has shown that smokers who  
43 used these price-related discounts were less likely to make quit attempts or to successfully quit in  
44 the future.<sup>17-20</sup> Although studies have previously investigated demographics and socioeconomic  
45 characteristics of smokers who used price minimization strategies, including using coupons or  
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9 other types of discounts from cigarette companies,<sup>11-15</sup> little is known about how these price-  
10 related discounts affect the average price paid per cigarette when factoring in discounts offered  
11 by specific cigarette companies or when looking at specific cigarette brands. Cigarette  
12 companies may be directly influencing the prices of their products by using these types of  
13 marketing strategies.  
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18 Using unique data from the 2009–2010 National Adult Tobacco Survey (NATS) about  
19 cigarette brands and price-related discounts used by adult smokers, we evaluated the uses and  
20 price discount effects of these price-minimization strategies by cigarette manufacturer and major  
21 brand. To the best of our knowledge, this is the first study to provide these estimates from a  
22 national representative sample of U.S. adult smokers. The findings of the analysis may help  
23 policy and public health stakeholders to further understand the promotion strategies of leading  
24 U.S. cigarette companies.  
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## 33 **METHODS**

### 34 **Data source**

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37 The 2009–2010 NATS is a stratified, national, landline and cell phone survey conducted  
38 during October 2009–June 2010. The survey population is a representative sample of non-  
39 institutionalized adults aged 18 years or older at both state and national levels. The survey was  
40 developed by the Office on Smoking and Health at the Centers for Disease Control and  
41 Prevention and was designed primarily to assess the prevalence of tobacco use and the factors  
42 related to tobacco use among U.S. adults. The survey has 130 questions that provide information  
43 about demographics, health status, cigarette smoking behaviors, price minimization behaviors,  
44 cigarette brands preference, the use of other tobacco products, and smoking quit attempts. The  
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9 2009–2010 NATS completed a total of 118,581 interviews, including 110,634 by landline and  
10 7,947 by cell phone. Because samples used for this analysis contain only de-identified  
11 observations, this research did not involve human subjects, as defined by Title 45 Code of  
12 Federal Regulations, Part 46, and institutional review board (IRB) approval was not required.  
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17 This analysis is restricted to current smokers who reported the cigarette brand name that  
18 they smoked most often during the past 30 days (n=16,015). Current smokers were defined as  
19 those who reported smoking at least 100 cigarettes in their lifetime and currently smoked every  
20 day or some days (n=16,542). Among them, respondents who failed to report a brand name were  
21 excluded (n=523). Because of the concern of small sample size (n=4), respondents who smoked  
22 Forsyth, which is a private brand label, were also excluded from the analysis.  
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29 In addition, respondents who failed to provide information on price paid for their latest  
30 purchase (n=978), the use of price-minimization strategies (n=2,794), demographic  
31 characteristics (age, race/ethnicity, gender, education, marital status, or employment status)  
32 (n=477), or time to first cigarette since wake up, were also excluded. The final sample size is  
33 11,766.  
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### 39 **Measures of brands and companies**

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41 In the survey, respondents were asked about the cigarette brand that they used most often  
42 during the past 30 days. A total of 17 brand choices were listed. Except Forsyth and the choice of  
43 other brands (n=3,299), the remaining 15 brand names are categorized as premium brands or  
44 generic brands. Premium brand names include Camel, Kool, Marlboro, Newport, Pall Mall,  
45 Parliament, Salem, Virginia Slims and Winston, and generic brands include Basic, Doral, GPC,  
46 Misty, Sonoma, and USA Gold.  
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9 To evaluate price-related discounts and promotions used by major companies, three  
10 major cigarette companies were identified on the basis of the 15 brand names above. They are  
11 Philip Morris (PM), R.J. Reynolds (RJR), and Lorillard. These companies jointly represented  
12 approximately 85% of total U.S. cigarette sales in 2010.<sup>21</sup> PM's brand names include Basic,  
13 Marlboro, Parliament, and Virginia Slims. Camel, Doral, GPC, Kool, Misty, Pall Mall, Salem,  
14 and Winston are brand manufactured by RJR. Lorillard has the brand Newport. The remaining  
15 brands, including Sonoma, USA Gold, and the choice of others brands, are included for other  
16 cigarette companies.  
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#### 24 **Measures of prices and discounts from the industry**

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26 The 2009–2010 NATS contains two types of price data. Current smokers who bought  
27 cigarettes by packs in their latest purchases were asked to report price paid per pack (after  
28 discounts or coupons) in dollars. Those who bought cigarettes by cartons were asked to report  
29 price paid per carton. Consequently, price per carton was divided by 10 to obtain a consistent  
30 measure of price paid per pack.  
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36 In the survey, current smokers were also asked whether they had taken advantage of  
37 coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes during  
38 the most recent purchase. These coupon and other discount offers were defined in the analysis as  
39 coupons and price-related discounts from the industry. Positive responses to this question were  
40 used to estimate the prevalence of usage of price-related discounts and promotions by  
41 manufacturer and brand name.  
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## Statistical analysis

Cigarette prices reported in the 2009–2010 NATS may reflect the price paid by a smoker after using multiple price minimization strategies. To assess the independent price reduction associated with coupons and other price-related discounts directly from the industry, for each cigarette company or brand, regression analysis with the following specification was used to obtain adjusted average prices per pack.

$$\text{Per pack price paid} = \beta_1 + \beta_2 \text{discounts} + \beta_3 \text{OtherPMS} + \beta_4 \text{Ciguse} + \beta_5 \text{Demographics} + \beta_6 \text{state}$$

The dependent variable ~~was-is~~ per pack price paid for cigarettes. The key independent variable ~~was-is~~ the dichotomous indicator of using a coupon and other price-related discounts during the most recent purchase (discounts). The covariates of other price minimization strategies (OtherPMS) included ~~four separate dichotomous variables, including to indicate~~ the use of premium or generic brands in the past 30 days, purchase of latest cigarette by carton or by pack, purchase on Indian reservations during the previous year, and purchase through the Internet during the previous year. ~~These variables are included to control for the possibility of using overlapping strategies during the latest cigarette purchase.~~ Daily smoking and time to first cigarette of the day (ciguse) ~~were-are~~ included in regression analysis as measures of smoking intensity and nicotine dependence so as to control for other price minimization strategies that ~~are~~ ~~were~~ not included in the survey, because heavy or more addicted smokers are more likely to use price minimization strategies.<sup>11,12,14,15</sup> ~~Daily smoking iswas measured by an dichotomous variable that indicates of whether or not the respondent iswas a current-daily smoker (versus current-nonsome-daily smoker) at the time of the interview. Time to first cigarette after waking was measured by four dummya categorical variable of fours (<5 minutes, 6-30 minutes, 31-60~~

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~~minutes, and >60 minutes). Gender, age, race/ethnicity, education, marital and employment status (demographics), Respondents' socio-demographic characteristics (demographics) and state dummy indicators (state) are also included to account for individual differences and state policy variations across states. Assessed respondents' socio-demographics is a vector, which includes: gender (male or female); age group (18-25, 26-44, 45-64, and 65+ years); race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Asian, non-Hispanic Native Hawaiian/Pacific Islander, non-Hispanic American Indian/Alaska Native, and non-Hispanic "Other"); education (less than high school, high school graduate or equivalent, some college, and college degree or higher); marital status (married or cohabitate, widowed, divorced, or separated; and not currently in a relationship), and employment status (employed or unemployed).~~

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Thus, the constant,  $\beta_1$ , presents the adjusted average per pack price before using any price minimization strategies, and the coefficient,  $\beta_2$  reflects the price reduction associated with price-related discounts directly from the industry. All analyses were performed using STATA (version 13). Post-stratification sampling weights were incorporated in all analyses to account for the complex survey design of the 2009-2010 NATS and nonresponse.

## RESULTS

Overall, among 11,766 adult current smokers, 38.4% identified Marlboro as the brand they used most often (Figure 1), followed by Newport (15.1%) and Camel (8.7%). The percentage of users of other identified brand names were all less than 5%, respectively, ranging

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9 from Pall Mall (4.9%) to GPC (0.5%). The combined remaining 15.2% of smokers usually  
10 smoked cigarette brands (classified as other brands) that were not identified in the 2009–2010  
11 NATS.  
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13  
14 Table 1 presents the use of coupons or other price-related discounts among adult smokers  
15 by cigarette manufacturer. Specifically, 43.4% (4,850) reported usually smoking cigarettes  
16 produced by PM, 23.9% (3,274) usually smoked cigarettes from RJR, and 15.0% (960) usually  
17 smoked Newport cigarettes (Lorillard) (Table 1). The remaining 17.7% (2,682) smoked  
18 cigarettes from other companies, including Sonoma and USA Gold, which do not belong to the  
19 three major cigarette companies identified in the analysis. Approximately 24.4% of U.S. adult  
20 smokers who smoked PM brands used coupons or other price-related discount offers from the  
21 company during their most recent cigarette purchase, compared with 21.0% of those who  
22 smoked RJR brands, 13.7% of those who smoked Newport (Lorillard), and 11.1% of those who  
23 smoked brands from other cigarette companies.  
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33 After adjusting for the use of multiple price minimization strategies, respondents'  
34 demographic characteristics, smoking intensity, and state policy variations, the average per pack  
35 prices paid for cigarettes from PM, RJR, Newport (Lorillard), and other companies were \$5.06,  
36 \$4.63, \$4.75, and \$3.94, respectively. The average price reductions of coupons or other discounts  
37 offered by PM or RJR were statistically significant and similar in magnitude, 29 cents per pack.  
38 That of Newport (Lorillard) cigarettes was 24 cents per pack and was marginally significant.  
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45 Table 2 presents the use of coupons or other price-related discounts by specific brand (10  
46 self-reported leading brands only) from the 3 leading cigarette manufacturing companies in the  
47 United States. Table 2 is ordered by PM brands first, followed by RJR brands, and last by  
48 Newport, the only Lorillard brand listed. The prevalence of using coupons or other price-related  
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9 discounts varied from 33.9% (Camel, RJR), to 25.6% (Marlboro, PM), 13.7% (Newport,  
10 Lorillard), and 10.5% the lowest (Salem, RJR). Thus, about 1 of 3 Camel smokers used these  
11 strategies during the last time they bought their cigarettes, compared to about 1 of 4 Marlboro  
12 smokers, and about 1 of 8 Newport smokers. The percent price reductions due to use of coupons  
13 or discounts ranged from 1.1% (Basic) to 17.3% (Kool). Among these 10 leading U.S. cigarette  
14 brands, the average price paid per pack not using any price minimization strategies ranged from  
15 paying \$3.19 (Pall Mall, RJR) to \$6.49 (Virginia Slims, PM). After using coupons or other price-  
16 related discounts, the average prices paid for a pack of cigarettes of the top 3 selling brands were  
17 28 cents less for Marlboro (\$4.72 instead of \$5.00), 41 cents less for Camel (\$4.83 instead of  
18 \$5.24) and 24 cents less for Newport (\$4.51 instead of \$4.75). Also, those who smoked Salem  
19 and used coupons or other price-related discounts saved 80 cents the last time they purchased it.  
20 Finally, among these 10 leading U.S. brands, users of Camel (RJR), Marlboro (PM), and Basic  
21 (PM) used price minimization strategies the most.  
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39 **Discussion:**

40 Coupons or other price-related discounts from PM, RJR, and Lorillard were used by  
41 14%-25% of their consumers and have provided price reductions for the smokers who used  
42 specific brands. Coupons or other price-related discounts from other companies did not result in  
43 statistically significant price per pack reductions for their consumers. Therefore, after controlling  
44 for the use of other price minimization strategies and respondents' smoking intensity and  
45 nicotine addition, the 3 leading cigarette companies provided price reductions for their products  
46 through coupons or other price-related discounts.  
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9 To put the range of price reductions associated with coupons or other price-related  
10 discounts into context, the cigarette federal tax was \$1.01 per pack starting April 1<sup>st</sup>, 2009, and  
11 the weighted average state cigarette excise tax rate was \$ 1.17 per pack in 2010. These numbers  
12 imply that the coupon discounts from the three leading cigarette companies (about 24–29 cents)  
13 offset 23.8%–28.7% of the price impacts from the federal tax or 11.0%–13.3% of the price  
14 impacts from the federal and state excise taxes combined to the smokers of cigarettes produced  
15 by these manufactures. As a result, these offers brought actual average prices down for users of  
16 specific brands, while the price reductions associated with these discounts were likely to increase  
17 the sales in these companies. For example, with a price elasticity of overall demand for cigarettes  
18 among adults at somewhere between -0.3 and -0.7,<sup>22</sup> ceteris paribus, these price discounts can be  
19 translated into 10.2-23.9 million packs of cigarette sales in 2010 for Marlboro, 3.0-6.6 million  
20 packs for Newport, and 1.8-4.1 million packs for Camel.<sup>21</sup>

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22 Although it is true that statistically significant or marginally statistically significant price  
23 reductions were observed for the 3 leading U.S. cigarette companies, significant reductions are  
24 brand specific. The significant reductions were observed only for Marlboro (U.S. leading brand),  
25 Camel (second U.S. leading brand), Kool, Doral and Salem, while marginally for Newport (third  
26 U.S. leading brand). Thus, PM, RJR, and Lorillard have concentrated their efforts to provide  
27 price discounts mainly to their bestselling brands. This might be one of the reasons that a  
28 previous analysis failed to identify significant price reductions associated with promotional  
29 offers.<sup>12</sup>

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31 This study has some limitations. First, the study design is cross-sectional. Therefore, the  
32 study findings may be specific only to the period October 2009–June 2010. However, the study  
33 covers the entire United States, and there is a variety of prices as a function of brand smoked and  
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9 other factors. Second, most variables in the analysis are collected from recent purchases (i.e.,  
10 price paid, coupon and other price-related discounts, and carton purchase are for the latest  
11 purchase; premium or generic brands are for the last 30 days), but others are collected with a  
12 time frame of 1 year (i.e., purchase on Indian reservations, purchase through Internet). However,  
13 when we excluded Indian reservation and Internet purchases from the analysis, the adjusted  
14 average prices and price discounts associated with coupons did not change much. Third, because  
15 of an approval delay, only approximately 20% of respondents interviewed during the first 2  
16 months of the survey were asked if purchases had been made on an Indian reservation anytime  
17 during the past year. In subsequent months, this question was asked of more than 90% of  
18 respondents. In the full sample, total missing responses for this question were 18.4% (3,503).  
19 However, sensitivity analysis has shown that dropping these observations does not significantly  
20 affect the results.<sup>16</sup> As noted in the method section, we also excluded respondents who failed to  
21 report price paid for their latest purchase, the brand name they used most often in the last 30  
22 days, or some of their demographic characteristics. We compared smoking and social-  
23 demographic characteristics between individuals with incomplete information and individuals  
24 with complete information and have found little differences at the mean level. Fourth, as noted  
25 above, the 2009-2010 NATS does not collect information for all price minimization strategies,  
26 including cigarette purchases from states with lower price. Although the cross-border purchase is  
27 an issue in tobacco control, the prevalence of this behavior was quite low in the United States  
28 compared to other forms of price minimization strategies. For example, data from the 2003 and  
29 2006-2007 Tobacco Use Supplement to the Current Population Survey (TUS-CPS) suggests that  
30 about 5% of smokers made purchase across a state border,<sup>23</sup> while in the 2010-2011 TUS-CPS,  
31 approximately 3.0% of smokers purchased cigarettes from non-tribal land in lower-taxed and  
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9 non-residential states (estimates not shown). In order to account for unmeasured price  
10 minimization strategies, we controlled for smoking intensity and level of nicotine addiction in  
11 the analysis since the literature suggests that these are important risk factors of using any price  
12 minimization strategies. ~~Finally~~ Additionally, the paid prices were determined by using self-  
13 reported information from the smoker, which may be subject to recall bias. However, existing  
14 evidence indicates that the average of self-reported prices per pack in the 2009-2010 NATS was  
15 very consistent with the corresponding 2009 national average price reported in the Tax Burden  
16 on Tobacco (TBOT).<sup>16</sup> Another benefit of using self-reported price in this analysis is that we are  
17 able to control for the corresponding smoking intensity of each smoker, which is not available in  
18 market scanned data but closely related to potential use of unmeasured price minimization  
19 strategies. Finally, smokers' self-reported use of coupon or other types of price-related discounts  
20 in the 2009-2010 NATS only reflects direct-to-consumer discounts from the industry. As a  
21 result, the discount measure in the analysis does not include tobacco industry's promotional  
22 allowances directly paid to cigarette retailers or wholesalers, as these disaggregated promotional  
23 allowances by cigarette manufacture or by brand have not been disclosed to consumers or to the  
24 public.

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39 In addition to cigarette companies directly influencing cigarette retail prices by providing  
40 coupons or other price-related discounts, cigarette companies may also indirectly affect cigarette  
41 prices by offering discounts to retailers and by promoting cigars or pipe tobacco that can be used  
42 in roll-your-own cigarettes.<sup>24</sup> Although these indirect influences are critical in tobacco control  
43 and certainly warrant additional studies, the NATS survey did not collect such information thus  
44 they are not within the scope of this analysis.  
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9 Our results show that the three leading cigarette companies in the United States continue  
10 to offer price discounts to smokers of their brands, although these promotions appear to be  
11 concentrated among their top-selling cigarette brands. Cigarette companies can be strategic when  
12 offering price discounts. For example, existing literature suggests that young adults, females, and  
13 heavy smokers are more frequently targeted for these promotions.<sup>19</sup> Other study have shown that  
14 cigarette brands with low market share target young adults with the goal of encouraging brand  
15 switching, while major brands target older smokers to facilitate brand loyalty.<sup>25</sup> As pointed out  
16 earlier, smokers who use price-related discounts are less likely to make quit attempts or to  
17 successfully quit in the future. The length (duration) of smoking and the amount of cigarettes  
18 smoked per day on days the person smoked is strongly associated with a higher likelihood of  
19 developing and dying from a smoking-related disease, such as lung cancer, COPD, or heart  
20 attacks.<sup>1</sup> Therefore, even though price minimization strategies may increase sales and profits for  
21 cigarette companies, these price discounts are likely preventing or delaying some smokers from  
22 permanent cessation. Policies that decrease price-minimization strategies will benefit public  
23 health.  
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9 Contributorship Statement

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11 All 3 authors meet the authorship criteria:

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13  
14 Ralph Caraballo participated in 1)the conception and design of data; 2) drafting the article or  
15  
16 revising it critically for important intellectual content; and 3) final approval of the version to be  
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18 published.

19  
20 Xu Wang participated in 1) the conception and analysis and interpretation of data; 2) revising it  
21  
22 critically for important intellectual content; and 3) final approval of the version to be published.

23  
24 Xin Xu participated in 1)the conception and design of data; 2) drafting the article or revising it  
25  
26 critically for important intellectual content; and 3) final approval of the version to be published.  
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29 Competing Interests

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31 None

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34 Data Sharing Statement

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36 The raw and weighted data set are available to the public. A request can be made to the authors  
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**Table 1. The use of in-store coupons or other price-related discounts by major cigarette manufactures<sup>†</sup>**

	PM	RJR	LORILLARD (Newport only)	Other Companies <sup>a</sup>
Prevalence of brand use	43.4%	23.9%	15.0%	17.7%
Prevalence of coupons or discounts used by smokers of that manufacture	24.4%	21.0%	13.7%	11.1%
Price reduction per pack for smokers of that manufacture(\$)	-0.29**	-0.29**	-0.24*	-0.23
Average price per pack for smokers of that manufacture (\$)	5.06	4.63	4.75	3.94
Percentage of discount rendered to smokers of that manufacture	5.7%	6.3%	5.1%	5.8%
N	4,850	3,274	960	2,682

Notes: N represents un-weighted sample size. All estimates were obtained with post-stratification weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry's promotional allowances directly paid to retailers include or wholesalers are not included.

<sup>a</sup> Users of Sonoma, USA Gold brands, and other brand names which not listed in the survey.

\*\*Statistically significant at 5% level; \* statistically significant at 10% level.

**Table 2. The use of in-store coupons or other price-related discounts by cigarette manufacturer and by top 10 leading U.S. brands<sup>†</sup>**

		Prevalence of coupon use	% of discount	Average price	Price after discount	Rank <sup>a</sup>
PM	Basic	22.2%	1.1%	\$4.41	\$4.36	3
	Marlboro	25.6%	5.6%	\$5.00	\$4.72**	2
	Virginia Slims	10.6%	3.4%	\$6.49	\$6.27	9
RJR	Camel	33.9%	7.8%	\$5.24	\$4.83**	1
	Doral	15.6%	12.7%	\$3.93	\$3.43**	6
	Kool	11.6%	17.3%	\$4.23	\$3.50**	8
	Pall Mall	15.9%	1.3%	\$3.19	\$3.15	5
	Salem	10.5%	15.7%	\$5.11	\$4.31**	10
	Winston	17.1%	3.7%	\$4.07	\$3.92	4
Lorillard	Newport	13.7%	5.1%	\$4.75	\$4.51*	7

Notes: N represents un-weighted sample size. All estimates were obtained with post-stratification weights. In regressions, the dependent variable is price paid per pack, and the variable of interest is whether using coupons, rebates, buy-1-get-1-free, 2-for-1, or any other special promotions for cigarettes in the most recent purchase. Control variables include demographic characteristics (race, age, gender, education, marital status, and employment status), state dummy variables, whether the respondent is a daily smoker, time to first cigarette since wake up, and all other price-minimization behaviors (i.e., purchase of generic brands, purchase of cartons, purchase on Indian reservation, or purchase through the Internet). Percentage of discount rendered is obtained by dividing average price per pack with price reduction associated with coupons and other price-related discounts.

<sup>†</sup>The self-reported use of coupons or other price-related discounts only reflects direct-to-consumer discounts from the industry. Therefore, industry’s promotional allowances directly paid to retailers include or wholesalers are not included.

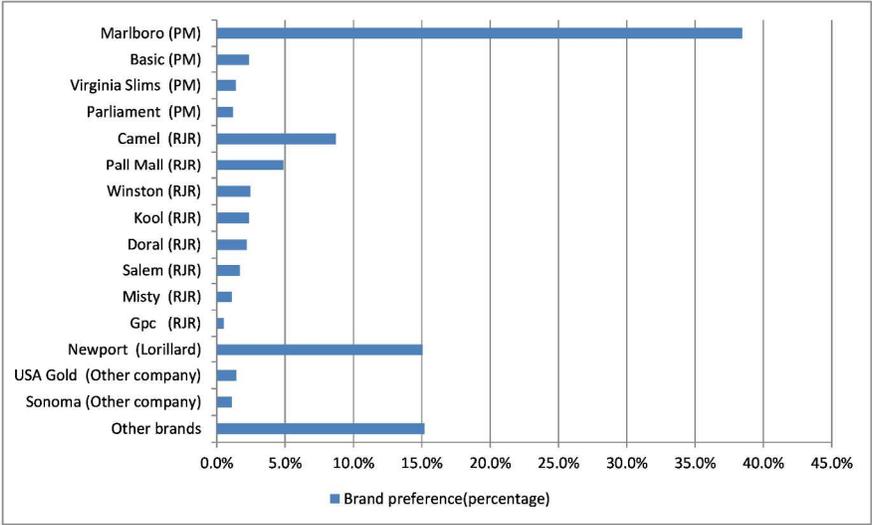
<sup>a</sup>Based on prevalence of coupon use.

\*\*Price reduction associated with coupons and other price-related discounts is statistically significant at 5% level, \* statistically significant at 10% level.

**Figure 1. Brand preference among U.S. adult smokers (2009-2010 NATS)**

**Comment [XX(2):** Xu, is our figure 1 also missing from the original file?

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