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# How Does the Impact of Tobacco Control Policies Change Over Time?: Evidence from South Korea

Jisun Baek and WooRam Park\*

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## Abstract

In this paper, we examine the dynamic effect of tobacco control policies on tobacco consumption using the recent implementation of such policies in Korea. The results show that such policies discretely reduce the incidence and amount of tobacco consumptions. We document that after the initial drop, spending on tobacco products gradually recovered towards the pre-policy level. We also find that there is considerable heterogeneity in the persistence of the impact of tobacco control policies. For higher income households, the impact dissipated approximately six months after the implementation of the policy whereas for low-income households, it persisted through the first year.

**JEL classification:** I12, I18

**Keywords:** Tobacco Control Policies; Dynamic Effect; Tobacco Consumption; Household-level Data; South Korea

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# 1 Introduction

The negative impact of tobacco on health is widely documented in the literature (World Health Organization., & Research for International Tobacco Control., 2008; Piano et al., 2010; U.S. Department of Health and Human Services., 2014). As health is closely related to the labor market outcomes of workers (Ettner, Frank, and Kessler, 1997; Currie and Madrian, 1999; Lundborg, Nilsson, and Rooth, 2014), policy makers and health economists alike have been interested in the effectiveness of measures to reduce tobacco consumption.

In this paper, we attempt to extend our understanding of the impact of tobacco control policies by examining its persistence. Although a great amount of literature has examined the effect of tobacco control policies (Chaloupka and Warner, 2000), relatively little attention has been paid to how this impact changes with time (Ouellet et al., 2010). Specifically, most earlier work such as Abadie, Diamond, and Hainmueller (2010) and Callison and Kaestner (2014) employs annually collected data to examine the impact of tobacco control policies. We attempt to fill the gap in the literature by employing monthly collected data on household expenditures and then to document how the impact changes over time over the course of a year. In particular, our paper is one of few to document the difference in the endurance of the impact of a tobacco price increase across income levels of households. By documenting this heterogeneity, we complement the previous literature that finds a larger impact of a tobacco price increase on individuals and

households of low socioeconomic (SES) status (Colman and Remler, 2008; Farrelly et al., 2001; Gruber, Sen, and Stabile, 2003; Townsend, Roderick, and Cooper, 1994).

Furthermore, the empirical setting used in this paper allows us to examine the effect of a tobacco tax on tobacco consumption as opposed to a cigarette tax on smoking. The literature on the impact of an increase in the tobacco price has mainly estimated its effect using an increase in the cigarette tax (International Agency for Research on Cancer., 2011).<sup>1</sup> As a result, studies of the consumption of other tobacco products are relatively scarce compared to those focusing on the impact of a cigarette tax on smoking (Chaloupka and Warner, 2000).<sup>2</sup> Although the cigarette is the most prominent type of tobacco products, there are other types as well, such as cigars, chewing tobacco and snuff. Moreover, estimating the impact of a tobacco tax using the consumption of smoking tobacco could overestimate the impact, as smokers could replace this type with another type of tobacco products (Ohsfeldt and Boyle, 1994; Adams, Cotti, and Fuhrmann, 2013). We can contribute to the literature by providing a comprehensive understanding of the impact of tobacco control policies on *all* tobacco products—both smoking and smokeless types of tobacco.

As will be described in the following sections, the regulation affecting

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<sup>1</sup>The recent literature examining the impact of a cigarette tax on smoking includes Abadie, Diamond, and Hainmueller (2010); Callison and Kaestner (2014); Carpenter and Cook (2008); DeCicca and McLeod (2008); DeCicca, Kenkel, and Mathios (2008); Nesson (2015); Nonnemaker and Farrelly (2011); Sen, Hideki, and Daciana (2010).

<sup>2</sup>A few notable exceptions include: Chaloupka, Tauras, and Grossman (1997), Kostova and Dave (2015), and Ohsfeldt, Boyle, and Capilouto (1997). These studies agree that a price increase will reduce the consumption of smokeless tobacco.

tobacco products at the national level and the geopolitical characteristics of South Korea provide an ideal institutional setting in which to examine the effects of an increase in tobacco prices. In particular, the possibility of cross-border smuggling or shopping of tobacco products is very low in South Korea, unlike that in Canada, the U.S. or Europe (Galbraith and Kaiserman, 1997; Lockwood and Migali, 2009; Lovenheim, 2008; Joossens and Raw, 1998).

In January of 2015, the price of tobacco products in Korea was increased discretely due to a tax hike on tobacco products. This discrete increase was accompanied by other measures to reduce tobacco consumption, such as the expansion of smoking bans in restaurants and coffee shops. We exploit this recent implementation of tobacco control policy in Korea and adopt a regression discontinuity design to examine the instant impact of this policy. The estimation results show that the policy instantaneously reduced the incidence of tobacco consumption. Specifically, the probability of realizing positive expenditures on tobacco products plummeted in January of 2015. Similarly, we find that the average real expenditures on tobacco products also decreased by a large amount in January of 2015.

Furthermore, we examine whether this initial impact of a tobacco control policy persisted over time by adopting an event-study type of framework. Specifically, we document changes in the probability of positive spending on tobacco products after controlling for household characteristics. We find that after the initial drop, the incidence of positive spending on tobacco products gradually recovered towards the pre-policy level. Thus, our results suggest

that focusing on the instant impact of a price increase may substantially overestimate the price elasticity of addictive substances such as tobacco products. We also find that there is heterogeneity in the persistence of the impact of a tobacco tax hike. In particular, the initial negative impact persisted during the first year after the implementation of the policy for low-income households, whereas for higher income groups, the impact dissipated approximately six months after the policy went into effect. These results suggest that tobacco control policies, especially a tax increase, are effective policy measures for improving the health outcomes of households and population of low socioeconomic status (SES) levels.

The remainder of the paper is organized as follows. Section 2 explains the detailed institutional background regarding regulations which affect the tobacco industry and the tobacco price hike in Korea, and Section 3 describes the household-level data employed in this paper. Section 4 explains the empirical strategy adopted for the analysis. Section 5 discusses the estimated results, followed by several robustness checks of the main results. Section 6 offers a summary and then concluding remarks.

## **2 Background**

The centralized regulation of tobacco products in Korea provides the ideal institutional setting for examining the impact of tobacco control policies. In particular, the production, import, distribution and retailing of tobacco

products are regulated under the Tobacco Business Act.<sup>3</sup> According to this law, manufacturers and importers must report the selling price of tobacco products to the central government at least six days prior to the sale and should make prices publicly available. The law further requires retailers to sell tobacco products at the selling price previously made public.<sup>4</sup>

Due to this regulation, the price of a given tobacco product is identical across *every* retailer in *all* regions of South Korea—South Korea and not North Korea.<sup>5</sup> The law also strictly prohibits providing money or goods to promote tobacco sales. Moreover, because South Korea is effectively an island—surrounded by North Korea and the sea—tobacco smuggling or cross-border shopping is not as simple as it is between the U.S. and Canada or among European countries. Overall, it is safe to argue that all potential consumers in Korea must pay the same price for a given tobacco product. Thus, our empirical setting is substantially different from those in other countries such as the U.S., where the impact of a tobacco tax on the price of tobacco products varies across states or even within a given state (DeCicca, Kenkel, and Liu, 2013; Harding, Leibtag, and Lovenheim, 2012).

Until January of 2015, the price of tobacco products remained relatively stable. It has done so since December of 2004, when a tobacco tax at that

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<sup>3</sup>The law regulates all products that are manufactured with tobacco leaves for smoking, chewing and inhaling.

<sup>4</sup>In Korea, only retailers authorized by the government can sell tobacco products to consumers.

<sup>5</sup>A few exceptions include, most notably, tobacco products sold in bonded areas, which are usually less expensive than tobacco products of which the price is regulated by the aforementioned article of the law. To prevent possible smuggling, the law requires this ‘special purpose tobacco’ to be packaged differently with the normal tobacco products. The maximum customs allowance is 200 cigarettes, 50 cigars or 250 grams of tobacco per capita.



time increased the average price of a pack of cigarettes from 2000 KRW to 2500 KRW. In September of 2014, the Korean government announced a plan to increase the tax on tobacco products for the first time in ten years, hoping to discourage tobacco consumption. After considerable debate, the National Assembly approved the increase in the tobacco tax in December of 2014 and thus the new price of tobacco products came into effect on January 1, 2015. Table A.1 in Appendix A summarizes the changes of taxes on the major types of tobacco products, excluding a value-added tax which is not specific to tobacco products.<sup>6</sup>

As a result of this tobacco tax hike, the average price of cigarettes increased from 2500 KRW to 4500 KRW per pack on January 1, 2015. Figure 1(a) describes the consumer price index for tobacco products, with a base year of 2010 (100 in 2010), from 2013 to 2015. As emphasized in the beginning of this section, given that the price of a given tobacco product is identical across every retailer in a given period, the consumer price index for tobacco at the national level applies to practically all consumers regardless of their location. The trend shows little discrete change until January of 2015, when the index increased by nearly 80% due to the tax hike levied on tobacco products.

The price increase was also accompanied by other policies that may have a negative impact on tobacco consumption. In particular, the smoking ban in restaurants, which previously applied only to the restaurants larger than 100 square meters, was expanded to all restaurants regardless of their size,

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<sup>6</sup>The rate of the value-added tax, which is applied to every goods and services with few exceptions, is ten percent.

starting on January 1, 2015. However, it is unlikely that the impact of the smoking ban was as discrete as the tobacco price hike, as the policy went in effect after a grace period of three months. In addition to the smoking ban in restaurants, it became illegal to put terms such as “light,” “mild,” “low-tar” or “pure” on cigarette packs starting on January 22, 2015.<sup>7</sup>

### **3 Data**

We use the Household Income and Expenditure Survey from 2013 to 2015 in order to analyze the recent implementation of tobacco control policy in South Korea. The Household Income and Expenditure Survey is collected by Statistics Korea and is designed to constitute a representative sample of the entire South Korean population with approximately 6,500-7,000 households.<sup>8</sup> A household included in the sample is interviewed every month for three consecutive years, and one third of the sample is replaced by new households over six months. During the interviews, an interviewer collects information about household characteristics such as the number of household members and their education levels and economic activities. In addition to interviews, each household keeps a daily household account record including income and expenditures, and submits it every month. The household-level expenditure variables are classified based on the Classification of Individual Consumption According to Purpose(COICOP) published by

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<sup>7</sup>Legislation that obligates cigarette packaging to carry picture warnings was passed in May of 2015 and will go into effect starting in December of 2016.

<sup>8</sup>The survey excludes farming households, forestry households and fishery households because it is difficult to measure income in such households.

the United Nations Statistics Division.

Because the data provides monthly household expenditure information pertaining to tobacco products, we use it to define the incidence of smoking households that spend a positive amount of money on tobacco products. Household expenditure on tobacco products can also serve as a measure of tobacco product consumption. The discrete change in household expenditure in this category after the tobacco taxes were raised on January 1, 2015 enables us to examine the effect of tobacco tax increase on the incidence of tobacco consumption.

Using household expenditure survey has advantages and shortcomings when examining the effect of tobacco control policies on tobacco consumption. As expenditures on tobacco include spending on all types of tobacco products, our estimate will be comprehensive compared to those studies focusing on a specific type of tobacco consumption, such as cigarette smoking. However, the survey used in our paper provides aggregate household expenditure on tobacco products; therefore we are not able to draw any implication regarding tobacco consumption at the individual level within a household.

We use all households observed from January of 2013 to December of 2015, except for those for which the head of household is under 20 years old. As the dataset has a household identifier which is consistent only within the same calendar year, and not across years, we are not able to use the dataset as a panel dataset. Although a household identifier cannot be included to control household fixed effects, it is utilized when calculating quarterly av-

erage household income. We use this quarterly average income to identify the household income quintiles.

Table 1 summarizes the variables used in this study and presents the characteristics of the households in the sample. Columns (1) and (2) in Table 1 correspondingly show the mean and standard deviation of the variables for the entire sample periods. Columns (3)-(4) and (5)-(6) indicate the mean and standard deviation of the variables for the periods before and after the tobacco tax hike, respectively. It is noteworthy that the proportion of households with positive expenditure levels on tobacco products is noticeably lower in the periods after the tobacco tax hike while household income and other demographic characteristics remain stable. In addition, we examine the real expenditure levels on tobacco products for implications pertaining to the intensity of tobacco consumption. Specifically, we use the CPI for tobacco products to calculate the real expenditure levels for tobacco products based on the 2010 constant price. The average of this value for tobacco products was approximately 15,600 KRW per month in 2010 KRW before the tobacco tax was increased, with a decreased of 33% coming after the tax hike. This decrease could both reflect the reduced incidence of a positive expenditure levels on tobacco and the possibility of a decrease in the intensity of tobacco consumption.

## 4 Empirical Strategy

We employ a regression discontinuity framework to identify the causal effect of tobacco control policies on the incidence and intensity of tobacco consumption. In particular, we use time as a forcing variable and examine whether there is a discrete change in the probability of a positive expenditure levels on tobacco products given that the average price of tobacco was increased discretely by 80%—from 2500 KRW to 4500 KRW on January of 2015. Thus, in terms of an empirical strategy, our paper is similar to previous studies such as those by Almond and Doyle (2011); Chen and Whalley (2012); Davis (2008) in its use of time as a forcing variable in a regression discontinuity framework. Formally, the effect of tobacco control policies caused by the tax hike on tobacco consumption could be revealed by estimating it with the following ordinary least square (OLS) equation:

$$Y_{ht} = \gamma_0 + \gamma_1 TCP_t + f(t) + \mathbf{X}'_{ht}\Lambda + \varepsilon_{ht} \quad (1)$$

where  $Y_{ht}$  is the outcome variable of interest of household  $h$  at time  $t$ , such as the incidence of tobacco consumption, which is represented by an indicator variable which takes a value equal to one if household spending on tobacco products is positive.  $TCP_t$  is an indicator variable for periods after the implementation of the tobacco control policies described in Section 2. That is,  $TCP_t$  takes a value equal to one if  $t$  is after January 1, 2015. Additionally,  $f(t)$  is a flexible function of time  $t$  and captures any smooth changes in the trend of tobacco consumption. In particular, we specify  $f(t)$  as a third-

order polynomial of time and the interaction terms between  $TCP_t$  and a third-order polynomial of time such that the smooth changes may differ on either side of the implementation of the tobacco control policy.  $\mathbf{X}_{ht}$  refers to the set of household characteristics that could affect household expenditures on tobacco such as the age and the gender of the head of household, the size of the family, and the monthly household income.  $\mathbf{X}_{ht}$  also contains the number of males in the household, the number of senior citizens in the household, urban residency, the marital status of the head of household and their education level and categorized occupation.<sup>9</sup> Because the data is repeated cross-sectional data, and not a panel data at the household level, it is not feasible to control for household fixed effects. Furthermore, for binary outcome variables, we also estimate the equation using a probit model and report the average marginal effect at the cutoff (Bartus, 2005).

The coefficient of  $TCP_t$ ,  $\gamma_1$ , would solely identify the impact of the tobacco control policy enacted in January of 2015 in the absence of discrete changes of other factors that could affect expenditures on tobacco, allowing  $Y$  to change smoothly without any effects of the policy (Hahn, Todd, and der Klaauw, 2001; Imbens and Lemieux, 2008). Although it is virtually impossible to identify all of the factors that may affect the consumption of tobacco, we show that most probable factors other than the price of tobacco itself are smooth around January of 2015. First, the prices of other goods were relatively stable compared to the price of tobacco, which increased by approximately 80 percent. Panels in Figure 1 depict the trend of consumer

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<sup>9</sup>We provide the list of variables included in  $\mathbf{X}_{ht}$  in the note of Table 2.

price index for tobacco products, alcoholic beverages and the overall consumer price index including tobacco products. Figures 1(b)-1(c) confirm that there are no discrete changes in the prices of other goods and services in January of 2015 unlike the trend of CPI for tobacco presented in Figure 1(a). In particular, the trends in the price of alcoholic beverages, known to be related to the consumption of tobacco (Cameron and Williams, 2001; Decker and Schwartz, 2000; Tauchmann et al., 2013; Yu and Abler, 2010), as described in Figure 1(b), are smooth during our periods of interest.

Moreover, the characteristics of households that could affect tobacco consumption change smoothly around the time of tobacco tax hike. As described in Figure 2, we observe no sudden deviation from this trend in household income, the age of head of household, or the size of the household after the implementation of the policy. Overall, the evidence shows few significantly compounding factors that could affect the interpretation of  $\gamma_1$  being a causal effect of the tobacco control policy.

One potential concern when using the regression discontinuity design (RDD) to estimate the effect of an event such as a tobacco tax hike is the possibility of endogenous consumption behavior such as the hoarding of tobacco products. In particular, households may have stocked up on tobacco products in anticipation of higher prices and then consumed those tobacco products at least for a while after the price had actually increased. In such a case, the estimates from the RDD could be biased towards a large decrease in the incidence of consumption. On the other hand, if the announcement of the plan itself induced individuals to reduce or suspend their tobacco con-

sumption prior to the actual implementation of the tobacco control policy, then the effect will be underestimated. To show that our results from the RDD are robust to these responses to the announcement of the plan, we exclude data around the cutoff, leaving a “donut hole” (Almond and Doyle, 2011; Cohodes and Goodman, 2014).

The regression discontinuity design has been employed in many contexts to document a causal impact due to its simplicity and intuitiveness. The shortcoming of the RDD, however, is that it mostly reflects the causal impact near the cutoff when the tobacco control policy is implemented. To complement the RD specification, we adopt an even-study style regression and document the evolution of the impact of the tobacco price increase over time. In particular, we estimate the following equation which yields a set of coefficients reflecting how the instant impact that we find from the RDD develops over time.

$$Y_{ht} = \delta_t + \mathbf{X}'_{ht}\Xi + \epsilon_{ht} \quad (2)$$

Similar to the notations in equation (1),  $Y_{ht}$  denotes the incidence of tobacco consumption and  $\mathbf{X}_{ht}$  is the set of variables that could affect household expenditures on tobacco. Thus, the set of time-fixed effects,  $\delta_t$ , captures the change in the probability of a positive expenditure level on tobacco while holding other factors constant. Specifically, after normalizing the coefficient for December of 2014 at zero, we compare the size and significance of each time-fixed effect to reveal how the impact of the tax hike persisted over time. Furthermore, by examining the time trend between the announcement and



actual implementation of the policy, we can examine the degree of the potential endogenous response to the announcement of the policy. That is, if there had been an intensive response to the announcement of the plan, the estimated time-fixed effects for the period between the announcement and the actual implementation would differ from those during the remaining the pre-policy period. In addition to the OLS estimation, we also estimate equation (2) using a probit model and report the average marginal effects of the time-fixed effects.

## 5 Results

Before we present the estimation results in detail, we initially provide graphical evidence by plotting the measure of the incidence of tobacco consumption and the average monthly expenditure on tobacco products over time. Figure 3(a) plots the proportion of households showing positive spending on tobacco products from January of 2013 until December of 2015, and Figure 3(b) depicts the average real expenditure on tobacco during the same period. In both graphs, one can observe a discrete decrease in January of 2015, as indicated by the red vertical line, when the average price of tobacco increased by approximately 80%. In particular, the proportion of households with positive spending on tobacco products remained comparatively stable for the two years prior to January of 2015.

## 5.1 Instant response to the policy

The graphical evidence coincides with the results as estimated by equation (1) with the various specifications summarized in Table 2. Columns (1)-(4) in Table 2 present the results from equation (1) using the indicator variable for positive spending on tobacco as  $Y_{ht}$ , and columns (5)-(6) provide the results for a household's real expenditures on tobacco products as the dependent variable. While columns (3)-(4) report the average marginal effect at the cutoff ( $t = 0$ ), as estimated using a probit model, the estimates shown in the other columns are estimated using the ordinary least squares (OLS). Even-numbered columns control for household characteristics such as the age of the head of household and household income while odd-numbered columns do not.

When the dependent variable is an indicator variable for positive spending on tobacco, the estimates of  $\gamma_1$ , the coefficient of  $TCP_t$ , are negative and statistically significant for all specifications as reported in columns (1)-(4) of Table 2. These results suggest a discrete decrease in the probability of spending a positive amount of money on tobacco products as an instant response to the increase in the tobacco price. Specifically, the estimates imply that the incidence of positive household expenditures on tobacco products was instantly reduced by six percentage points due to the tobacco control policy enacted in January of 2015. As the proportion of households with positive tobacco expenditures prior to the tobacco tax hike was approximately 29%, this estimate implies that incidences of positive household expenditures on tobacco decreased by 20%.

The estimates of  $\gamma_1$  for the real expenditure on tobacco products as a dependent variable, reported in columns (5)-(6) of Table 2, show the effect of the tax increase on tobacco products on the extent of tobacco consumption. The estimated coefficients imply that households instantly reduced the real expenditures on tobacco by 34 percent, and this decrease reflects the decrease in the incidence of positive tobacco expenditures reported in columns (1)-(4) of Table 2. This decrease in real expenditures exceeds the decrease in the incidence of positive expenditures on tobacco. Thus, the result suggests that households with positive expenditures on tobacco reduced their spending on tobacco in response to the implementation of the policy.

In the remaining parts of this subsection, we provide several robustness checks of our results from the RDD. First, we impose an imaginary tax hike in January of 2014 and examine whether the results exhibit patterns similar to those of our main findings. In other words, if our main results simply reflect the effect of a new year given that a new year's wish by many smokers is to quit smoking, we would find similar effects using January 2014 as the timing of the imposition of the policy. The results of a regression discontinuity design imposing this pseudo-timing on the tobacco control policy in January of 2014 are reported in Panel A of Table 3. Columns (1)-(4) report the estimated coefficient of  $TCP_t$  using the indicator variable for positive spending on tobacco as a dependent variable. The amount of real expenditure on tobacco products in log form is used for columns (5)-(6). Unlike the results of the main analysis, the incidence of having positive expenditures on tobacco products and the amount of real expenditures on tobacco do not exhibit a

discrete decrease. That is, we find little evidence of any “new year” effect on the consumption of tobacco products. Thus, the results suggest that our main results are indeed an effect of the tobacco control policy, which happened to coincide with the new year.

Furthermore, we employ a “donut hole” regression discontinuity explicitly to address any potential endogenous consumption behavior such as the hoarding of the tobacco products, as discussed in Section 4. To examine whether our main results from the RDD are robust to potential hoarding behaviors by households, we use the sample while leaving a donut hole for the period when those behaviors are likely to occur. Specifically, we use the sample leaving a four-month donut hole around the cutoff, i.e., excluding observations from September of 2014 to April of 2015, as the government announced its plan to increase the tax in September of 2014. Panel B in Table 3 documents the results from the donut hole regression discontinuity adopting the four-month donut hole around the cutoff. The results are similar to the main results. In particular, if anything, the absolute magnitudes of the coefficients from the donut hole RDD are larger than those from the main results. Thus, these results strongly suggest that the instant decrease in tobacco consumption after the implementation of the policy was not driven by changes in tobacco consumption such as hoarding prior to the implementation.

Furthermore, we balance the length of the pre-policy period and post-policy period in order to determine whether our main results are affected by the period of analysis. In particular, we also estimate equation (1) with a

two-year window around the policy implementation date—January of 2014 to December of 2015—of which the lengths of the pre-policy period and post-policy period are balanced. The results using the alternative window, shown in Panel C of Table 3, are similar to our main results.

To examine the validity of the results from the RDD framework further, we use an alternative specification for the time trend,  $f(t)$  in equation (1). In particular, we employ a linear, quadratic and quartic polynomial function for  $f(t)$ . The corresponding results for each specification of  $f(t)$  are summarized in Panel D of Table 3. Regardless of the functional forms of  $f(t)$ , the results are both qualitatively and quantitatively consistent with the main results.

## 5.2 Evolution of the impact

In addition to the causal impact of the tobacco control policy as documented by the instant decrease in tobacco consumption, we also examine how the impact of the tobacco control policy changed over time. Table 4 reports the estimation results from an event-study style estimating equation (2). Columns (1) and (2) present the coefficient of each time-fixed effect estimated using a linear probability model and the average marginal effect on each time dummy variable as estimated using a probit model, respectively, after normalizing the coefficient of December of 2014 to zero. Thus, each estimate documents the relative change in the probability of positive expenditures compared to the probability in the month prior to the implementation of the tobacco control policy.

We also graphically illustrate the average marginal effects with a 95%

confidence interval from the probit model in Figure 4(a). These results show that the probability of positive expenditures on tobacco is stable prior to the implementation of the policy. Specifically, all of the coefficients for 2013 and 2014 are quantitatively small and statistically indistinguishable from zero. In contrast, the probability of spending a positive amount of money on tobacco decreased dramatically in January of 2015, consistent with the results from the RDD specification. Furthermore, we find that the probability slowly recovered towards the level prior to the implementation of the tobacco control policy, as the estimates after January of 2015 exhibit an upward trend. The point estimate for December of 2015 is still smaller than zero, but it is statistically insignificant.

By conducting the event-study style analysis separately for each household income quintile, we find that the pattern is more prominent for one group as compared to the others. Specifically, we find that the impact of the policy persisted for the lowest income quintile whereas it quickly dissolved for the upper income quintiles. Figures 4(b)-4(f) describe the trend in the probability of a positive expenditure amount on tobacco for each income quintile by illustrating the average marginal effect of time dummy variables estimated from the probit model using each income quintile.<sup>10</sup> It was noted that the probability quickly regained its pre-policy level for the upper income groups, whereas for the low-income groups, the probability was relatively stable after the initial drop in January of 2015. In particular, the incidence

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<sup>10</sup>The estimates from the linear probability model are quantitatively and qualitatively similar to those from the probit model. We report the estimation results from the linear probability model and the probit model in Tables A.2 and A.3, respectively, in Appendix A.

of positive spending on tobacco for the highest income group returned to its pre-policy level within six months. In contrast, the point estimate for the first income quintile is lower than zero a year after the implementation of the policy.

In addition to the analysis of the incidence of positive expenditures on tobacco, we also estimate equation (2) using OLS with real expenditures on tobacco as an outcome variable. The panels in Figure 5 plot the coefficients and the 95% confidence interval of time-fixed effects estimated based on the full sample and the income quintile samples. The estimation result for the full sample is reported in column (3) in Table 4. Figure 5(a) depicts the change in the amount of average tobacco consumption over time for the full sample, showing that tobacco consumption gradually recovers towards the pre-policy level after the plunge in January of 2015. This pattern of tobacco consumption is confirmed by retail sales data for cigarettes in Korea. Figure 6, presents the number of cigarette packs sold in each month in Korea between 2013 and 2015. Cigarette sales were reduced by nearly half in January of 2015 as compared to sales in December of 2014 and those in January of 2014. However, sales quickly recovered over time although the level still remains below the level prior the tobacco tax hike.

In addition, we document the change in tobacco consumption over time separately for each income quintile. Figures 5(b)-5(f) illustrate the estimation results, which are also reported in Table A.4 in Appendix A, and thus describe the change in real tobacco expenditures over time for each income quintile. Similar to the results pertaining to the incidence of positive to-

bacco expenditures, low-income households exhibit slower recovery to their pre-policy levels of real tobacco expenditures in contrast with high-income households. In particular, the amount of tobacco consumption for the highest income quintile regained the pre-policy level of tobacco consumption within six months from the tobacco tax hike. For the lower three quintiles, real tobacco expenditure amounts one year after the policy implementation remain significantly lower than any period prior to its implementation. Specifically, the estimates for the first quintile increased for the first six months after the tax hike, but they remained stable in general afterwards. Overall, our results show that the effectiveness of an increase in the tobacco price shrinks with the household income level. Our finding is consistent with recent studies which found that low-income smokers are more responsive to price increases (Coady et al., 2013; Siahpush et al., 2009).

Because our dataset is not a panel data, we cannot identify households that suspended tobacco expenditures and reduced the expenditure. However, comparing the results shown in Table A.4 with the results in Tables A.2 and A.3 tells us that the incidence of positive tobacco expenditures among the second and third quintiles of household income recovered to the pre-policy level but the amount of tobacco consumption among those households is still lower than its pre-policy level a year after from the implementation of policy. For higher income quintiles, both the incidence of positive tobacco expenditures and the amount of tobacco consumption regained their pre-policy level.<sup>11</sup>

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<sup>11</sup>As the incidence of positive tobacco expenditures and the amount of tobacco consumption are lower than their pre-policy level a year after the implementation of the policy, we



Many possible factors could lead to this pattern of tobacco expenditures—an initial plunge upon the implementation of the policy then a gradual recovery—as described in this paper. For example, hoarding behavior by consumers could lead to this pattern. In particular, consumers may have stocked up on tobacco products and thus could have reduced their spending on these products without an actual change in their consumption levels. However, additional evidence implies that households reduced their tobacco consumption at least over the short-run. In particular, Figure 3(b) indicates that the average monthly expenditures on tobacco remained generally stable until December of 2014 when the increase in tobacco tax became official. Moreover, even in December of 2014, the increase in expenditures is only about 10% of the previous level, which is far less than necessary to compensate fully for the decreased tobacco consumption level following the implementation of the policy. Moreover, the point estimates for time-fixed effects described in Figure 5 are not statistically different from each other during the period prior to the actual implementation of the tobacco control policy. That is, it is hard to find supportive evidence that household expenditure levels for tobacco products deviated from their trends during the period when the policy was announced but not yet implemented.

The limited evidence of the hoarding of tobacco products from the our household data is also consistent with the limited increase in cigarette sales shown in Figure 6 during the period when the plan to increase the tax on tobacco was announced but not yet implemented. Again, given a large decrease in the average tobacco consumption, we cannot tell whether the decrease in the average tobacco consumption arose solely from the reduced incidence of positive tobacco expenditures.

crease in sales after the actual implementation of the policy, it would be far-fetched to argue that hoarding behavior is the major factor behind the tobacco consumption pattern observed in this section. This rather limited evidence of hoarding at the household level may be due to the fact that retailers also have an incentive to hoard. As consumers want to buy and stock up on tobacco products before the price increases, retailers also have an incentive to buy tobacco products at a low price and sell them after the mandated price increase.<sup>12</sup> This conflict of interest could account for the limited increase in the expenditure on tobacco products at the household level despite the expected price hike. Furthermore, a large discrepancy in the tobacco consumption rate across men and women in Korea could be a factor affecting the limited degree of changes in expenditures on tobacco products prior the implementation of the tobacco control policy. Specifically, approximately 36.2% of Korean adult males smoked whereas only 4.2% of the adult females smoked in Korea in 2013 (OECD, 2015). Thus, a house wife in Korea who has a slightly more bargaining power than her husband (Ham and Song, 2014) would have been likely to oppose increasing household expenditures on tobacco products. Specifically, given widespread knowledge of the negative effect of tobacco consumption on health, house wives would have urged their husbands to quit using tobacco in response to the announcement of the tobacco price hike.

More likely, the subsequent increase in the incidence of tobacco consump-

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<sup>12</sup>As the wholesale price of tobacco includes factory price and tobacco specific taxes, retailers can have a higher margin if they buy products before the tax hike and sell them after the retail price reflects the higher tax.

tion after the initial decrease may have arisen owing to the addictive nature of tobacco. In particular, it is well known that nicotine in tobacco products is one of the most addictive materials. Individuals who have continuously consumed tobacco products are highly likely to experience nicotine withdrawal symptoms which include craving for nicotine, if they discontinue their use of tobacco. Thus, quitting smoking and other types of nicotine consumption for a long time, i.e., at least more than eight to twelve weeks—is regarded as challenging. Although we cannot directly test whether this characteristics of tobacco caused the pattern found here, it likely contributed to the regained level of tobacco consumption toward the pre-policy level after the instant reduction despite the large increase in tobacco price.

## **6 Conclusion**

In this paper, we examine the effect of a tobacco control policy on the incidence and amount of tobacco consumption at the household level. In particular, we exploit the timing of tobacco control policy, which included the tobacco tax hike in January of 2015 in Korea and apply a regression discontinuity design to shed light on the causal effect of tobacco control policies. Our empirical results from the RDD specification show that the tobacco control policy had an instant negative impact on the incidence of tobacco consumption. Specifically, the policy led to a decrease in the probability of spending a positive amount on tobacco products by six percentage points. We also find that the tobacco control policy had a negative instant impact on real

expenditures, i.e. quantities consumed, on tobacco products.

We also employ an event-study type of framework to examine whether the impact of tobacco control policy caused by the tax hike persists over time. We find that the persistence of the effect of tobacco price increase depends on the household income level. In particular, we find that the impact of the tobacco tax hike is short-lived for households with relatively high income levels but that it lasts longer for low-income households. Specifically, the incidence of positive expenditure on tobacco and the amounts of real expenditures on tobacco recovered to their levels prior to the tax hike in the six months for high-income households. However, for low-income households, the impact found from the RDD specification persisted during the first year after the implementation although the initial magnitude eventually diminishes. Overall, our paper suggests that an increase in the price of tobacco is effective to curb the consumption of tobacco products, especially for low-income households. Furthermore, our work implies that to maintain the effect of the tobacco control policy for high-income households continuous increases in the tobacco price may be necessary.

## References

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105 (490):493–505.

- Adams, Scott, Chad D. Cotti, and Daniel M. Fuhrmann. 2013. "Smokeless Tobacco Use Following Smoking Bans in Bars." *Southern Economic Journal* 80 (1):147–161.
- Almond, Douglas and Joseph J. Doyle. 2011. "After Midnight: A Regression Discontinuity Design in Length of Postpartum Hospital Stays." *American Economic Journal: Economic Policy* 3 (3):1–34.
- Bartus, Tamás. 2005. "Estimation of marginal effects using `margeff`." *Stata Journal* 5 (3):309–329.
- Callison, Kevin and Robert Kaestner. 2014. "Do Higher Tobacco Taxes Reduce Adult Smoking? New Evidence Of The Effect Of Recent Cigarette Tax Increases On Adult Smoking." *Economic Inquiry* 52 (1):155–172.
- Cameron, Lisa and Jenny Williams. 2001. "Cannabis, Alcohol and Cigarettes: Substitutes or Complements?" *Economic Record* 77 (236):19–34.
- Carpenter, Christopher and Philip J. Cook. 2008. "Cigarette taxes and youth smoking: New evidence from national, state, and local Youth Risk Behavior Surveys." *Journal of Health Economics* 27 (2):287 – 299.
- Chaloupka, Frank and Kenneth E. Warner. 2000. "The economics of smoking." In *Handbook of Health Economics*, vol. 1, edited by A. J. Culyer and J. P. Newhouse, chap. 29. Elsevier, 1 ed., 1539–1627.
- Chaloupka, Frank J., John A. Tauras, and Michael Grossman. 1997. "Public Policy and Youth Smokeless Tobacco Use." *Southern Economic Journal* 64 (2):503–516.

- Chen, Yihsu and Alexander Whalley. 2012. "Green Infrastructure: The Effects of Urban Rail Transit on Air Quality." *American Economic Journal: Economic Policy* 4 (1):58–97.
- Coady, Micaela H., Christina A. Chan, Rachel Sacks, Ijeoma G. Mbamalu, and Susan M. Kansagra. 2013. "The impact of cigarette excise tax increases on purchasing behaviors among New York city smokers." *American journal of public health* 103 (6):e54–e60.
- Cohodes, Sarah R. and Joshua S. Goodman. 2014. "Merit Aid, College Quality, and College Completion: Massachusetts' Adams Scholarship as an In-Kind Subsidy." *American Economic Journal: Applied Economics* 6 (4):251–85.
- Colman, Gregory J. and Dahlia K. Remler. 2008. "Vertical equity consequences of very high cigarette tax increases: If the poor are the ones smoking, how could cigarette tax increases be progressive?" *Journal of Policy Analysis and Management* 27 (2):376–400.
- Currie, Janet and Brigitte C. Madrian. 1999. "Health, health insurance and the labor market." In *Handbook of Labor Economics, Handbook of Labor Economics*, vol. 3, edited by O. Ashenfelter and D. Card, chap. 50. Elsevier, 3309–3416.
- Davis, Lucas W. 2008. "The Effect of Driving Restrictions on Air Quality in Mexico City." *Journal of Political Economy* 116 (1):38–81.
- DeCicca, Philip, Don Kenkel, and Alan Mathios. 2008. "Cigarette taxes and

- the transition from youth to adult smoking: Smoking initiation, cessation, and participation.” *Journal of Health Economics* 27 (4):904 – 917.
- DeCicca, Philip, Donald Kenkel, and Feng Liu. 2013. “Who Pays Cigarette Taxes? The Impact of Consumer Price Search.” *The Review of Economics and Statistics* 95 (2):516–529.
- DeCicca, Philip and Logan McLeod. 2008. “Cigarette taxes and older adult smoking: Evidence from recent large tax increases.” *Journal of Health Economics* 27 (4):918 – 929.
- Decker, Sandra L. and Amy Ellen Schwartz. 2000. “Cigarettes and Alcohol: Substitutes or Complements?” Working Paper 7535, National Bureau of Economic Research.
- Ettner, Susan L., Richard G. Frank, and Ronald C. Kessler. 1997. “The Impact of psychiatric disorders on labor market outcomes.” *Industrial and Labor Relations Review* 51 (1):64–81.
- Farrelly, Matthew C., Jeremy W. Bray, Terry Pechacek, and Trevor Woollery. 2001. “Response by Adults to Increases in Cigarette Prices by Sociodemographic Characteristics.” *Southern Economic Journal* 68 (1):156–165.
- Galbraith, John W. and Murray Kaiserman. 1997. “Taxation, smuggling and demand for cigarettes in Canada: Evidence from time-series data.” *Journal of Health Economics* 16 (3):287–301.
- Gruber, Jonathan, Anindya Sen, and Mark Stabile. 2003. “Estimating price

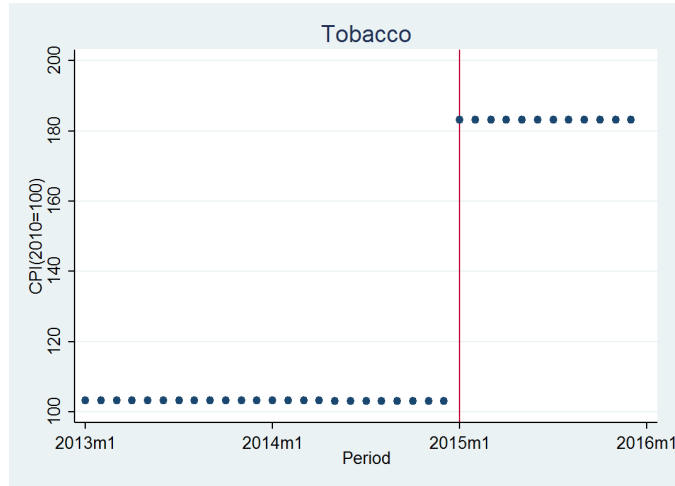
- elasticities when there is smuggling: the sensitivity of smoking to price in Canada.” *Journal of Health Economics* 22 (5):821–842.
- Hahn, Jinyong, Petra Todd, and Wilbert Van der Klaauw. 2001. “Identification and estimation of treatment effects with a regression-discontinuity design.” *Econometrica* 69 (1):201–209.
- Ham, John C. and Heonjae Song. 2014. “The determinants of bargaining power in an empirical model of transfers between adult children, parents, and in-laws for South Korea.” *Journal of Development Economics* 109:73 – 86.
- Harding, Matthew, Ephraim Leibtag, and Michael F. Lovenheim. 2012. “The Heterogeneous Geographic and Socioeconomic Incidence of Cigarette Taxes: Evidence from Nielsen Homescan Data.” *American Economic Journal: Economic Policy* 4 (4):169–98.
- Imbens, Guido W. and Thomas Lemieux. 2008. “Regression discontinuity designs: A guide to practice.” *Journal of Econometrics* 142 (2):615–635.
- International Agency for Research on Cancer. 2011. *IARC Handbooks of Cancer Prevention, Tobacco Control, Volume 14: Effectiveness of Tax and Price Policies in Tobacco Control*. Lyon, France: International Agency for Research on Cancer.
- Joossens, Luk and Martin Raw. 1998. “Cigarette smuggling in Europe: who really benefits?” *Tobacco Control* 7 (1):66–71.



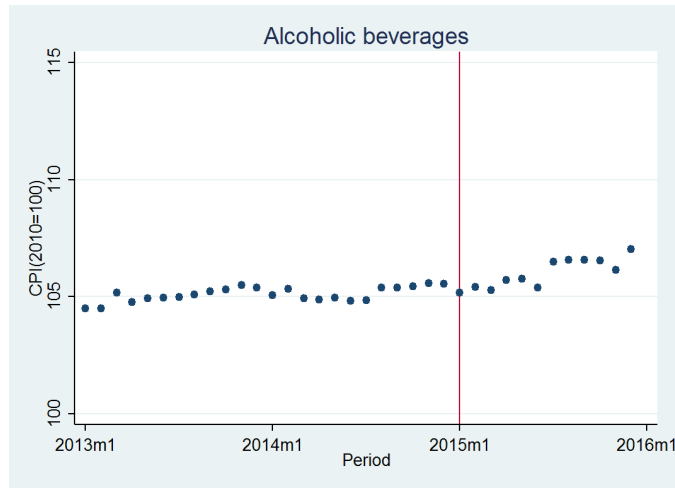
- Korea Taxpayers Association. 2015. "Expected tobacco tax revenue this year is 11.0489 trillion KRW." URL <http://www.koreatax.org/taxboard/bbs/tb.php/outboard2/1892>.
- Kostova, Deliana and Dhaval Dave. 2015. "Smokeless tobacco use in India: Role of prices and advertising." *Social Science & Medicine* 138:82 – 90.
- Lockwood, Ben and Giuseppe Migali. 2009. "Did The Single Market Cause Competition in Excise Taxes? Evidence From EU Countries." *The Economic Journal* 119 (536):406–429.
- Lovenheim, Michael F. 2008. "How Far to the Border?: The Extent and Impact of Cross-Border Casual Cigarette Smuggling." *National Tax Journal* 61 (1):7–33.
- Lundborg, Petter, Anton Nilsson, and Dan-Olof Rooth. 2014. "Adolescent health and adult labor market outcomes." *Journal of Health Economics* 37 (C):25–40.
- Nesson, Erik. 2015. "Heterogeneity in Smokers' Responses to Tobacco Control Policies." *Health Economics* :n/a–n/a.
- Nonnemaker, James M. and Matthew C. Farrelly. 2011. "Smoking initiation among youth: The role of cigarette excise taxes and prices by race/ethnicity and gender." *Journal of Health Economics* 30 (3):560–567.
- OECD. 2015. *Health at a Glance 2015: OECD Indicators*. OECD Publishing.

- Ohsfeldt, Robert L. and Raymond G. Boyle. 1994. "Tobacco Excise Taxes and Rates of Smokeless Tobacco Use in the US: An Exploratory Ecological Analysis." *Tobacco Control* 3 (4):316–323.
- Ohsfeldt, Robert L., Raymond G. Boyle, and Eli Capilouto. 1997. "Letter: Effects of tobacco excise taxes on the use of smokeless tobacco products in the USA." *Health Economics* 6 (5):525–531.
- Ouellet, Jean-François, Mariachiara Restuccia, Alexandre Tellier, and Caroline Lacroix. 2010. "The Impact of Cigarette Tax Reduction on Consumption Behavior: Short-and Long-Term Empirical Evidence From Canada." CIRANO Working Papers 2010s-25, CIRANO.
- Piano, Mariann R., Neal L. Benowitz, Garret A. FitzGerald, Susan Corbridge, Janie Heath, Ellen Hahn, Terry F. Pechacek, George Howard, and on behalf of the American Heart Association Council on Cardiovascular Nursing. 2010. "Impact of Smokeless Tobacco Products on Cardiovascular Disease: Implications for Policy, Prevention, and Treatment: A Policy Statement From the American Heart Association." *Circulation* 122 (15):1520–1544.
- Sen, Anindya, Ariizumi Hideki, and Driambe Daciana. 2010. "Do Changes In Cigarette Taxes Impact Youth Smoking? Evidence from Canadian Provinces." *Forum for Health Economics & Policy* 13 (2):1–25.
- Siahpush, Mohammad, Melanie A. Wakefield, Matt J. Spittal, Sarah J. Durkin, and Michelle M. Scollo. 2009. "Taxation Reduces Social Dispari-

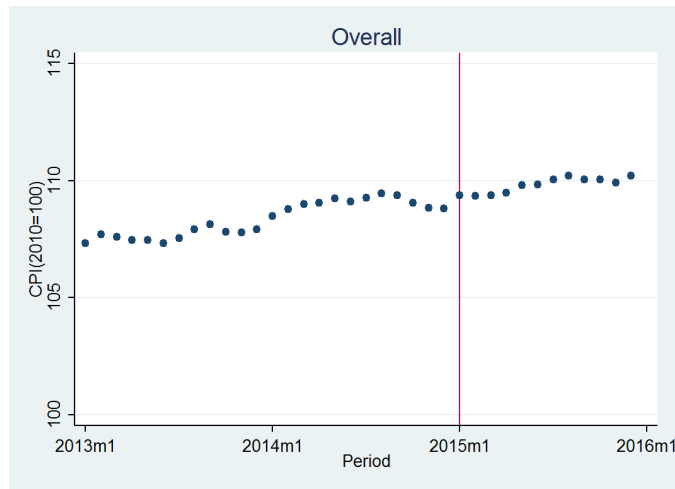
- ties in Adult Smoking Prevalence.” *American Journal of Preventive Medicine* 36 (4):285 – 291.
- Tauchmann, Harald, Silja Lenz, Till Requate, and Christoph M. Schmidt. 2013. “Tobacco and alcohol: complements or substitutes?” *Empirical Economics* 45 (1):539–566.
- Townsend, J, P Roderick, and J Cooper. 1994. “Cigarette smoking by socioeconomic group, sex, and age: effects of price, income, and health publicity.” *BMJ* 309 (6959):923–927.
- U.S. Department of Health and Human Services. 2014. *The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- World Health Organization., & Research for International Tobacco Control. 2008. *WHO report on the global tobacco epidemic, 2008: The MPOWER package*. Geneva: World Health Organization.
- Yu, Xiaohua and David Abler. 2010. “Interactions between cigarette and alcohol consumption in rural China.” *The European Journal of Health Economics* 11 (2):151–160.



(a) Tobacco Products

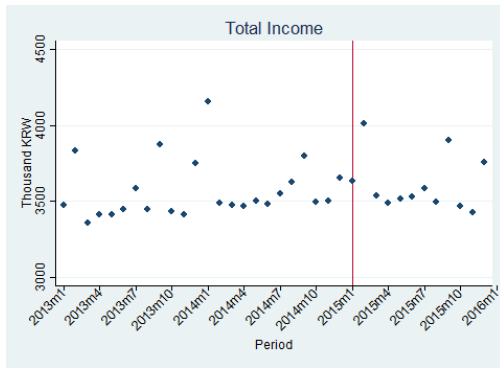


(b) Alcoholic Beverages

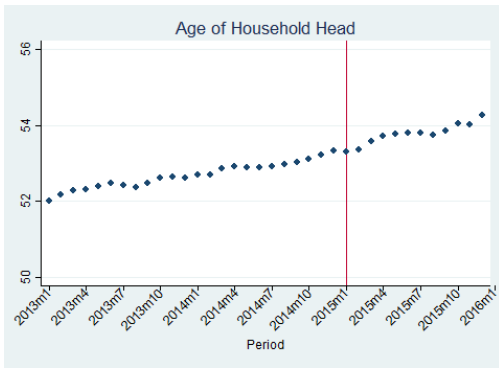


(c) Overall

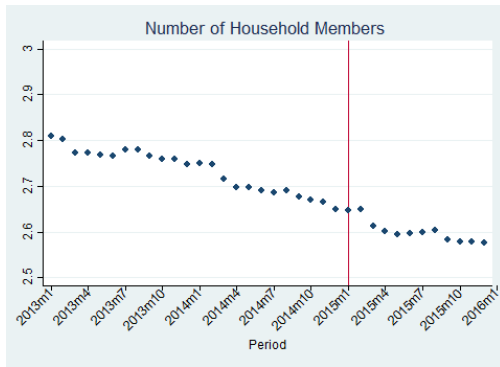
Figure 1: Consumer Price Index, 2013-2015  
 Source: Economic Statistics System, <http://ecos.bok.or.kr/>



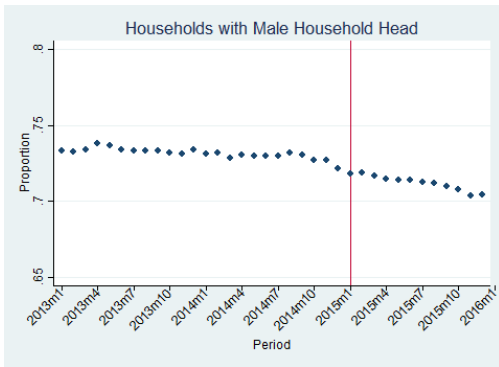
(a) Monthly Household Income



(b) Age of Head of Household



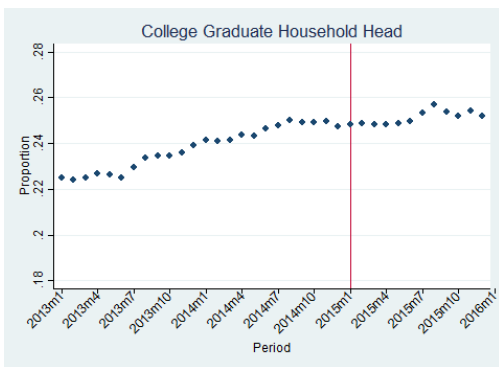
(c) Number of Household Members



(d) Male Household Head

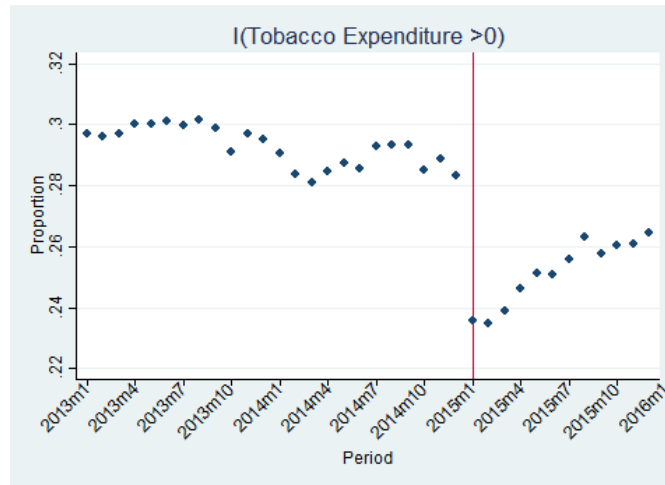


(e) Have a Spouse

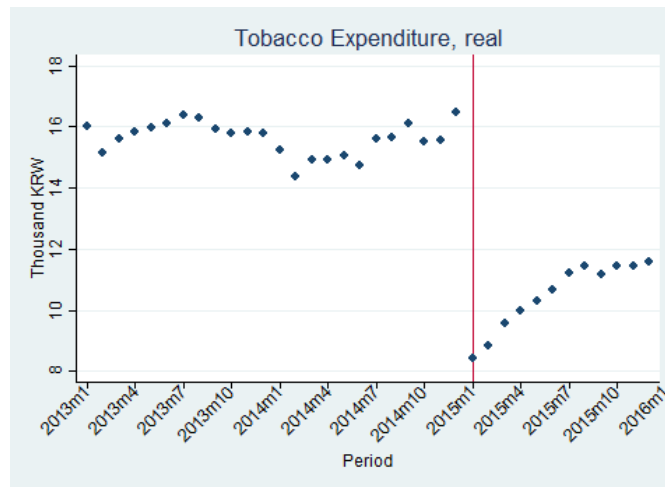


(f) College Graduate Head of Household

Figure 2: Smoothness of Household Characteristics, 2013-2015  
 Source: Authors' calculations from Household Income & Expenditure Survey



(a) Proportion of households with a Positive Spending on Tobacco Products



(b) Average Monthly Real Expenditure on Tobacco Products

Figure 3: Household Tobacco Expenditures, 2013-2015

Source: Authors' calculations from Household Income & Expenditure Survey

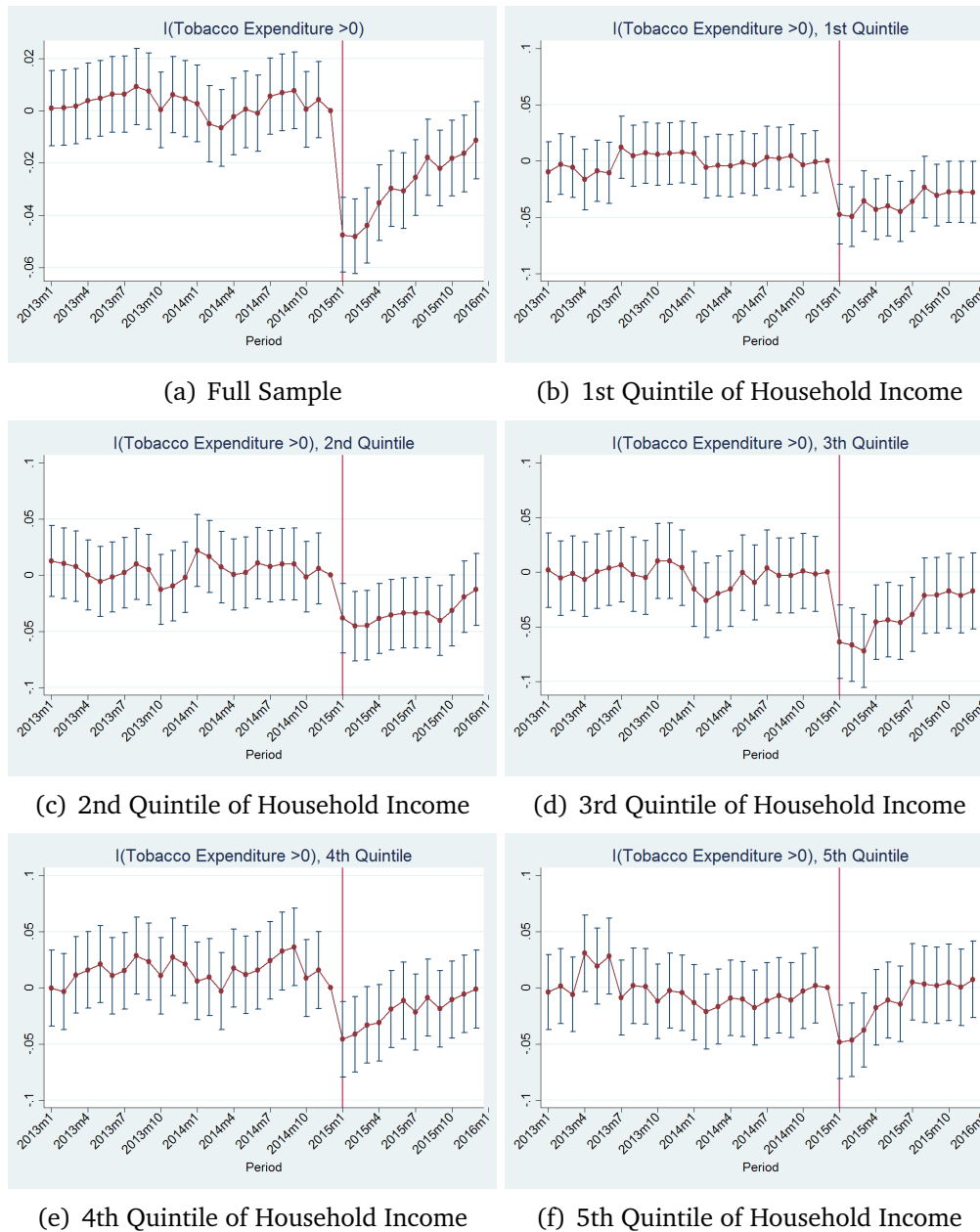


Figure 4: Evolution of the Impact of the Tobacco Control Policy on the Incidence of Positive Tobacco Expenditures, Probit

Source: Authors' calculations from Household Income & Expenditure Survey

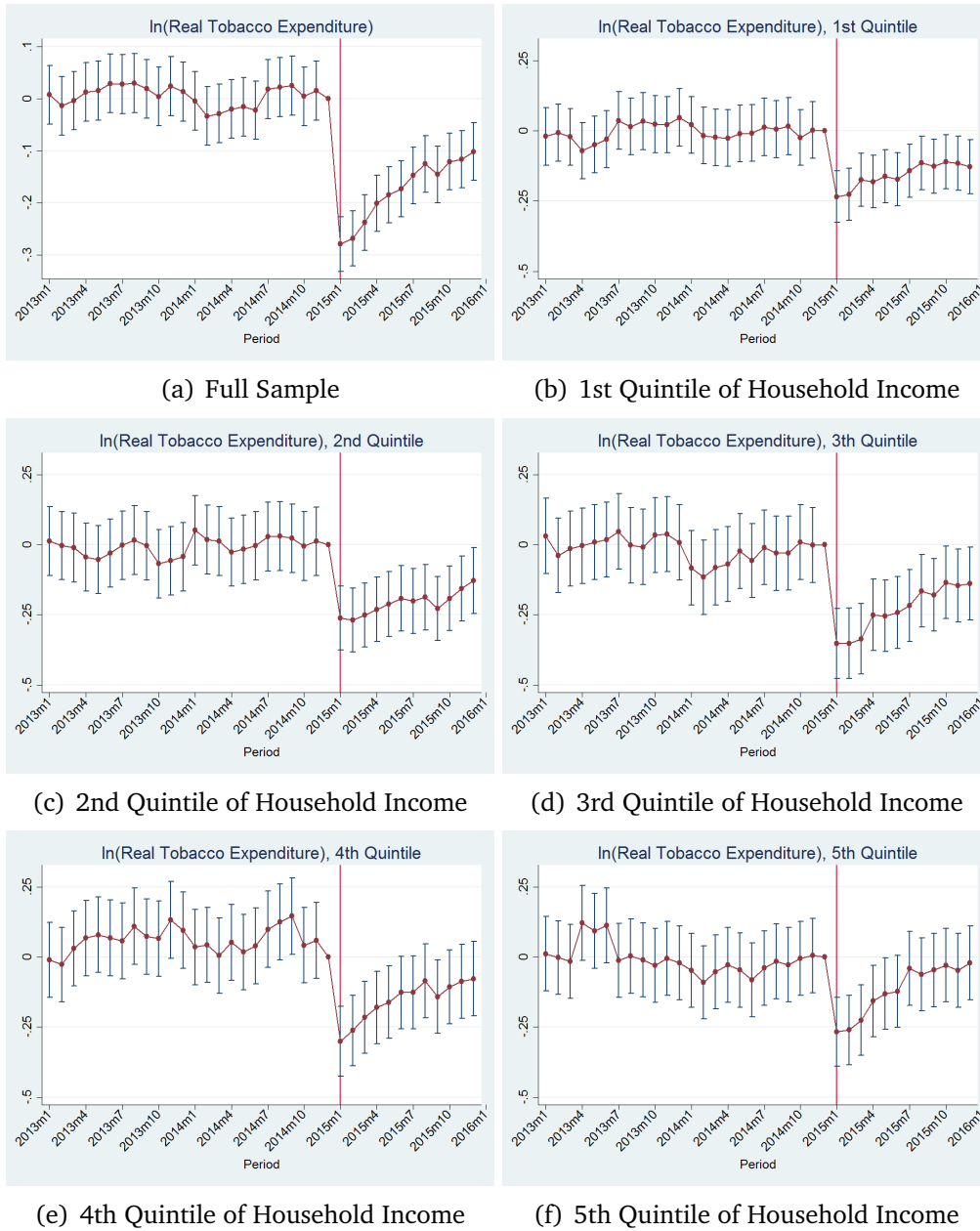


Figure 5: Evolution of the Impact of the Tobacco Control Policy on Real Tobacco Expenditures, OLS

Source: Authors' calculations from Household Income & Expenditure Survey



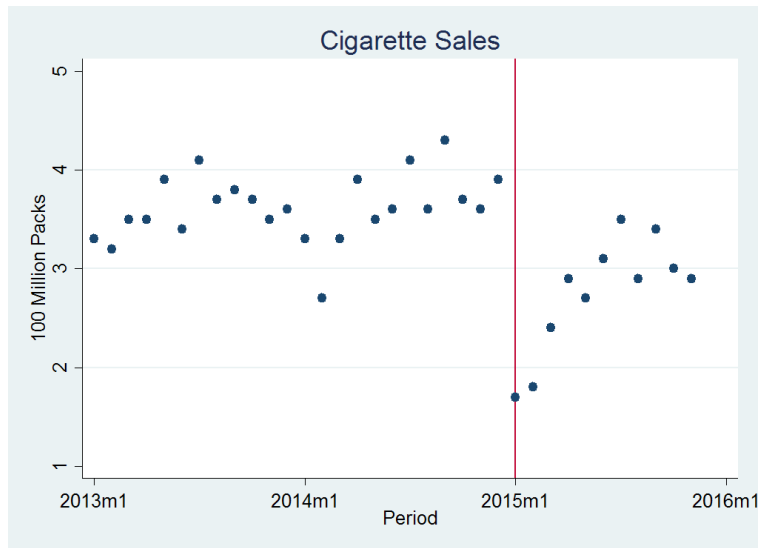


Figure 6: Cigarette Sales, 2013-2015

Source: Korea Taxpayers Association (2015)

Table 1: Summary Statistics

	Full Sample		Before Tobacco Tax Hike		After Tobacco Tax Hike	
	Mean (1)	SD (2)	Mean (3)	SD (4)	Mean (5)	SD (6)
I(Tobacco Expenditure >0 )	.279	( .45)	.293	( .46)	.252	( .43)
Expenditure on Tobacco Products (Real)	14	( 29)	15.6	( 32)	10.5	( 24)
Total Monthly Income	3583	( 3091)	3569	( 3056)	3613	( 3163)
Age of Household Head	53	( 14)	52.7	( 14)	53.8	( 15)
Number of Household Members	2.69	( 1.2)	2.73	( 1.2)	2.6	( 1.2)
Number of Males in Household	1.27	( .85)	1.29	( .85)	1.21	( .84)
Number of Seniors in Household	.41	( .68)	.402	( .67)	.428	( .69)
Male Household Head	.725	( .45)	.731	( .44)	.712	( .45)
Have Spouse	.735	( .44)	.746	( .44)	.711	( .45)
College graduate Household Head	.242	( .43)	.238	( .43)	.251	( .43)
Urban Residence	.788	( .41)	.789	( .41)	.785	( .41)
N	N=238405		N=160676		N=77729	

Odd number of columns report the mean level of the variable indicated in the row heading and the sample indicated in the column heading. Even number of columns report the standard deviation of the variable indicated in the row heading and the sample indicated in the column heading. The numbers in the last row present the number of observations in the sample indicated in the column heading. All monetary units are nominal, thousand KRW, unless specified. Expenditure on Tobacco Products (Real) is expressed in constant 2010 Korean Won (KRW).

Source: Authors' calculations from Household Income & Expenditure Survey

Table 2: Effect of Tobacco Control Policy on Household Tobacco Expenditures, Regression Discontinuity Design, Full sample, 2013-2015

Dependent Variable	I(Tobacco Expenditure>0)				Real Tobacco Expenditure, in logs	
	OLS (1)	OLS (2)	Probit (3)	Probit (4)	OLS (5)	OLS (6)
<i>TCP</i>	-.06*** (.0051)	-.0594*** (.0049)	-.0599*** (.005)	-.0598*** (.0049)	-.348*** (.0194)	-.346*** (.0191)
Controls	No	Yes	No	Yes	No	Yes
Mean of dependent var.	.279	.279	.279	.279	14	14
N	238405	238405	238405	238405	238405	238405

*TCP* is an indicator variable taking the value equal to one for all periods after the tax on tobacco increased on January 2015 and taking zero otherwise. Each column reports the result from one regression with controls for a third-order polynomial time trend. Columns (1)-(2) and (5)-(6) report the estimates from Equation (1) using OLS, and Columns (3) and (4) report the average marginal effects based on the estimates from the probit model. Even-numbered columns additionally include household characteristics: the age of head of household and its square, the number of household members and its square, the number of males in the household and its square, the number of senior citizens in the household and its square, the existence of children in the household, and the logarithm of household income, the gender of head of household and their marital status, education level and occupation. For columns (5)-(6), we take a natural logarithm of real expenditure on tobacco products. We report the mean of dependent variables, which is not in logs. Standard errors in parentheses are clustered at month level.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Authors' calculations from Household Income & Expenditure Survey

Table 3: Robustness Checks for RDD Results

Dependent Variable	I(Tobacco Expenditure>0)				Real Tobacco Expenditure, in logs	
	OLS (1)	OLS (2)	Probit (3)	Probit (4)	OLS (5)	OLS (6)
<b>Panel A: Imaginary Tax hike in January 2014</b>						
<i>TCP</i>	-8.2e-04 (.0038)	-3.1e-04 (.0042)	-7.9e-04 (.0038)	3.8e-04 (.0043)	-.0081 (.0134)	-.0093 (.0144)
Controls	No	Yes	No	Yes	No	Yes
Mean of dependent var.	.3005	.3005	.3005	.3006	16.03	16.03
N	243419	243419	243419	243351	243419	243419
<b>Panel B: Four-Month Donut Hole</b>						
<i>TCP</i>	-.0786*** (.0056)	-.0779*** (.0056)	-.0781*** (.0054)	-.0781*** (.0053)	-.4162*** (.0213)	-.4164*** (.0201)
Controls	No	Yes	No	Yes	No	Yes
Mean of dependent var.	.2805	.2805	.2805	.2805	14.04	14.04
N	225283	225283	225283	225283	225283	225283
<b>Panel C: Alternative Window (2014-2015)</b>						
<i>TCP</i>	-.0523*** (.004)	-.0524*** (.0041)	-.0523*** (.0039)	-.0525*** (.0041)	-.3155*** (.0132)	-.3164*** (.0145)
Controls	No	Yes	No	Yes	No	Yes
Mean of dependent var.	.2697	.2697	.2697	.2697	12.95	12.95
N	156787	156787	156787	156787	156787	156787
<b>Panel D: Alternative Splines</b>						
Linear	-.0518*** (.0024)	-.0521*** (.0022)	-.0516*** (.0024)	-.0524*** (.0022)	-.2799*** (.0127)	-.2816*** (.0117)
Quadratic	-.0584*** (.0036)	-.0575*** (.0034)	-.0582*** (.0035)	-.0571*** (.0032)	-.3252*** (.0113)	-.322*** (.0111)
Quartic	-.0456*** (.0033)	-.0459*** (.0035)	-.0459*** (.0033)	-.0468*** (.0035)	-.2998*** (.0131)	-.3002*** (.0138)
Controls	No	Yes	No	Yes	No	Yes
Mean of dependent var.	.2794	.2794	.2794	.2794	13.96	13.96
N	238405	238405	238405	238405	238405	238405

*TCP* is an indicator variable taking the value equal to one for all periods after the tax on tobacco increased on January 2015 and taking zero otherwise. Each column reports the result from one regression with controls for a third-order polynomial time trend. Columns (1)-(2) and (5)-(6) report the estimates from Equation (1) using OLS, and Columns (3) and (4) report the average marginal effects based on the estimates from the probit model. Even-numbered columns additionally include household characteristics: the age of head of household and its square, the number of household members and its square, the number of males in the household and its square, the number of senior citizens in the household and its square, the existence of children in the household, and the logarithm of household income, the gender of head of household and their marital status, education level and occupation. For columns (5)-(6), we take a natural logarithm of real expenditure on tobacco products. The estimates reported in Panel D are the coefficients of *TCP*. Standard errors in parentheses are clustered at month level.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Authors' calculations from Household Income & Expenditure Survey

Table 4: Evolution of the Impact of the Tobacco Control Policy on Household Tobacco Expenditures, Full Sample

Dependent Variable	I(Tobacco Expenditure>0)		Real Tobacco
	OLS	Probit	Expenditure, in logs
Model	(1)	(2)	OLS
	(1)	(2)	(3)
Jan-13	.0017(.0074)	9.9e-04(.0073)	.0069(.0288)
Feb-13	.0018(.0074)	.0011(.0073)	-.0142(.0285)
Mar-13	.0023(.0074)	.0017(.0074)	-.0042(.0286)
Apr-13	.0046(.0074)	.0038(.0074)	.0126(.0288)
May-13	.0055(.0074)	.0047(.0074)	.0149(.0288)
Jun-13	.0068(.0074)	.0062(.0074)	.029(.0288)
Jul-13	.0065(.0074)	.0063(.0074)	.0275(.0289)
Aug-13	.0095(.0075)	.0093(.0074)	.0293(.0289)
Sep-13	.0075(.0074)	.0075(.0074)	.0185(.0288)
Oct-13	3.5e-04(.0074)	3.5e-04(.0074)	.0038(.0287)
Nov-13	.0065(.0075)	.0061(.0074)	.0239(.0289)
Dec-13	.0045(.0075)	.0046(.0075)	.0133(.0289)
Jan-14	.0021(.0075)	.0027(.0075)	-.0047(.0288)
Feb-14	-.0052(.0074)	-.0049(.0074)	-.0335(.0286)
Mar-14	-.0067(.0074)	-.0066(.0074)	-.0289(.0288)
Apr-14	-.0025(.0075)	-.0022(.0075)	-.0201(.0288)
May-14	4.0e-04(.0075)	5.6e-04(.0075)	-.0159(.0287)
Jun-14	-1.0e-03(.0075)	-9.2e-04(.0074)	-.0225(.0286)
Jul-14	.0057(.0075)	.0056(.0075)	.0176(.0289)
Aug-14	.0071(.0075)	.007(.0075)	.0219(.0288)
Sep-14	.0077(.0074)	.0077(.0074)	.0248(.0288)
Oct-14	5.0e-04(.0074)	4.8e-04(.0074)	.0041(.0287)
Nov-14	.0045(.0074)	.0042(.0074)	.015(.0288)
Dec-14	-	-	-
Jan-15	-.0471***(.0073)	-.0474***(.0073)	-.2794***(.0267)
Feb-15	-.0475***(.0072)	-.048***(.0073)	-.2686***(.0268)
Mar-15	-.0437***(.0073)	-.0438***(.0073)	-.2379***(.0271)
Apr-15	-.035***(.0073)	-.0352***(.0074)	-.201***(.0274)
May-15	-.0295***(.0073)	-.0297***(.0074)	-.1848***(.0274)
Jun-15	-.03***(.0073)	-.0305***(.0073)	-.173***(.0275)
Jul-15	-.0247***(.0073)	-.0255***(.0074)	-.1475***(.0277)
Aug-15	-.017**(.0074)	-.0178**(.0074)	-.1255***(.0278)
Sep-15	-.0215***(.0074)	-.0219***(.0074)	-.1456***(.0277)
Oct-15	-.0178**(.0073)	-.0181**(.0074)	-.121***(.0278)
Nov-15	-.0159**(.0074)	-.0163**(.0075)	-.1165***(.0279)
Dec-15	-.0116(.0074)	-.0113(.0075)	-.1017***(.028)
Controls	Yes	Yes	Yes
Mean of dependent var.	.2794	.2794	13.96
N	238405	238405	238405

Columns (1) and (3) report the coefficients of time-fixed effect for the month indicated in the row heading which are estimated from equation (2) with an outcome variable indicated in the column heading using OLS. Column (2) reports the average marginal effects of each time dummy variable estimated using a probit model. All columns include household characteristics included for the even-numbered columns in Table 2. White-Huber standard errors are in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Authors' calculations from Household Income & Expenditure Survey

# Appendix A

Please see Tables A.1-A.4

Table A.1: Changes of Taxes on Tobacco Products

	Individual Consumption Tax		Tobacco Consumption Tax		Local Education Tax		National Health Promotion Fund	
	Before (1)	After (2)	Before (3)	After (4)	Before (5)	After (6)	Before (7)	After (8)
Smoking Tobacco								
Cigarettes (KRW/Pack)	-	594	641	1007	320.5	443.0	354	841
Pipe Tobacco (KRW/g)	-	21	23	36	11.5	15.8	12.7	30.2
Cigars (KRW/g)	-	61	65.4	103	32.7	45.3	36.1	85.8
Cut Tobacco (KRW/g)	-	21	23	36	11.5	15.8	12.7	30.2
Electronic Tobacco (KRW/ml)	-	370	400	628	200	276.3	221	525
Water pipe Tobacco (KRW/g)	-	422	455	715	227.5	314.5	442	1050.1
Chewing Tobacco (KRW/g)	-	215	26.2	364	13.1	160.1	14.5	34.4
Snuffing Tobacco (KRW/g)	-	15	16.4	26	8.2	11.4	9	21.4
Dipping Tobacco (KRW/g)	-	215	232	364	116	160.1	225	534.5

Local education tax has been modified from 50% to 43.99% of tobacco consumption tax, and the amount of tax per unit shown in the table is calculated accordingly.

One pack contains 20 cigarettes.

Tax on electronic tobacco is based on the milliliters of nicotine solution used in the product.

Table A.2: Evolution of the Impact of Tobacco Control Policy on the Incidence of Positive Tobacco Expenditures by Household Income Quintile, OLS, 2013-2015

Dependent Variable: I(Tobacco Expenditure>0)					
Sample	1st Quintile (1)	2nd Quintile (2)	3rd Quintile (3)	4th Quintile (4)	5th Quintile (5)
Jan-13	-.0066 (.0142)	.0119 (.0163)	.0026 (.0175)	-6.0e-04 (.0174)	-.0038 (.017)
Feb-13	4.1e-04 (.0142)	.0102 (.0162)	-.0053 (.0175)	-.0039 (.0173)	.0017 (.017)
Mar-13	-.0025 (.0142)	.0062 (.0162)	-.0018 (.0176)	.0111 (.0175)	-.0061 (.0171)
Apr-13	-.0156 (.014)	-.0014 (.0162)	-.0057 (.0176)	.016 (.0174)	.031* (.0174)
May-13	-.0089 (.0141)	-.0062 (.0162)	.0025 (.0175)	.0205 (.0175)	.0196 (.0173)
Jun-13	-.0099 (.0141)	-.0022 (.0162)	.005 (.0175)	.0106 (.0174)	.028 (.0173)
Jul-13	.0129 (.0143)	.0023 (.0161)	.0075 (.0176)	.0144 (.0175)	-.0089 (.0171)
Aug-13	.0072 (.0141)	.01 (.0162)	-.0023 (.0175)	.0279 (.0176)	.0013 (.0172)
Sep-13	.0108 (.0141)	.0037 (.0162)	-.0052 (.0175)	.0225 (.0176)	4.8e-04 (.0171)
Oct-13	.0073 (.0141)	-.0137 (.0161)	.0104 (.0175)	.0106 (.0174)	-.0126 (.017)
Nov-13	.0096 (.0141)	-.0099 (.0162)	.0097 (.0176)	.0273 (.0176)	-.003 (.0172)
Dec-13	.0095 (.0141)	-.0031 (.0163)	.0038 (.0176)	.0207 (.0176)	-.005 (.0172)
Jan-14	.0099 (.0142)	.0197 (.0165)	-.0157 (.0176)	.0059 (.0175)	-.0137 (.017)
Feb-14	-.0029 (.0141)	.015 (.0164)	-.0263 (.0175)	.0097 (.0175)	-.0222 (.017)
Mar-14	-.0017 (.0141)	.0072 (.0163)	-.0199 (.0176)	-.0029 (.0174)	-.017 (.0171)
Apr-14	-.0024 (.0141)	-3.7e-04 (.0162)	-.0156 (.0176)	.0161 (.0177)	-.0094 (.0173)
May-14	7.4e-04 (.0141)	.0017 (.0162)	-8.3e-04 (.0176)	.0097 (.0176)	-.01 (.0172)
Jun-14	-.0015 (.0141)	.0094 (.0163)	-.0083 (.0175)	.0138 (.0176)	-.0179 (.0171)
Jul-14	.0054 (.0142)	.0064 (.0162)	.0039 (.0176)	.0245 (.0176)	-.0114 (.0172)
Aug-14	.0047 (.0142)	.0081 (.0161)	-.0027 (.0175)	.0322* (.0177)	-.007 (.0172)
Sep-14	.0069 (.0142)	.0075 (.0162)	-.0024 (.0174)	.0363** (.0176)	-.0114 (.0171)
Oct-14	-.0032 (.0141)	-.0025 (.016)	.0011 (.0175)	.0082 (.0174)	-.0024 (.0171)
Nov-14	6.3e-04 (.0141)	.0053 (.0161)	-.0016 (.0175)	.0154 (.0175)	.0024 (.0172)
Dec-14	-	-	-	-	-
Jan-15	-.0451*** (.0135)	-.0394** (.0159)	-.0633*** (.0171)	-.0461*** (.0171)	-.0479*** (.0167)
Feb-15	-.0476*** (.0135)	-.0457*** (.0157)	-.0658*** (.0171)	-.042** (.0171)	-.0464*** (.0167)
Mar-15	-.0347** (.0137)	-.0445*** (.0157)	-.0704*** (.017)	-.0342** (.0173)	-.038** (.0169)
Apr-15	-.0402*** (.0135)	-.0386** (.0158)	-.0461*** (.0173)	-.0317* (.0173)	-.018 (.0172)
May-15	-.0365*** (.0135)	-.0362** (.0158)	-.044** (.0172)	-.0196 (.0174)	-.0116 (.0172)
Jun-15	-.0411*** (.0134)	-.0341** (.0158)	-.0463*** (.0172)	-.0117 (.0174)	-.0149 (.0171)
Jul-15	-.0313** (.0135)	-.0339** (.0158)	-.039** (.0173)	-.0207 (.0173)	.0041 (.0174)
Aug-15	-.02 (.0137)	-.033** (.0158)	-.0224 (.0175)	-.0087 (.0175)	.0027 (.0174)
Sep-15	-.0278** (.0136)	-.0394** (.0157)	-.0224 (.0175)	-.019 (.0175)	.0015 (.0173)
Oct-15	-.0237* (.0136)	-.032** (.0157)	-.0177 (.0174)	-.0117 (.0175)	.0047 (.0173)
Nov-15	-.0238* (.0136)	-.0208 (.0159)	-.0213 (.0174)	-.006 (.0176)	1.6e-04 (.0174)
Dec-15	-.0258* (.0137)	-.0141 (.016)	-.0186 (.0175)	-.0027 (.0177)	.0073 (.0174)
Controls	Yes	Yes	Yes	Yes	Yes
Mean	.1858	.2758	.327	.3185	.2895
N	47647	47671	47714	47685	47688

The main entries in all columns report the coefficients on time-fixed effect for the month indicated in the row heading which are estimated from equation (2) using OLS based on the sample indicated in column heading. All columns include household characteristics included for the even-numbered columns in Table 2. The row with "Mean" heading reports the average proportion of households with positive tobacco expenditure levels in the sample indicated in the column heading. White-Huber standard errors are in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Authors' calculations from Household Income & Expenditure Survey



Table A.3: Evolution of the Impact of Tobacco Control Policy on the Incidence of Positive Tobacco Expenditures by Household Income Quintile, Probit, 2013-2015

Dependent Variable: I(Tobacco Expenditure>0)					
Sample	1st Quintile (1)	2nd Quintile (2)	3rd Quintile (3)	4th Quintile (4)	5th Quintile (5)
Jan-13	-.0095 (.0137)	.0125 (.0161)	.0019 (.0174)	-1.4e-04 (.0173)	-.004 (.017)
Feb-13	-.0029 (.0137)	.0106 (.016)	-.0055 (.0173)	-.0033 (.0172)	.0016 (.017)
Mar-13	-.0056 (.0138)	.0077 (.016)	-9.9e-04 (.0174)	.0114 (.0174)	-.0059 (.017)
Apr-13	-.0165 (.0137)	-3.4e-05 (.0159)	-.0066 (.0174)	.0159 (.0174)	.0307* (.0173)
May-13	-.0088 (.0139)	-.0057 (.0158)	8.5e-04 (.0174)	.021 (.0175)	.0193 (.0172)
Jun-13	-.0107 (.0138)	-.0017 (.0159)	.0037 (.0174)	.0107 (.0174)	.028 (.0172)
Jul-13	.012 (.0141)	.0022 (.016)	.0067 (.0174)	.015 (.0174)	-.0087 (.017)
Aug-13	.0045 (.0139)	.0099 (.0161)	-.002 (.0174)	.0286 (.0176)	.0018 (.0172)
Sep-13	.0074 (.0139)	.0048 (.0161)	-.0049 (.0173)	.0233 (.0175)	.0012 (.0171)
Oct-13	.006 (.014)	-.0127 (.0159)	.0104 (.0175)	.0106 (.0174)	-.0121 (.017)
Nov-13	.0067 (.014)	-.0095 (.0159)	.0104 (.0176)	.0274 (.0176)	-.0026 (.0171)
Dec-13	.0079 (.0141)	-.0019 (.0161)	.0042 (.0176)	.021 (.0176)	-.0045 (.0171)
Jan-14	.0067 (.014)	.0219 (.0164)	-.0153 (.0175)	.0061 (.0175)	-.0131 (.0171)
Feb-14	-.0056 (.0138)	.0167 (.0164)	-.0258 (.0174)	.0095 (.0175)	-.0214 (.017)
Mar-14	-.0037 (.014)	.0072 (.0162)	-.0193 (.0175)	-.003 (.0174)	-.0168 (.0171)
Apr-14	-.0045 (.0141)	5.1e-04 (.0162)	-.0151 (.0175)	.0173 (.0177)	-.009 (.0172)
May-14	-.0011 (.0141)	.0024 (.0162)	-4.8e-04 (.0176)	.0116 (.0176)	-.0102 (.0171)
Jun-14	-.0033 (.0141)	.0106 (.0163)	-.0093 (.0174)	.0156 (.0176)	-.0178 (.017)
Jul-14	.0033 (.0142)	.0077 (.0162)	.004 (.0175)	.0244 (.0176)	-.0112 (.0171)
Aug-14	.0021 (.0141)	.0097 (.0163)	-.003 (.0175)	.0327* (.0177)	-.0068 (.0171)
Sep-14	.0047 (.0141)	.0099 (.0163)	-.003 (.0174)	.0363** (.0176)	-.011 (.017)
Oct-14	-.0036 (.0141)	-.0016 (.016)	.0011 (.0175)	.0086 (.0174)	-.0028 (.017)
Nov-14	-7.6e-04 (.0141)	.0059 (.0161)	-.0017 (.0175)	.0156 (.0175)	.0021 (.0171)
Dec-14	-	-	-	-	-
Jan-15	-.0474*** (.0135)	-.0384** (.0159)	-.0637*** (.0171)	-.0458*** (.0171)	-.0482*** (.0167)
Feb-15	-.0495*** (.0135)	-.0455*** (.0157)	-.0663*** (.017)	-.0414** (.0171)	-.0465*** (.0167)
Mar-15	-.0357*** (.0137)	-.0448*** (.0158)	-.072*** (.017)	-.0331* (.0173)	-.0377** (.0169)
Apr-15	-.043*** (.0138)	-.0386** (.0159)	-.0457*** (.0173)	-.0313* (.0174)	-.0175 (.0171)
May-15	-.0398*** (.0137)	-.0353** (.0159)	-.0435** (.0173)	-.0191 (.0175)	-.011 (.0172)
Jun-15	-.045*** (.0136)	-.0337** (.0159)	-.0461*** (.0173)	-.0113 (.0175)	-.0144 (.0171)
Jul-15	-.0359*** (.0138)	-.0337** (.016)	-.0387** (.0173)	-.0216 (.0173)	.0051 (.0174)
Aug-15	-.0233* (.014)	-.0336** (.016)	-.0214 (.0175)	-.009 (.0175)	.0031 (.0174)
Sep-15	-.0306** (.014)	-.0403** (.0159)	-.021 (.0175)	-.0188 (.0174)	.0021 (.0173)
Oct-15	-.0275** (.0139)	-.0316* (.0161)	-.0172 (.0175)	-.0105 (.0175)	.0048 (.0173)
Nov-15	-.0275** (.0139)	-.0193 (.0163)	-.0212 (.0176)	-.0055 (.0176)	3.9e-04 (.0174)
Dec-15	-.0277** (.014)	-.0128 (.0164)	-.0172 (.0177)	-.0011 (.0177)	.0074 (.0174)
Controls	Yes	Yes	Yes	Yes	Yes
Mean	.1859	.2759	.327	.3186	.2896
N	47625	47663	47714	47672	47679

The main entries in all columns report the average marginal effects of each time dummy variable for the month indicated in the row heading which are estimated from equation (2) using probit based on the sample indicated in column heading. All columns include household characteristics included for the even-numbered columns in Table 2. The row with "Mean" heading reports the average proportion of households with positive tobacco expenditure levels in the sample indicated in the column heading. White-Huber standard errors are in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Authors' calculations from Household Income & Expenditure Survey

Table A.4: Evolution of the Impact of Tobacco Control Policy on Real Tobacco Expenditures by Household Income Quintile, OLS, 2013-2015

Dependent Variable: Real Tobacco Expenditures, in logs					
Sample	1st Quintile (1)	2nd Quintile (2)	3rd Quintile (3)	4th Quintile (4)	5th Quintile (5)
Jan-13	-.0203 (.0523)	.012 (.0627)	.0312 (.0685)	-.0103 (.0679)	.0116 (.0673)
Feb-13	-.0068 (.0517)	-.0031 (.0619)	-.0383 (.0675)	-.0271 (.0677)	-.0022 (.0667)
Mar-13	-.022 (.0516)	-.0105 (.0622)	-.0144 (.0683)	.0298 (.0683)	-.0156 (.0671)
Apr-13	-.0708 (.0511)	-.0449 (.0618)	-.004 (.0685)	.0675 (.0686)	.1211* (.0683)
May-13	-.049 (.0512)	-.0539 (.0618)	.0095 (.0681)	.0794 (.0689)	.093 (.0682)
Jun-13	-.0296 (.0517)	-.0299 (.0619)	.0178 (.0681)	.0676 (.0688)	.1122* (.068)
Jul-13	.0366 (.0522)	-.0021 (.0622)	.0473 (.0687)	.057 (.0688)	-.0126 (.0675)
Aug-13	.0149 (.0515)	.016 (.0625)	-.0023 (.0686)	.1095 (.0692)	.0031 (.0676)
Sep-13	.0341 (.0515)	-.0035 (.0623)	-.0084 (.0685)	.0726 (.0686)	-.0099 (.0672)
Oct-13	.0233 (.0514)	-.068 (.0621)	.0343 (.0679)	.0656 (.0687)	-.0305 (.0674)
Nov-13	.0212 (.0512)	-.0569 (.0622)	.0377 (.0685)	.1322* (.0697)	-.0055 (.0675)
Dec-13	.0471 (.052)	-.0434 (.0623)	.0074 (.0685)	.0953 (.0695)	-.0214 (.0673)
Jan-14	.0211 (.0515)	.0511 (.0633)	-.0828 (.0678)	.0352 (.0689)	-.0482 (.067)
Feb-14	-.0173 (.0512)	.0177 (.0625)	-.1161* (.0675)	.0432 (.0684)	-.0907 (.0664)
Mar-14	-.0238 (.051)	.0127 (.0628)	-.0811 (.0683)	.0047 (.0685)	-.0535 (.0673)
Apr-14	-.0259 (.051)	-.0264 (.062)	-.0698 (.0683)	.0525 (.069)	-.0282 (.0681)
May-14	-.0102 (.0512)	-.0167 (.0623)	-.0232 (.0681)	.0172 (.0687)	-.0467 (.0676)
Jun-14	-.0082 (.0515)	-.0039 (.0622)	-.0567 (.0674)	.0393 (.0687)	-.082 (.0671)
Jul-14	.0135 (.0519)	.0287 (.0629)	-.0104 (.0677)	.0987 (.0692)	-.0392 (.0677)
Aug-14	.0058 (.0515)	.0306 (.0626)	-.0309 (.0676)	.1245* (.0693)	-.0159 (.0678)
Sep-14	.0155 (.0517)	.0227 (.0625)	-.0294 (.0673)	.1454** (.0693)	-.0276 (.0675)
Oct-14	-.0239 (.0508)	-.0053 (.0623)	.0089 (.068)	.042 (.0684)	-.0056 (.0673)
Nov-14	.0024 (.0514)	.0119 (.0622)	-.0021 (.068)	.0588 (.0687)	.0047 (.0674)
Dec-14	-	-	-	-	-
Jan-15	-.2344*** (.0468)	-.262*** (.0581)	-.352*** (.0637)	-.3006*** (.0635)	-.2671*** (.0629)
Feb-15	-.2264*** (.0471)	-.2689*** (.0582)	-.3516*** (.0636)	-.2622*** (.0644)	-.2605*** (.063)
Mar-15	-.1739*** (.0481)	-.2508*** (.0583)	-.3358*** (.0642)	-.2152*** (.0653)	-.2253*** (.0638)
Apr-15	-.181*** (.0478)	-.2312*** (.0586)	-.2506*** (.0648)	-.1803*** (.0661)	-.1569** (.0649)
May-15	-.162*** (.0481)	-.2122*** (.059)	-.2539*** (.0647)	-.1612** (.0658)	-.1311** (.0651)
Jun-15	-.1722*** (.0479)	-.1916*** (.0593)	-.2418*** (.0652)	-.1269* (.0659)	-.1232* (.0652)
Jul-15	-.142*** (.0483)	-.2012*** (.059)	-.2167*** (.0655)	-.1265* (.0666)	-.0408 (.0669)
Aug-15	-.1142** (.0486)	-.1873*** (.0593)	-.1652** (.066)	-.086 (.0672)	-.0616 (.0664)
Sep-15	-.1264*** (.0487)	-.228*** (.0584)	-.179*** (.0657)	-.1415** (.0668)	-.0467 (.0666)
Oct-15	-.1101** (.0488)	-.1916*** (.0585)	-.1347** (.0659)	-.1069 (.0669)	-.0295 (.0665)
Nov-15	-.1155** (.0488)	-.157*** (.0591)	-.146** (.066)	-.0872 (.0672)	-.0475 (.0671)
Dec-15	-.1279*** (.0487)	-.128** (.0596)	-.1394** (.0664)	-.0773 (.0675)	-.0212 (.0673)
Controls	Yes	Yes	Yes	Yes	Yes
Mean	7.821	13.13	16.54	16.9	15.39
N	47647	47671	47714	47685	47688

The main entries in all columns report the coefficients on time-fixed effect for the month indicated in the row heading estimated from equation (2) using OLS based on the sample indicated in column heading. All columns include household characteristics included for the even-numbered columns in Table 2. The row with “Mean” heading reports the average household real expenditures on tobacco in the sample indicated in the column heading. White-Huber standard errors are in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Authors' calculations from Household Income & Expenditure Survey

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