On the Regressivity of Gambling Taxes in Switzerland

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SUMMARY

In this study, the author assesses whether the gambling tax in Switzerland is regressive using a large, representative sample of the population and the reported gambling expenditures of the Swiss Health Survey 2007 (SHS 07). To analyze the tax incidence, the Suits index was constructed. This result is supported by a regression analysis, which highlights the income elasticity of gambling expenditures. The two measures provide converging results and demonstrate the regressive pattern of the gambling tax in Switzerland. As such, this taxation structure contributes to increased income inequality in Switzerland.

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1. Introduction

In Switzerland, a significant part of the revenues of gambling providers is transferred to the state. A tax on the revenues of gambling providers reflects the expenditures of gamblers, thus raising the question of tax incidence. To analyze this pattern, this study investigates how gambling expenditures change with respect to income. This study examines whether lower income groups devote a higher part of their revenue to gambling expenditures than do higher income groups. If this assumption is valid, the gambling tax in Switzerland can be said to contribute to increased income inequalities.

This assumption has been corroborated in international studies, in which casino and lottery taxes have been found to be predominantly regressive. Because lotteries are run by the government to finance public expenditures, many of these analyses have been conducted in the United States to analyze principles of equity. Two main methods have been used to assess the regressivity of the gambling tax. The first type of measure is based on a concentration index inspired by the Gini coefficient. The second type of analysis estimates the income elasticity of gambling expenditures to describe the latter based on variations in income.

In 1977, Suits developed a concentration index to analyze the tax incidence (1977b). He used this construct to analyze the regressivity of casino and lottery taxes (Suits, 1977a) in Nevada. In that study, Nevada casino taxation was found to be progressive. However, when Suits restricted his analysis to Nevada residents, the contribution to the casino tax was found to be highly regressive. The author explained this pattern as the result of the significant costs of traveling to Nevada during this period. Mason, Shapiro, and Borg (1989) highlighted the regressive pattern of the casino tax using income elasticity, and they corroborated this result with the Suits index.

In line with these results, similar studies have found that the lottery tax is also highly regressive. In 1987, Clotfelter and Cook used survey data to conclude that the lottery tax in the United States was regressive. This early finding was corroborated by Mobilia (1992) with county-level data from the state of Kansas. Furthermore, a longitudinal study showed increasing regressivity from 1988 to 1992 (Pirog Good and Mikesell, 1995). In fact, studies have consistently found the lottery tax to be regressive using either income elasticity coefficients or concentration measures (Hansen, Miyazaki and Sprott, 2000; Price and Novak, 1999). Two national surveys conducted in Canada and New South Wales (MacDonald, McMullan, and Perrier, 2004; Worthington, 2001) concluded that lower income households spent a higher proportion of their

revenues on gambling compared to higher income households. The international literature provides results that support these findings by demonstrating the overrepresentation of individuals with lower socioeconomic status among gamblers, including problem gamblers (Abbott and Volberg, 2000; Gerstein et al., 1999; Petry, 2005; Productivity Commission, 1999; Rönnberg et al., 1999; Volberg, 1994; Volberg and Abbott, 1997; Volberg and Steadman, 1989; Welte et al., 2002).

The landscape of casino gambling in Switzerland is unique because the establishment and operation of casinos was banned from 1928 to 2000. A new law authorizing gambling venues came into force on April 1, 2000. In 2009, the casino industry in Switzerland consisted of 19 gambling venues that generated CHF 936 million in gross revenues. This amount, which was obtained by subtracting the winnings returned to players from the sums they wagered, is the tax base used to levy the gambling tax, which totaled CHF 479 million in 2009. This amount is allocated to financing the Old-Age Insurance (OAI) and the expenditures of the different cantons that host casinos. During 2009, CHF 406 million was transferred to the OAI, and CHF 73 million was transferred to the cantons.

According to the first article of the lottery law, lotteries are forbidden in Switzerland. However, exceptions are made for lotteries and raffles organized for recreational events that do not provide cash rewards. Article 5 stipulates that lotteries are allowed if they are designed to serve non-profit organizations or charities. In practice, two firms are allowed to run the lottery and betting business, namely, the Lotterie Suisse Romande (LoRo) in the western part of the country (i.e., the French-speaking part) and Swisslos in the eastern part (i.e., the German- and Italian-speaking part). In the last decade, the number of lottery games increased significantly with the establishment of a transnational lottery and the launch of video lottery terminals. As a result, the annual lottery sales from 2000 to 2009 rose from CHF 1,373 to CHF 2,833 million. In accordance with article 5 of the lottery law, all profit is transferred to cantonal commissions, which distribute this amount to non-profit organizations or charities. In 2009, the gross revenue of lotteries and betting rose to CHF 896 million, and the total profit (CHF 534 million) was transferred to non-profit organizations and charities. In this study, this amount is defined as the implicit tax on the lottery.

Because a significant part of the revenues of gambling providers is taxed by the government, the principle of tax equity must be respected. This golden standard implies that people must contribute to the government's revenues according to their ability to pay. Therefore, individuals with the same income should contribute the same amount to government revenues (i.e., horizontal

equity), and those with higher incomes should contribute more (i.e., vertical equity). To test the assumption that the gambling tax on lotteries and casinos is regressive, we focus on the amount transferred by lotteries and casinos to either the state or the cantonal commissions. We analyze this pattern using two different measures: the Suits index (SUITS, 1977b) and the income elasticity of gambling expenditures. The former shows how the tax burden is distributed according to income repartition. The second estimates the variation in gambling expenditures based on variation in income. The results provide insight into the regressivity of the gambling tax in Switzerland. To the best of our knowledge, a study of this type has never been conducted in Switzerland. With this article, we aim to inform decision makers about the impact of the gambling tax on income distribution.

2. Data and Method

2.1 Sample

To conduct the analyses, we used a representative survey of the Swiss population, the Swiss Health Survey 2007 (SHS). The survey is conducted every five years on a cross-sectional sample of the Swiss population aged 15 years and older, based on a random stratified sample. The cantons constitute the different strata. Two-step random sampling is implemented for each stratum, where the households are defined as the primary units and the individuals living in the households are the secondary units. Using this method, 18,760 individuals were interviewed by phone. Respondents were also asked to complete a written survey that included questions on gambling. Of those who accepted, 14,393 returned the written questionnaires. Of these respondents, 6,036 reported having gambled during the past twelve months.

2.2 Measures of Tax Progressivity

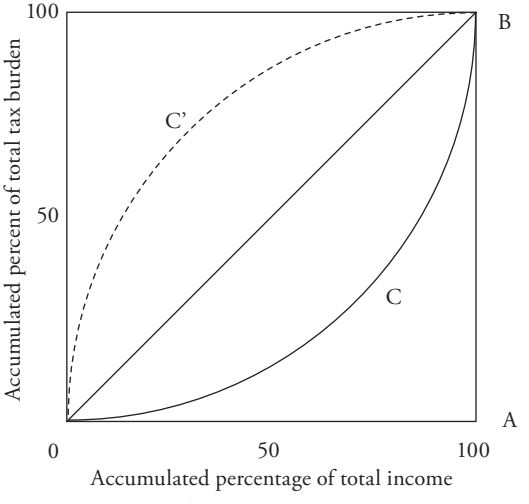
Several methods can be applied to analyze the tax pattern. Point estimations of progressivity are based on an analysis of the tax schedule according to income. This is the case for measures such as marginal rate progression, average rate progression, liability progression and residual income progression (MOTTU, 1997). However, these measures only provide a point estimate; they do not consider the tax impact on the entire population. To solve this problem, global measures based on the Lorenz curve and the Gini index can be used to account for the

distribution of the tax burden. This is the case for the Suits index, which is used in this study together with a second analysis to verify the consistency of the Suits results. For this purpose, we use regression analysis to estimate the income elasticity coefficients.

2.2.1 The Suits Index

The Suits index is the first measure used in this study to assess the progressivity of the tax. This index has been one of the most widely used instruments for this purpose since its development by Suits (1977b). It is inspired by the well-known measure of inequality, the Lorenz curve, and the resulting Gini ratio. The Suits index is obtained by plotting the accumulated percentage of the tax burden on the horizontal axis and the accumulated percentage of total income on the vertical axis. We can conclude that the gambling tax is regressive if the percentage of the total tax burden is always higher than the corresponding percentage of total income, as indicated by the C' curve in Figure 1. If the tax is progressive, the Lorenz curve will show the same pattern as the C curve shown in Figure 1. Finally, in the case of perfect proportionality, the Lorenz curve would follow a straight 45-degree line.

Figure 1: Illustration of the Suits Index



Source: Suits (1977b)

The index is defined as

$$S = 1 - \left(\frac{L}{K}\right), \tag{1}$$

where L is the area *0ABC*, which is the area under the Lorenz curve indicated by the tax, and K is defined by *0AB,* which is the area under a straight 45-degree line that indicates perfect proportionality. The interpretation of S is straightforward. In the case of proportionality, $L = K$, and so $S = 0$. If a tax is progressive, the area under the Lorenz curve is smaller than the area under the 45-degree straight line; as a result, index S is positive. Conversely, if the tax is regressive, a higher part of the tax burden is paid by individuals with lower incomes. The Lorenz curve lies above the straight line, and so S will be negative. This measure has some interesting properties. First, any transfer of the tax burden from lower to higher income groups increases S. Second, the index value for several taxes in combination is the weighted average of the index for the individual taxes, and the weights are given by the proportion of the total revenue collected by the taxes. Nevertheless, it should be noted that this index is a summary of different taxes. Thus, it is an average, and as such, it has all of the shortcomings of such a measure.

To construct the Suits index, we need to know the gambling net expenditures to assess the tax burden on each individual. The SHS allows us to assess individual-level monthly gambling budgets. This amount gives us the participation of each individual in the gross revenue of casinos and lotteries. Using the average tax rate for gambling, we can obtain an estimation of the tax burden on each individual. It must be noted that these data from the SHS are related to the total expenditures on games of chance; we do not have desegregated information to assess the tax incidence of casinos and lotteries separately.

In the survey, the total monthly gambling budget is defined in intervals: less than CHF 10, between 10 and 99, between 100 and 999, between 1,000 and 2,499, between 2,500 and 9,999, and 10,000 and over. We use the middle of the interval to assess the total monthly gambling budget of each respondent. We apply a mean rate burden to these expenditures to obtain the tax burden on each individual. As supported by BLASZCZYNSKI et al. (1997), we assume that the gambling budget reported by most of the respondents represents the net expenditures, corresponding to the gross revenue of casinos and lotteries. To determine this rate, we calculate a weighted average of the tax on the 19 casinos and 2 lotteries in Switzerland. The weights are derived from the gross revenue of each casino and lottery. This calculation result in a mean tax rate of 56% on games of chance

in Switzerland. This rate is an approximation, but changing this rate does not influence the calculation of the Suits index because it is applied uniformly to each individual. That is, the distribution of the tax burden does not change. The second variable required to calculate this index is household income. The SHS collects the adjusted income of each individual. This variable represents the sum of the different incomes of the household and is adjusted by family size. This calculation allows us to consider the economy of scale of increasing the size of the household. By combining the tax burden and the adjusted household income, we are able to estimate the Suits index.

2.2.2 Income Elasticity

Another method of assessing the tax incidence is to analyze income elasticity. As with private goods, we expect the demand for gambling to rise with income because we assume that it is not an inferior good. Nevertheless, we do not know whether this increase will be proportional. To simplify, suppose that all individuals have the same structure of tastes. Thus, with the same income, they all equally value their gambling expenditures and the social good provided by the implicit tax. In this case, individuals with an income of $20,000 may be willing to spend $2,000 gambling, of which $1,000 would represent the implicit tax (assuming a tax rate of 50% on the gross revenues of gambling). If 1,000 units of the social good are provided, this implies that all individuals with an income of $20,000 value 1 unit of the social good at $1. If all other individuals with an income of $40,000 value the social good at $2, a proportional tax rate would apply based on the structure of tastes. If these individuals would be willing to pay only $1.50, the appropriate tax pattern would be a regressive schedule. This example shows us how the tax schedule depends on preference patterns. Indeed, if we assume high income elasticity, prices would increase rapidly with income. Nevertheless, if price elasticity is high, this increase will be reduced (Musgrave and Musgrave, 1989). To express this as a formula, we write the income elasticity as

$$\mu_r = \frac{\left(\frac{\Delta Q}{Q}\right)}{\left(\frac{\Delta Y}{Y}\right)} \tag{2}$$

where Q = Quantities and Y = Income,

and the price elasticity as

$$\varepsilon_p = \frac{\left(\frac{\Delta Q}{Q}\right)}{\left(\frac{\Delta P}{P}\right)} \tag{3}$$

where Q = Quantities and P = Price.

Using the two expressions, we have

$$\frac{\left(\frac{\Delta P}{P}\right)}{\left(\frac{\Delta Y}{Y}\right)} = \frac{\mu_r}{\varepsilon_p} \tag{4}$$

The left side of equation 4 shows the tax price elasticity with respect to income. Therefore, in the case of a proportional tax, the ratio of tax to income remains constant. In fact, the left side of the equation is equal to one. In the case of a progressive tax, this elasticity is higher than one. Conversely, it is lower than one for a regressive tax. This also demonstrates how the required schedule is linked to the ratio of income and price elasticity. In this study, to estimate the left side of this equation, we explain the natural logarithm of a household's gambling budget using the natural logarithm of the household's income, and we control the regression with socio-economic variables. Indeed, because we assume a constant tax rate on gambling expenses of 56%, the resulting coefficients can be used to assess tax regressivity.

To facilitate comparison between our two estimations, we use the same adjusted household income for both analyses, and we control our regression with socio-demographic characteristics. Age is regrouped into four binary variables indicating the following age intervals: 15–35, 36–55, 56–75 and over 75. The effect of unemployment is captured in a binary variable separating individuals who are unemployed from other individuals. Marital status indicates whether the individual is married or not. Another binary variable is used to identify individuals who are Swiss from other respondents. The effect of educational level is captured with a categorical variable representing five different levels of scholarly achievement: compulsory school, general education, vocational education, higher vocational education, and tertiary education. Finally, to control for the characteristics of the different regions, we used a fixed effect for each of the 26 cantons.

3. Results

3.1 Suits Index

The summary statistics of the adjusted income and the monthly gambling budget used to calculate the Suits index are shown in Table 1.

Table 1: Summary Statistics of the Suits Index Components

Variable	n	Mean	Std. dev.	Min	Max
Monthly adjusted household Income (CHF)	13,725	4,239.12	3,118.53	46.67	80,000
Monthly gambling budget (CHF)	12,181	25.68	95.70	0	1,750

Source: Swiss Health Survey 2007.

Income exhibits a mean of CHF 4,239.1 with a standard deviation as high as CHF 3,119.5 (1 CHF = 1.16 USD). This variable is limited to values between CHF 46.7 and CHF 80,000.0. The net monthly expenditures show a mean at CHF 25.7 with a small standard deviation of CHF 95.7. This pattern is explained by the fact that the values of this variable are bounded by CHF 0 and CHF 1,750. To obtain the estimation of the tax burden on each individual, we apply the average tax rate of 56% on gambling expenditures. Using these data, we compute the Suits index using STATA, finding an index of –0.184 and an average tax rate of 0.35% of the household income. If we limit our analysis to individuals who had gambled during the past year ($n = 6{,}036$), the resulting Suits index is equal to –0.196. These two results unambiguously show that the tax on casinos and lotteries is regressive and that lower income groups contribute proportionally more to the tax revenues than higher income groups.

3.2 Income Elasticity

The second analysis of this study assesses the tax incidence by determining the income elasticity coefficient. It also analyzes the ratio of the percentage change in gambling expenditures to the percentage change in a household's income. To test whether this ratio increases, decreases or remains constant, we perform an ordinary least squares regression using the logarithm of gambling expenditures and income and controlling for socio-economic variables. The summary statistics of the different variables included in the regression are shown in Table 2. Due to the characteristics of the natural logarithm, the following analysis is limited to

individuals who gambled during the previous 12 months and had net expenses greater than 0 ($n = 6{,}036$).

Table 2: Summary Statistics of the Regression Variables

Variables	Mean	Std. dev.	Min	Max
Monthly gambling budget	54.04	131.65	5.00	1750.00
Income	4245.81	2973.61	200.00	60000.00
Gender (ref: male)	0.505	0.500	0	1
Age				
15–35	0.263	0.440	0	1
36–55	0.405	0.491	0	1
56–75	0.289	0.453	0	1
Over 75	0.043	0.202	0	1
Swiss nationality	0.902	0.297	0	1
Married	0.511	0.500	0	1
Unemployed	0.017	0.129	0	1
Education (5 levels)	2.600	1.273	1	5

Source: Swiss Health Survey 2007.

According to Table 2, the monthly expenditures of gamblers range from CHF 5 to 1,750, with a mean value of 54.04 CHF. The minimum adjusted household income in our sample is CHF 200, and the maximum is 60,000. Moreover, it has an average of CHF 4,246. With the exception of educational status, all other variables are binary variables. In our sample, 50.5% of the respondents are male, and two-thirds of the gamblers are younger than 56 years old. More than half are married, and only 9.8% do not have Swiss nationality. A fairly low unemployment rate is observed in the sample. Finally, the educational variable ranges from 1 to 5, with a mean value of 2.6.

We run two regressions presented in Table 3. The first does not include fixed effects for the cantons. However, as the cantons have different characteristics, especially in term of public health policies, we run a second regression considering fixed effects for each canton. The coefficients are very similar, suggesting robust results. Here we are discussing only this latter analysis. The adjusted R^2 is equal to 7.6%, indicating that an important part of the variation in the dependent variable remains unexplained by the explanatory variables. However, this result is not unusual in cross-sectional gambling studies. To improve this statistic, we should have included more variables to describe budget allocation; however, these

variables are not in the SHS database. The *F* statistic demonstrates that the model is statistically significant at the 5% level. This last result allows us to validate this model and to interpret its coefficients. In this study, the coefficient of interest is that associated with the income variable. This regression analysis reveals an income elasticity of 0.199 with a standard deviation of 0.036. As suggested by the p-value, this coefficient is statistically significant. This result is interpreted as follows: an increase of 10% in income will increase gambling expenditures by 1.99%. Conversely, a decrease in income will generate a decline in gambling expenditures, but less than proportional compared to the reduction in income. Thus, the tax on games of chance in Switzerland can be considered regressive.

Table 3: Result of the Ordinary Least Squares Regressions

	Canton fixed effects			
	No		Yes	
Variables	Coefficient	Std. dev.	Coefficient	Std. dev.
Income (ln)	0.181***	0.036	0.199***	0.036
Gender	0.479***	0.037	0.484***	0.037
Age (ref: 15–35)				
36–55	0.360***	0.046	0.361***	0.046
56–75	0.600***	0.051	0.600***	0.051
76 and over	0.346**	0.102	0.355**	0.102
Swiss nationality	–0.039	0.062	–0.014	0.063
Married	–0.052	0.038	–0.049	0.038
Unemployed	0.165	0.144	0.193	0.144
Education (5 levels)	–0.115***	0.015	–0.118***	0.015
Constant	1.193***	0.291	1.499**	0.623
	$R^2 = 0.066$ $F = 44.42$ Significant $F < 0.001$ $N = 5{,}565$		$R^2 = 0.076$ $F = 13.30$ Significant $F < 0.001$ $N = 5{,}565$	

Notes: ***p<0.001; **p<0.01; *p<0.05
Source: Swiss Health Survey 2007

For the other independent variables, gender is highly significant, with men spending 62.3% more on gambling than women do. The different age group dummies indicate that compared to individuals aged 15 to 35 years old, older individuals

spend much more money on gambling than younger individuals do. Interestingly, our analysis shows that the more educational level increases, the more the gambling budget decreases. The remaining variables in the regression (i.e., nationality, marital status and unemployment) do not seem to have a significant effect on gambling expenditures.

This second analysis corroborates the Suits index estimated above,[1] indicating a highly regressive pattern for the gambling tax in Switzerland. Changing the method did not change the conclusion. Therefore, we consider the results of the present paper robust.

4. Discussion and Conclusion

This study concludes unambiguously that the tax imposed on gambling activities in Switzerland is regressive. Lower income individuals contribute proportionally more to the total state revenues than do higher income groups. Indeed, the Suits index shows a negative value of –0.184, indicating a clear regressive tax pattern. The regression analysis corroborates this first result. The income elasticity of 0.199 is clearly and statistically lower than one, providing further proof of a regressive tax pattern. Decreasing income by 10% results in a decrease of only 1.99% in the gambling budget. Therefore, the economic incidence clearly shows that the final distribution of the tax burden is proportionally larger for individuals with lower incomes. Thus, this tax violates one of the main qualities of a good tax in Switzerland, namely vertical equity. Vertical equity suggests that individuals with higher income should have a larger tax burden. However, this is obviously not the case in the present study.

Another type of inequality is related to educational level. In the regression analysis, this coefficient is found to be negative. This pattern shows that the more educated an individual is, the less money he/she will spend on gambling. According to our analysis, state gambling revenues are expected to rise if the population that has access to gambling is poorly educated. These two results lead to the surprising conclusion that the revenues to the state from games of chance will be higher if the population is poor and not well educated. This finding is in line with the findings of Abt, Smith, and Christiansen (1985).

1 Using two very different methods, we obtained the same results. Therefore, we did not test other regression models. In addition, this model specification is commonly used for such analysis.

Why this subpopulation may be encouraged to spend money on gambling is addressed by Wisman (2006). He highlighted three reasons why poor people may be more "vulnerable to the promise of getting rich by 'investing' in gambling" (Wisman, 2006). The first reason is related to human capital. Because they have less access to high-quality schools, poor people have difficulty developing human capital, finding well-paid jobs or accessing credit to start businesses. Second, due to their poor human capital, low-income populations have a higher discount rate, and so they are more oriented toward the present. Poor people generally have a shorter life expectancy and live in a culture that is more preoccupied with the present because of uncertainties about the future. The third reason is that because poor people possess little control over their everyday lives, work or financial means, choosing lucky numbers provides them with a sense of control and participation. The first reason highlighted by Wisman may not be applicable in Switzerland because high-quality schools are accessible to all socio-economic classes. However, the overrepresentation of lower income groups in gambling expenditures may be a combination of a lower discount rate and the quest for the artificial feeling of control provided by gambling.

Several limitations to this study must be considered when interpreting the results. First, we focus our analysis on the tax incidence for gambling in Switzerland. We do not account for the budgetary incidence of this activity. This incidence is difficult to compute for Switzerland because many expenses derived from gambling tax are not earmarked. While part of the tax imposed on casinos is transferred to the OAI, the other part is not earmarked and is given to the cantons, which are free to use this money as they wish. Due to this specific repartitioning, considering the benefits of casinos may decrease the regressivity of the present study. However, this observation does not hold for the tax lottery redistribution. Because an important part of the revenues collected by this tax are redistributed for cultural or leisure activities, the regressivity may increase. Therefore, if we properly account for the benefits of this tax, the budgetary incidence may differ for casinos and lotteries. Another limitation of this study is related to how individuals reported their gambling expenditures. Rather than a continuous variable, the answers were designed to be grouped into a categorical variable with six categories, which reduces the precision of the answers. Moreover, the question asked how much the respondent spent on gambling. As shown by Blaszczynski et al. (2006), this question is biased and is subject to ambiguity because the question "how much money do you spend gambling?" may be interpreted in different ways and may lead to misinterpretation. Generally, this question is asked to determine the difference between the amount of money a person has at the beginning of a gambling session and the amount of money he or

she has at the end. In other words, the information of interest is the net value of the money spent. BLASZCZYNSKI et al. (1997) concluded that in response to this question, two-thirds of the respondents interpret this as their net expenditure. The rest of the respondents relate their answer to turnover or other alternative interpretations. In this study, we assume that the answer to the question asked in the SHS reflected the net expenditure. Finally, we are unable to distinguish between casino and lottery expenditures. Because the incomes of these two categories of gamblers may be different, grouping these two types of expenditures may have an impact on the final results.

This study is in line with the international literature that finds that the gambling tax on casinos and lotteries exhibits regressive patterns (MASON et al., 1989). This conclusion was expected because several international studies have shown that poor and uneducated individuals tend to gamble more and to experience gambling problems more often. Thus, it is not unexpected to find that these individuals spend a proportionally larger part of their revenue on games of chance in Switzerland and that this tax violates vertical equity.

A means of restoring this equity and protecting uneducated individuals was proposed by RIVENBARK (1998) and consists of introducing a substantial charge for entering casinos. In Switzerland, this is already the case in some, but not all, gambling venues. The aim of such a preventive measure would be to deter poor and less educated individuals from entering casinos. Moreover, this solution could also increase the state's revenues and thus balance the decline generated by this preventive measure. The results of this study should be of interest to Swiss policy makers insofar as the tax incidence is an issue that must be addressed whenever a new tax is considered. Finally, a more precise study could be undertaken if the next SHS separated casino and lottery expenditures to allow for separate estimations.

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