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Article

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The Real Effect of the Czech Tax Policy for Combating the Tobacco Epidemic

Petr DAVID – Marek LITZMAN** – Petr ROZMAHEL***

Abstract

Similar to other developed countries, the Czech Republic implements socio-economic policies aimed at minimizing smoking. The objective of this research is to provide evidence of the real impact of increasing cigarette taxes on cigarette consumption and its structure in the Czech Republic. The unique database consisting of manufacturers' subscribed cigarette stamps and all posted brand prices were collected by the authors over the past two decades and was utilized in the analysis. The analysis shows that a continuous rise in cigarette market prices does not motivate consumers to prefer low price brands or to reduce cigarette consumption. The research provides evidence that smokers did not minimize smoking but even spent more money on cigarettes, preferring more expensive brands or staying loyal to a favored one. This implies necessary changes in the market basket of the smokers' households.

Keywords: *cigarette consumption, consumer behaviour, price effects, tax policy*

JEL Classification: I18, H22, L66

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Introduction

Smoking has significant negative effects on human health, resulting in a large number of physical and mental illnesses and premature deaths (Doll et al., 2004; Johnson et al., 2003; Lasser et al., 2000; Smith et al., 2014; Thun et al., 2013; WHO, 2019) as well as high social costs including healthcare costs of smokers,

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second-hand smoking costs, employers' costs of smoking employees, cleaning up after smoking, damages incurred as a result of cigarette fires, and many others, borne by the whole society (David, 2018; David, 2019). Tobacco consumption is the most common preventable cause of premature death (Samet, 2013) and according to various estimates, smoking shortens life by an average of about 5 – 15 years (CDC, 2008; John and Hanke, 2015; Streppel et al., 2007). In the Czech Republic, 18.1% of the population smokes daily and 6.8% on occasion (Csémy et al., 2020).

In addition to negative advertising and smoking bans in selected places, a tax on these products is also an important tool for limiting the use of tobacco products (Rabin and Sugarman, 2001). For example, the impact of increased tax imposed on cigarette prices, the collection of taxes and the potential to determine the prevalence of smoking were quantified in the case of a 2015 tax policy reform in China (Goodchild and Zheng, 2018). It is also possible to reduce smoking prevalence by devoting tobacco tax revenues to tobacco control programs which are focused on ending the epidemic (Smith et al., 2020).

Demand for tobacco products is strongly inelastic (David, 2010), which limits the effectiveness of tax instruments in reducing the consumption of tobacco products. In terms of lowering total consumption, the tax often appears to be rather secondary (David, 2009). Elasticity of cigarette demand in developed countries is generally estimated around –0.4 (Jha and Chaloupka, 2000). However, elasticity varies according to income groups, that is, as per some studies, persons with lower incomes have slightly greater price elasticity than those with higher incomes (Lim and Khang, 2020; Wilkinson et al., 2019). However, other studies have not been able to validate this (Gallego et al., 2021). In the case of young people, the price elasticity of demand can be twice as high as that of adults (Cnossen, 2005). It has also been shown that young people are becoming indifferent to the growth of tobacco taxes (Hansen et al., 2017).

With low price elasticity, the rising tax burden imposed on cigarettes is largely passed on to customers, increasing their expenses in order to acquire this type of goods. However, the distribution of these expenditures is inconsistent. In the Czech Republic, cigarette use is associated with socioeconomic status, where people in the lower socioeconomic level smoke more (Csémy et al., 2020). A similar phenomenon in other countries was observed (Hiscock et al., 2018; Khang and Cho, 2006; Wellman et al., 2018).

In previous research, regressive tax places a relatively greater burden on the poor than the rich (Fuchs et al., 2018; Fuchs and Meneses, 2017). It is also necessary to keep in mind the context of tobacco-growing activities in low- and middle-income countries (Kulik et al., 2017).

Higher smoking susceptibility has been demonstrated in lower socioeconomic groups (Csémy et al., 2018). It has also been found that a drastic rise in prices has a particularly greater impact on smoking prevalence than a gradual increase over a number of years (Wilkinson et al., 2019). Also, the pre-announced high increments in future tobacco excise taxes have the potential to discourage or reduce smoking (Li et al., 2015). Thus, price increase seems to be an important part of the social initiative to reduce consumption. However, price strategies of tobacco industry – at least in some countries aim to undermine the effect of growing tax burden (Smith et al., 2017). This occurs mostly in the lower-price segment (Hiscock et al., 2018). Low-income customers are the most price-sensitive, and non-priced forms of prevention have a better effect on smoking cessation for high-income consumers (Hill et al., 2014).

This paper aims to provide evidence on the effect of the cigarette tax policy on smokers' consumption behaviour in the Czech Republic. In particular, it evaluates the structural changes of sought-after cigarette brands according to their prices. The research questions if the increasing cigarette taxes have an effect on customer brand preference as per their cost or lower their level of consumption. It hypothesizes that rising cigarette prices, due to rising taxes, encourage smokers to prefer the lowest-priced cigarette brands.

1. Data and Methodology

In the research, we use a unique combination of data and their processing to enrich current procedures and broaden knowledge of solutions to severe smoking problems. From January 2004 to August 2020, a time series of data on the sale of tobacco labels in individual price categories was produced monthly when the data were provided by the Customs Administration of the Czech Republic. Furthermore, we refer to these prices as weighted, as they include the size of the number of cigarettes at each price level.

Using data processing information published in the Price Bulletins of the Ministry of Finance of the Czech Republic, subsequent long-term continuous collection of time series data on prices of all cigarette brands distributed in the Czech Republic market from January 2004 to December 2019 was performed. A total of 1 366 cigarette brands and their 7 424 price changes during the period were recorded. These prices are considered unweighted because companies do not disclose the number of their sales, that is, the consumption.

It is not possible to identify the timing of the withdrawal of some brands from the Price Bulletins. For this reason, it is necessary to ignore the time series data of brands for which there has been no price change by the end of examined period.

Changes in cigarettes prices from 2004 to 2019 occur in 75% of cases within nine months. Accordingly, we end the brand-specific price time series in cases, where the price of the individual cigarette brand has not changed for nine months, and we consider such cigarette brand to be withdrawn.

In addition, all adjustments in the tax rates levied on cigarettes were identified, that is, the excise duty consisting of the ad valorem part, the specific part, the minimum excise duty and the value added tax (VAT).

Based on the knowledge of weighted and unweighted prices and tax rate parameters, the individual tax components for each of the prices for the period 2004 to 2020 can be identified monthly, as well as the price excluding taxes. By processing unweighted cigarette prices, the price quantiles can be segmented and the most common value of the weighted price of one cigarette can be identified within all distributed cigarette brands in the Czech Republic. We divide weighted prices into quartiles depending on their selling price and display the frequency of tobacco labels taken in the given quartiles.

Unweighted prices contain significantly more observations (58 111) because they include all brands available on the market. Weighted prices only include information on prices with no further differentiation (on manufacturers or brands). As several brands are usually sold for the same price, the number of observations is lower (6 536). Through the processing of created data sets, it is possible to examine the aforementioned hypothesis.

2. Results

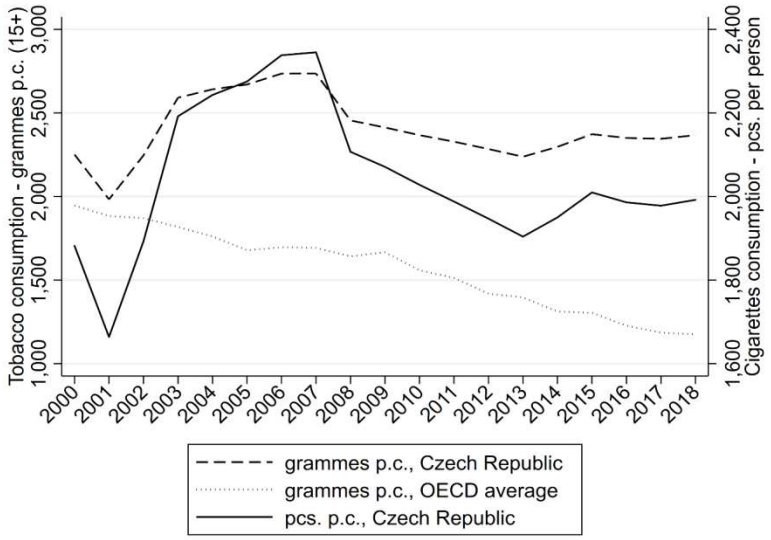
Figure 1 compares the development of tobacco and cigarette consumption in the Czech Republic and the average of OECD countries from 2000 to 2018. Data on cigarette consumption per capita in the Czech Republic are based on national statistics which disregard illegal and cross-border sales (CZSO, 2020). The source of data on tobacco consumption per capita 15+ in the Czech Republic and the OECD was the OECD (2021).

As evident from Figure 1, in OECD countries, the average per capita tobacco consumption has been declining evenly over the reference period. However, due to the aggregation of data from all 37 OECD countries, this average consumption is unable to capture the partial effects of socioeconomic factors in individual countries. Nevertheless, the national statistics of the Czech Republic can capture partial influences regulating consumption. Sudden changes in trends in tobacco and cigarette consumption in the Czech Republic respond to various socioeconomically significant events affecting consumer behaviour, such as frontloading due to expectations of possible negative effects of the Czech Republic's accession to

the EU, changes in frontloading regulation, introduction of combined and minimum excise duty, or decline in macroeconomic performance during the global economic crisis. In the Czech Republic, in contrast to the OECD average, the declining trend in cigarette and tobacco consumption is not apparent in the long term. Although, there is apparent temporary mild decrease in consumption between 2008 and 2013, still the consumption at the end of the reference period in 2018 is roughly 20% higher than at its beginning of 2000.

Figure 1

Tobacco and Cigarette Consumption per capita, 2000 – 2018 in the Czech Republic and OECD Average



Source: CZSO (2020), OECD (2021), authors.

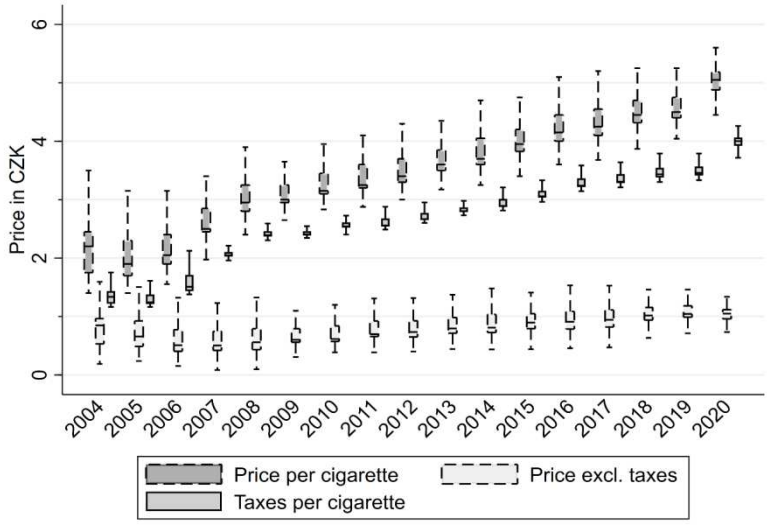
The problem of smoking in the Czech Republic persists despite government efforts. Figure 2 compares the development of unit prices of cigarettes in EUR in the form of median, interquartile margin (25% – 75%) and overall margin (minimum to maximum) using the created database of weighted prices. The graph in the period 2004 to 2020 compares the development of unit prices excluding indirect taxes (excise duty and VAT) the development of consumer prices including taxes, and the development of the values of indirect taxes imposed on cigarettes.

Figure 2 shows that consumer prices closely copy the development of indirect tax values. Both time series show a clear increasing trend over time. In contrast, unit prices of cigarettes excluding taxes have almost stagnated and do not show clear increasing trend. It is also evident from the graph that the gap between the price excluding tax and the consumer price is growing over time.

The development of all three indicators shows that consumer prices of cigarettes and their increase are mainly determined by the indirect taxes imposed on cigarettes. This is apparent on correlation coefficient, where the correlation between price per cigarette and taxes is almost perfect (0.996).

Figure 2

Decomposition of the Cigarette Selling Prices January 2004 – August 2020 in the Czech Republic*



Note: * Outside values (> = 1.5 * interquartile range from upper/lower quartile) are excluded as suggested by Tukey (1977).

Source: Authors.

Using the created database of unweighted prices of all existing brands on the market in the Czech Republic in a given period, the median, the percentile margin (25%–75%, 5%–95%) and the total margin of these prices can be observed in Figure 3.

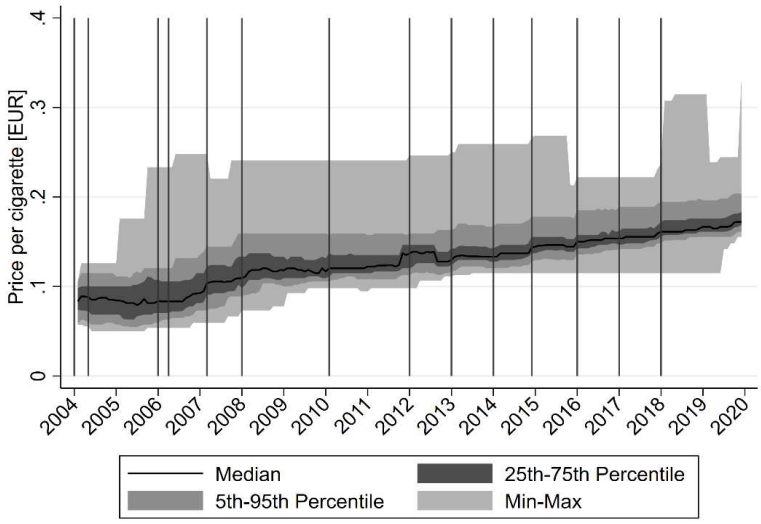
Figure 3 allows us to monitor the dynamics of cigarette price increase in different price groups divided by selected percentiles. The vertical lines indicate the changes in taxation of cigarettes including excise tax and value added tax. Considering the excise tax changes they can include changes in specific tax, ad valorem tax as well as minimum tax.

The relative increase in consumer prices in the period January 2004 to December 2019 is significantly the highest for the cheapest cigarette brands (0 – 5th percentile). This is followed by the group of the most expensive brands (price range of 95 – 100%), while the relative price increase for the 25th – 75th and 5th – 95th percentiles is slight and less significant. The figure also shows a change

in the pricing strategy of cigarette producers in terms of shifting the tax burden. While until 2013 individual tax increases are mainly reflected in the segment of the cheapest cigarettes, their market price is growing significantly. Since this period, the figure shows that tax changes are primarily reflected in the segment of medium-expensive cigarettes (25th – 75th percentile), while the percentile of the cheapest brands (0 – 5%) does not respond to these tax changes and their lowest price remains unchanged for several years until 2018. Changes in minimum and maximum prices occur also out of particular moments of tax changes introduction. Those price changes can result from the introduction of new cigarette brands, withdrawal of some cigarette brands from the market or changes in current prices of existing brands due to particular business strategies.

F i g u r e 3

The Cigarette Price Extent Dynamics and Tax Changes, January 2004 – December 2019 in the Czech Republic

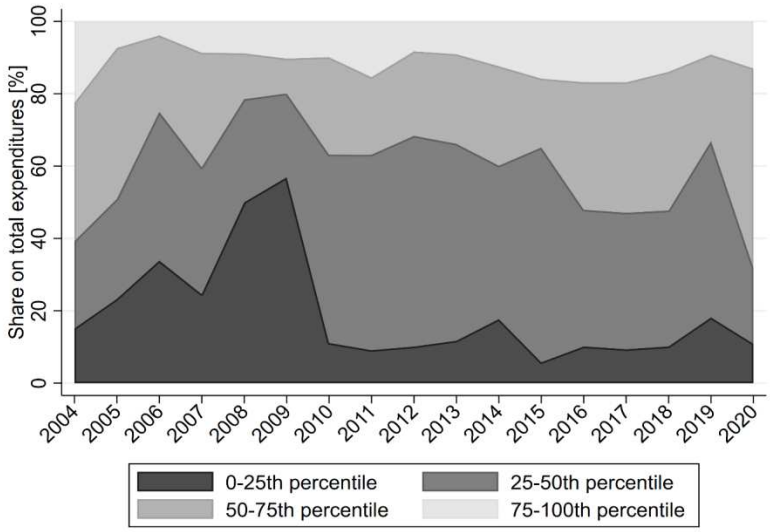


Source: Authors.

In the context of Figure 2, which indicates a high correlation between tax changes and rising consumer prices, it can be concluded from Figure 3 that the tax increases in the first half of the reference period mainly affected cheaper cigarette brands, whose prices increased significantly and with a high frequency. In the second half of the period, these changes were further reflected in the market prices of more expensive cigarettes. The modification in the pricing strategy of producers seems to be strongly determined by the change in consumer preferences. As shown in Figure 4, since 2010, smokers significantly prefer mid-priced and high-priced brands over the cheapest ones.

F i g u r e 4

Cigarette Consumption Shares by Price Categories, 2004 – 2020 in the Czech Republic



Source: Authors.

The processing of the created database of weighted cigarette prices enables further analysis of the development of the distribution of shares of cigarette expenditures in smoking households from January 2004 to December 2019. For such purpose, this was divided into four groups according to the price per cigarette: low-priced (0 – 25th percentile), mid-priced (25 – 50th percentile), high-priced (50 – 75th percentile) and luxury (75 – 100th percentile). Let's recall our original dataset consists of 1 366 cigarette brands. Still, as examples of particular cigarette brands we can name the purchased ones such as Dunhill, Marlboro, and Pall Mall, (high-priced), Petra, L&M, Lucky Strike (mid-priced), and Red & White, Winston, Moon, (low-priced). Figure 4 illustrates the development of the share of cigarette consumption in the above price groups.

From Figure 4 it is evident that with the continuous increase in taxes and consumer prices of cigarettes in the analysed period, there was a significant decrease in the share of consumption of low-priced cigarettes. Simultaneously, there was a significant increase in the share of consumption of mid-priced cigarettes and high-priced cigarettes. The trend in the development of the luxury group's share of cigarette consumption appears to be stable to slightly increasing.

The figure seemingly indicates a significant shift of consumers from low-price towards middle-price. In fact, the original dataset provides the evidence that there was a number of new low-priced cigarette brands introduced as a reaction of producers to the macroeconomic downturn beginning in 2008. Accordingly, the

previously low-priced brands shifted to the middle-priced level. The Figure 4 shows consumers naturally remained loyal to their favorite brand.

At rising prices, these findings can be interpreted as consumers leaving the cheapest brands segment favoring the mid-priced and high-priced ones. The explanation can be sought mainly through socioeconomic factors and marketing strategies of cigarette producers. In case of smokers' behavior the research findings indicate the signs of path dependency phenomenon witch leads the smokers to resistance to changing their favorite brand. In addition, loyalty, social status and prestige play the role. Considering the impact of marketing strategies psychological pricing strategies such as price skimming strategy, gradual increase price strategy or prestige pricing strategy focused on increasing consumers' loyalty are commonly conducted by the cigarette producers in this segment. Also, the non-price marketing tools complement the psychological-price strategies to support the resistance of smokers to change the brand.

3. Discussion and Conclusion

Our data show that the most significant cause of the continuous rise in cigarette prices is indeed the tax policy of gradually increasing excise duty.

The required effect of a decrease in cigarette consumption did not manifest in the analysed period. Consumption does not display a clear downward trend and it is apparent that the previously established conclusions (Wilkinson et al., 2019) on the impact of a rather large jump in prices on the consumption of tobacco products are valid.

Our data show how the structure of cigarette consumption (collected labels) in individual price quartiles changes during the period of continuous price increase due to tax growth. In the analysed period, relative to the set hypothesis, there was a substantial increase in the shares of cigarette consumption volume in the second and third quartiles of cigarettes, that is, mid-priced and high-priced, compared to a clear decrease in the share of the volume of low-priced cigarette consumption, contrary to the findings from previous studies in the UK (Hiscock et al., 2018).

Interestingly, the most significant growth in the share of mid-priced and high-priced consumption occurred in the period after the outbreak of the global financial crisis in 2007 – 2008, which in the following years reduced real disposable household incomes across Europe, including the Czech Republic. Thus, previous research on the direct ratio of harmful consumption and income can be confirmed only for the period of economic growth, but not for the period of crisis (Ruhm, 2005; Xu, 2013).

This research indicates the need to open a discussion on the direct impact of economic factors on cigarette consumption, that is, the decline in Gross Domestic Product (GDP), the rise in prices and the decrease in household income. The discussion also includes social or psychological factors, namely, perception of health value, information campaigns, anti-advertising, family and social status (Csémy et al., 2020; Valášková et al., 2018), whose impact on consumption is indirect, but as the data show, is stronger than expected. The cigarette tax revenues are positively correlated with GDP development. It is especially apparent in the years of the sharp business cycle down-swing such as 2008 and 2021 at which the tax revenues decreased. Still, there are other factors determining the cigarette tax revenues in particular years e.g. pre-stocking of producers and sellers, cross-border demand, and the increasing role of cigarette substitutes.

Tax and price changes do not even have a proportional effect on consumption in line with previous research (David, 2009; Goodchild and Zheng, 2018), but they do affect the structure of consumption due to their price level.

This may be the cause of changes in the pricing policy of producers, who tend to set prices less gradually and less sensitively as well as to project tax fluctuations directly into prices. One effect of the tax change is the adaptation of marketing policies of producers in this highly competitive environment who respond, for example, by creating new low-end brands to offer an alternative for smokers who would otherwise quit under the same conditions after the price increase of existing cigarette brands.

Another effect that demonstrates the steadfast resolve of producers to not lose their customers in light of price sensitivity, especially in low-income households (Hill et al., 2014) is their effort to broaden the supply of cigarettes not only according to brands but also in terms of their length, quantity in the package, packaging process that distract the consumer's thinking and defend the price changes of their products. In 2010, for example, packages with different quantity, varied opening methods, different cigarette lengths, different cigarette flavours, etc. began to appear in the Czech Republic and Worldwide. The result is a win-win situation from the perspective of both producers and the government if health care and other smoking related costs are not taken into account. The manufacturers do not lose their customers. There is only a migration of customers within brands, price segments, etc., and government can obtain the required resources in the short term by increasing the excise duty while retaining cigarette consumption, which is the primary but not explicitly stated objective of the policy of increasing indirect taxes.

Consumers and their households are the only ones on the losing end, as they pay an ever-increasing price for their addiction, and, as our research shows, the price of cigarettes is rising faster than inflation.

In summary, over the analysed period 2004 – 2020 the Consumer Price Index (CPI) increased by 23.2% in total (Eurostat, 2022). On the contrary, the weighted average price of the cigarette package in the whole dataset increased by 123.7% over the analysed period.

Consequently, the purchasing power of smokers' households for other products is diminished, resulting in the need to change the structure of the consumer basket. This implies an uneven distribution of the tax burden between high-income and low-income households of smokers, which is in line with previous research (Fuchs et al., 2018; Fuchs and Meneses, 2017). Considering the reduced purchasing power of low-income households and maintaining the current consumption of cigarettes, the state policy in cigarette taxation worsens the standard of living, especially for smokers in low-income households. Such effects impair the intention of various tax instruments such as tax advantages aimed at supporting low-income households, which are described by Krajňák (2019). Accordingly, our results imply much higher significance of other tools of the tax policy such as anti-advertising, spreading information within focused groups, supportive measures to quit smoking, legislation aimed at avoiding from second-hand smoking and other preventive measures to combat the tobacco epidemic than rising prices of cigarettes due to a gradual increase in tobacco taxes.

Despite the constant price increase, cigarette consumption was not minimized. This is not only due to low-price elasticity caused by smoking addiction but also of a carefully considered and aggressive marketing and pricing policy. Smokers do not realize that the price of the same commodity is increasing, so the unchanged volume of total consumption can easily be justified. This article provides evidence of one of the implications of the manufacturer's pricing strategy, which was in response to a government health policy based on gradual increase in taxes, where price increment only contributes to a shift in the price structure of cigarette consumption. The techniques used by producers in their marketing communication are truly sophisticated, and in combination with their addiction, consumers cannot face them capably.

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