

Tax harmonization in tobacco products: a risk-based approach

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Abstract: *Economic theory suggests that harmful goods should be taxed according to their level of harm, to reduce the externalities and internalities imposed on society. When multiple goods with different harmfulness levels are present in the market, tax policy may wish to push consumers towards the less harmful ones; in the tobacco market, where traditional and innovative products are economic substitutes, this implies levying tax rates which are proportional to the level of harm, which is believed to be substantially lower in the case of non-combustible nicotine and tobacco products (NNTP) as opposed to factory-made cigarettes (FMC). Market projections on EU27 show that doubling tax minima for traditional cigarettes while maintaining a substantial tax differential with NNTPs, grounded in their relative harmfulness, will substantially reduce smoking prevalence. Levelling traditional cigarettes and NNTP tax minima to a single harmonized amount would instead limit drastically the expansion of NNTPs as less harmful alternative to cigarettes and maintain higher level of smoking prevalence.*

1. Using taxes to achieve policy goals

The so-called “sin taxes” have been used for many decades to discourage consumption of goods deemed harmful or immoral. Typical examples are alcohol and tobacco; more recently taxation on sugary drinks has been implemented in some jurisdictions, in an effort to tackle increasing obesity rates.

The economic rationale for these taxes lies in the concepts of externality and internality. By externality is meant the cost on society generated by consumption or production of a given good, which is not

taken into consideration by the price system. Examples of these can be the harmful effect of pollution on the environment, the negative health consequences of smoking or heavy drinking, the harm made by passive smoke, the social cost of drink-driving or alcohol-related violence. Internality is somehow a subtler concept, which highlights the damage that addictive behavior may induce in subjects, such as the loss of self-control and the lower ability to take rational consumption decisions. There is good evidence that increased taxation (increased price) on alcohol, tobacco or sugary drinks have the expected negative effect on consumption, especially so for younger and poorer

consumers. There is also a fairly large literature on the “optimal taxation” of these products (e.g. Gruber and Koszegi, 2001; O’Donoghue and Rabin, 2003 and 2006), which state that taxing tobacco and alcohol at higher rates is optimal from the point of view of efficiency, i.e. it helps producers and consumers to take into account externalities and internalities. These contributions *de facto* are advising for tax rates which are directly related to the level of harm.

This policy brief is to highlight how economic and medical literature already suggest for differential taxation, i.e. levying higher taxes on harmful goods in proportion to the level of harm caused by their consumption/production. We will also argue that, according to the more reliable academic sources, the argument of differential taxation is even stronger when the low-risk and high-risk goods are substitutes, i.e. when increasing price (increasing tax) on the higher-risk good not only decreases its consumption, but “transfers” some of the consumption towards less harmful alternatives. Finally, we will describe the results of some simulation on European markets, in which we will compare the effect of changes in minimum tax on tobacco products on smoking prevalence and on the market penetration of non-combustible nicotine

and tobacco alternatives (NNTPs) to traditional cigarettes, such as e-cigarettes and heated tobacco products (HTP).

2. “Sin” and behavioral taxes

Basic economic theory argues for taxation levels to be directly related to harmfulness; Pigou (1920) argued that an efficient mean to correct externalities is to introduce a (Pigouvian) tax or subsidy that may help producers and consumers to “internalize the externality”, i.e. fully take into account the harms and benefits stemming from production and consumption of particular goods. It is explicit in this theory that a Pigouvian tax should correct for the amount of harm (or benefit) imposed on the economy, and that the optimal tax rate should be related to the elasticity of consumption and production (i.e. how much consumers and producer may react to changes in prices generated by taxation). This concept is very close to the one of “behavioral taxes”, according to which government tax policy is designed not only to raise revenues, but also to incentivize (or nudge) consumers towards particular consumption behaviors.

The economic rationale of this is explained by Gruber and Koszegi’s (2002, 2004) model. Their argument is that some consumers are imperfectly able to predict

the addiction caused by cigarette consumption, and therefore are more likely to start smoking. If this is the case, taxes on cigarettes need to compensate both for the externality (the damage smoking imposes on others) and the internality (the damage one imposes on oneself as a result of the inability to correctly anticipate addiction). Taxes on traditional tobacco products such as factory-made cigarettes (FMC) may also prevent some consumers from falling into addiction, and therefore bring positive utility to those consumers. As poorer individuals are more sensitive to price, these taxes are relatively more effective in discouraging poorer individuals from smoking, which makes them also less regressive than commonly thought.

These models do not consider a plurality of tobacco products, but strongly connect the level of taxation with the level of harm (externality) and addiction (internality). This is also confirmed by O'Donoghue and Rabin's (2003, 2006) models, who argue that "sin taxes" are justifiable as long as some consumers fail to exercise perfect foresight and self-control, for example by starting to smoke, failing to save for retirement, overeat.

Empirical analysis of taxation of harmful products such as tobacco, alcohol and (more recently) sugary drinks points towards the fact that taxes are (at least

partially) transmitted onto prices, and that consumption is indeed affected by taxes. This is especially true for those consumers who are more sensitive to prices, typically younger and lower-income individuals.

For example, Elder et al. (2010) confirm the effectiveness of alcohol taxation in reducing consumption and its related harm. Similarly Wagenarar et al. (2009) perform a meta-analysis of alcohol taxation and find a price elasticity between -0.77 and -0.51 (i.e. a 1% price increase leads to a drop in consumption between 0.51% and 0.77%), even if consumers with more rigid demands (including heavy drinkers) seem less responsive to price.

As policy makers in the USA and beyond have become more concerned of the social cost of obesity (see for example Vartanian et al., 2007; and Gortmaker et al., 2009), taxes on sugary drinks have become more common. Among others, Seiler (2019) found that introducing taxes on sugary drinks in Philadelphia lead to a 22% drop in consumption and 16% drop in calory intake, once they accounted for the effect of tax avoidance (out-of-town purchases).

These theoretical and empirical contributions typically analyze the case of taxing a specific good and argue for a taxation that is proportional to both the externality and internality produced by it. Relatively little work has been done to

explore taxation of a plurality of harmful products with different levels of harm and potential substitutability or complementarity. This is somehow at odds with the fact that excise and taxation policies do differentiate between different products: wine, beer and spirits are taxed differently, sugary drinks are sometimes taxed according to the sugar content (or added-sugar content), tobacco products and the variety of Noncombustible Nicotine or Tobacco Products (NNTPs) are also taxed differently. Also from the environmental point of view, taxes on pollutants are often differentiated according to their harm: Diesel and LPG are taxed differently from regular petrol, road tax in some countries is based on CO₂ emissions; and then of course there is the EU Carbon trading system. In all these cases we see a tax system, which differentiates according to level of harm. Chaloupka et al.'s (2015) recommendation is to tax according to the quantity of harm (or harmful ingredient); tax policy across countries surely shows heterogeneity in taxation of harmful products, at times in ways that match very imperfectly the level of harm, but respond to particular policy preferences (e.g. the UK taxes wine more than beer, but France does the opposite).

Evidence of substitutability between tobacco products

Research on tobacco products and in particular on NNTPs (be it heated tobacco products or e-cigarettes) has tried first to establish whether these are substitutes or complements of traditional factory-made cigarettes, and secondly to understand if NNTPs may act as “gateway” towards the consumption of cigarettes. This interest stems from the fact that there is now sufficient consensus that the harmfulness of NNTPs is substantially lower than the one of traditional combusted tobacco products (McNeill et al. 2018; US Surgeon General, 2018). Impact on respiratory disease seems to be lower: for example, Nutt et al. (2013) report expert polls according to which e-cigarettes are 5% as harmful as traditional ones. Also emissions of harmful particles and compounds is substantially lower (Mallock et al., 2018). While it is too early to say anything about the long-term impact, it is known that combustion is responsible for the cancerogenic effects of traditional cigarettes, and that NNTPs are conceived exactly with the aim of delivering nicotine without combustion. Authors are therefore debating whether NNTPs and cigarettes tend to be consumed together (complementarity) or if instead they are perceived by consumers as substitutes. Data availability is increasing, and many researchers leveraged into large surveys

such as the Nielsen Retail Survey to measure how the impact of NNTPs and FMCs taxation has affected consumption of both classes of products in the general public or in specific subpopulations, such as youth or pregnant women. These analyses typically rely on difference-in-difference techniques and on the heterogeneous implementation of taxes across time and space in the United States - i.e., they investigate the consumption of all tobacco products before and after the implementation of taxes on NNTPs, comparing areas of the US that introduced NNTP taxes with areas that did not. NNTP taxation has been introduced by some states (or counties) typically setting taxes at lower level than traditional cigarettes (albeit with some difficulty in defining the unit of measurement, given the heterogeneity of the products available to consumers). The outcome of these analyses is robust across techniques and data sources, but the short history of these products, the relatively small market share at the time of analysis, and the relatively small variability in taxes imposes some caution when applying these findings in other contexts.

Typically, these studies find a strong negative own price elasticity, such that an increase in taxation is passed through to prices and decreases consumption in a statistically significant way. This is true

both for traditional tobacco products and for NNTPs. Cotti et al. (2020), using Nielsen Retail scanner data, find a -1.3 own price elasticity for e-cigarettes and -0.39 for traditional cigarettes. NCI (2016) find a -0.4 tax elasticity for traditional cigarettes, and IARC (2011) argue that the short-run price elasticity is likely to be about half the long-run level and that poorer people tend to be more responsive to price changes.

More interesting to us, though, is the cross-price elasticity, i.e., the effect that changes in the price of a good may have on consumption of another good. Studies relying on Nielsen Retail Scanner data highlighted that e-cigarettes and traditional cigarettes are economic substitutes (Allcott & Rafkin, 2020; Cotti et al., 2020; Huang et al., 2018; Stoklosa et al., 2016; Zheng et al., 2017; Pesko and Warman, 2019 on youth); this is confirmed by other studies relying on survey data (Saffer et al., 2020; Pesko et al., 2020).

Cross-price elasticity is found to be typically higher for youth (2.2 according to Pesko and Warman, 2019) than for the general population (0.34 according to Abouk et al., 2021). Most of this evidence is from increases in NNTP taxes, i.e., it shows that increasing taxes on novel products had the effect of reducing consumption (and also initiation) of those products, but at the expense of an increase

in consumption (and initiation) in traditional tobacco products. This result, albeit not surprising theoretically, needs to be stressed, as it is evidence that introducing or increasing taxes on NNTPs shifted some consumers towards more harmful products (traditional cigarettes).

Scientists still debate whether NNTPs use is mostly “dual” and complementary, i.e., if most NNTPs users are also traditional smokers. US Surgeon General (2016) points towards a widespread dual use. At the same time, both a randomized control trial in the UK (Hajek et al., 2019) and population studies (West et al, 2016; Beard et al, 2016, 2017; Zhu et al., 2017) found that NNTPs were more successful than alternative methods in helping people to quit smoking. A number of other works point out to NNTPs as successful means to quit smoking, with heavy e-cig users be likely people who successfully quit, while moderate e-cigarette users to be likely to be dual users (Levy et al., 2018; Giovenco and Delnevo, 2018; Berry et al., 2019; Kalkhoran et al., 2020; Gralsser et al., 2021; Wang et al., 2021)

All this points towards evidence of that NNTPs and traditional cigarettes are mostly substitutes, and call for a tax policy that may take this into account.

Furthermore, current dual use could be the symptom of a positive dynamic process of

behavioral adaptation. We should not interpret the current ratio of dual use as a static picture, as today’s dual usage could be the first step towards fuller substitution of combusted products with less harmful alternatives. Interpreting correctly dual usage could have an important role in better understanding the market’s dynamics and could be decisive in the fight against smoking.

Differential taxes for different harmfulness

To our knowledge, Hagedorn and Wang (2021) is the only theoretical work that tried to build an optimal taxation theory explicitly aiming to describing markets composed by a plurality of harmful products with different levels of harmfulness. Having in mind the tobacco market in particular, they argue that in presence of substitutability between goods of different risk levels optimal taxation should maintain a substantial differential that mirrors the risk level. This will veer consumption towards less risky alternatives. The authors also go one step forward, arguing that this may also incentivize innovation, i.e., investment by firms directed to develop low-risk products that may be perceived as substitutes by consumers. In this scenario, a sort of “fiscal forward guidance” would be achieved, i.e.,

a tax policy able to shift both production and consumption towards less risky alternatives.

This theoretical contribution is confirmed by a number of empirical analyses that look into the optimal taxation of novel tobacco products (among others Bird, 2015; Abouk et al., 2016; Chaloupka et al., 2019; Kenkel et al., 2020; Pesko et al., 2020; Freitas et al., 2021; Pesko and Warman, 2021, and also Hagedorn and Wang, 2021 itself).

3. The EU and WHO Framework

EU Directives 2011/64 and 2014/40 aimed at harmonizing regulation and taxation for all tobacco products, in accordance with the WHO Framework Convention for Tobacco Control. The overarching objective of these directives was to promote “a high level of health protection” of citizens and maintain a single market also for tobacco products, taking into account “any new developments based on scientific facts.” (Art. 8, 2014/40). The “high level of health protection” is particularly directed at novel tobacco products, whose health effect was surely less known in 2014 than today.

These directives need also to be looked in conjunction with the “Europe’s Beating Cancer Plan” (EU Commission, 2021), in which tobacco control and protection from

hazardous substances sits in the foreground. Nine out of ten cases of lung cancer are related to smoking, and tobacco regulation and taxation is seen as “the most effective instrument to fight tobacco consumption, particularly in deterring young people from starting (EU Commission, 2021, p. 9). This document explicitly mentions that extending taxation to “new tobacco products” should be part of this strategy.

It is likely that an updated version of the Tobacco Tax Directive (TTD) will both increase the current level of minimum tax rates and encompass new products such as NNTPs.

4. A risk-based proposal for tobacco taxation

In Directive 2011/64, minimum excise taxes (MET) are currently set at 90 Euros per thousand cigarettes and at least 60% of the weighted average retail price jointly; in case this joint criterion fails, there is a further “escape clause” set at 115 Euros per thousand cigarettes, calculated on the weighted average price. In the EU27, the tax level of FMC is currently at 161 Euros per thousand cigarettes, substantially above the minima. The directive does not mention NNTPs, which are currently taxed at much lower rates, with e-cigarettes taxed 98% less than FMC (4 Euros per

177.62ml, equivalent to 1,000 FMC stick) and HTP taxes 77% less (37 Euros per 0.31kg, equivalent to 1,000 FMC stick).

Many Western European countries have set tax rates which are amply higher than the minima (e.g. 330 Euros in France, 165 Euros in Germany); in these countries FMC excise duties may not be affected (or as affected) in case these minima are raised. The opposite is true for most Eastern European countries, who tend to be much closer to the minima.

I will compare the effects of different taxation scenarios in terms of consumption and health outcomes.¹ We will compare three scenarios: (i) “status quo,” where minimum excise tax regulations are left unchanged, (ii) a “2020 Differential” scenario, where minima are doubled (180 Euros per thousand cigarettes for FMC), but tax differentials between FMC and novel products are increased to the 2020 EU-wide average levels, (iii) a “full equalization” scenario in which minima are doubled and applied to FMC and novel tobacco products alike. This allows to compare current regulation with the likely outcomes of the TTD updates, highlighting the differential effect of full equalization as opposed to risk-based policies, where taxation instead is linked to harmfulness. In

Figure 1 we show the current level of taxation for FMC, e-cigs and HTP in the EU27 (average values), France and Lithuania, and compare them with the figures in the two alternative scenarios.

France and Lithuania are paradigmatic of two very different, but common situations in the EU. France was chosen as its taxation level for FMC and HTP is so high that any reasonable increase in MET would not affect FMC taxation in France; e-cigarettes are instead untaxed, so the “2020 differential scenario” would see only an increase in e-cig taxation, and even stronger increases in the full equalization scenario. Based on the lessons accumulated by previous research in the field, these tax changes are likely to push consumers back towards FMC.

Lithuania was chosen as its taxation level is close to the current minima, and many consumers have already switched to HTP, which is taxed about 70% less than FMC. In this country increasing the minima would actually affect pricing. Once again, closing the tax gap between product categories would transfer consumers back to FMC.

¹ As a member of Pivot Regulatory’s advisory board, I had access to their market research data. The

scenarios - a. Status Quo; b. 2020 Differential; c. Full Equalization - are based on such data.

5. Data

Building blocks of this scenario analysis are (i) own- and cross-price elasticities for the EU27 regarding five products of interest (FMC, fine cut, e-cigs, HTP, and non-domestic products), (ii) projections on market evolution for innovative product markets, (iii) assumptions on how consumers move across markets. From these elements, together with the application of specific tax regimes, we can calculate consumption and translate these into smoking prevalence results.

In addition, country-specific demographic changes are also taken into account in the analysis.

Elasticities of consumptions for FMC and NNTPs are taken from recent literature, which is mostly based on US data (See Huang, 2018; Maier-Rigaud, 2013; Prieger, 2018; Zheng, 2017). For example, the own-price elasticity is calculated as -0.98 for FMC and -2.05 for HTP, i.e. a 1% increase in own price generates a 0.98% drop in consumption in the FMC market and a 2.05% drop in the HTP market, while a 1% increase in the FMC price generates an *increase* of HTP consumption by 1.06% (cross-price elasticity).

FMC, e-cigs and HTP products are on very different growth paths: FMC are an old,

established product, e-cigs have been around almost two decades and experience a slower growth, while HTP are fairly new in European markets, have a small market share but a rapidly increasing success. The model assumes a 10% annual growth rate for e-cigs, with growth decreasing 17% per year, while HTP is assumed to have a 27% or 33% annual growth in 2020, depending on each country's market maturity, with younger markets growing faster and growth rates decreasing 28% per year. These growth rates are fairly conservative assumptions based on market data from Italy and the United Kingdom, and are to be considered as the growth paths in absence of tax increases. In fact, both academic research and anecdotal observations show how important tax hikes may dramatically affect the market penetration of new products.

Finally, consistently with empirical evidence it is also assumed that increased demand for NNTPs is fully originating from conventional products and smuggling/cross-border shopping, i.e., that no initiation happens with e-cigs or HTP.

Results regarding smoking prevalence are reported in Figures 2-4. What is clear for all the three cases (EU27, France and Lithuania) is that a full equalization between FMC and NNTP implies a very

large relative increase of taxation on NNTP with respect to FMC. As the two markets are linked and the two products are (empirically) economic substitutes, this implies a relative push of consumers towards the more harmful traditional tobacco products. This generates a very mildly decreasing smoking prevalence and a very small reduction in the number of (traditional) smokers (Figures 2-4). The prevalence would decrease in the EU27 by only 4 percentage points until 2030, but will reduce by only 0.4 percentage points in France. The French result is particularly interesting, as this is mostly caused by the fact that a strong tax increase in NNTPs would just stop the NNTP market from developing in a significant way.

The other two scenarios are instead quite similar to each other. Both in the status quo and in the “2020 differential” (i.e., doubling minima on FMC, increase tax differentials to EU average if the other products are taxed at a lower level) smoking prevalence drops significantly: the EU-wide figure is at about 6 percentage points smaller than in 2020. Here the results highlight a stronger effect for the doubling tax scenario vs. the status quo. ²In many countries, doubling the minima on FMC and maintaining the

tax differential implies a sharp *absolute* increase in NNTP taxes, while the effect on FMC taxes may be less sharp, as taxation on FMC is often already above the current minima. The increase in FMC taxes pushes many smokers away from that market, but this effect is not as strong, as some smokers are discouraged to switch to NNTPs, as also NNTP taxation has increased. For some consumers, this means remaining in the more harmful FMC market instead of switching to the less harmful NNTPs. In other words, the parallel increase of taxes on FMC and NNTPs decreases the willingness to switch towards NNTPs of traditional smokers.

6. Conclusions

This report started highlighting how theoretical economic literature on behavioral taxes unanimously points towards taxing harmful goods according to their level of harm; empirical literature also points towards some level of substitutability between traditional and innovative tobacco products, which reinforces the rationale for taxing according to the level of harm.

The implication is that reducing smoking prevalence cannot be achieved simply by

² Assuming an MET of 180€, smoking prevalence for the 2020 differential scenario is lower (18.1%) than in

the status quo scenario (18.4%). With an MET of 140€, smoking prevalence in the status quo scenario is lower

setting higher taxes on more harmful products. Considering cross-market interactions, lower taxes should be levied on less harmful products, in order to push consumers away from more harmful consumption choices.

When we translate these concepts into scenarios for the EU tobacco products' market, market projections based on conservative assumptions reveal that maintaining an important tax differential between traditional cigarettes and non-combustible alternatives such as e-cigarettes and heated tobacco products is very effective in substantially decreasing smoking prevalence, even if the tax minima on traditional products were to increase.

Funding

This article is commissioned by PIVOT Regulatory. The views expressed are those of the author, and not necessarily those of PIVOT Regulatory.

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Figure 1: Tax levels for FMC, e-cigarettes and HTP in the EU27, France and Lithuania across the three different scenarios

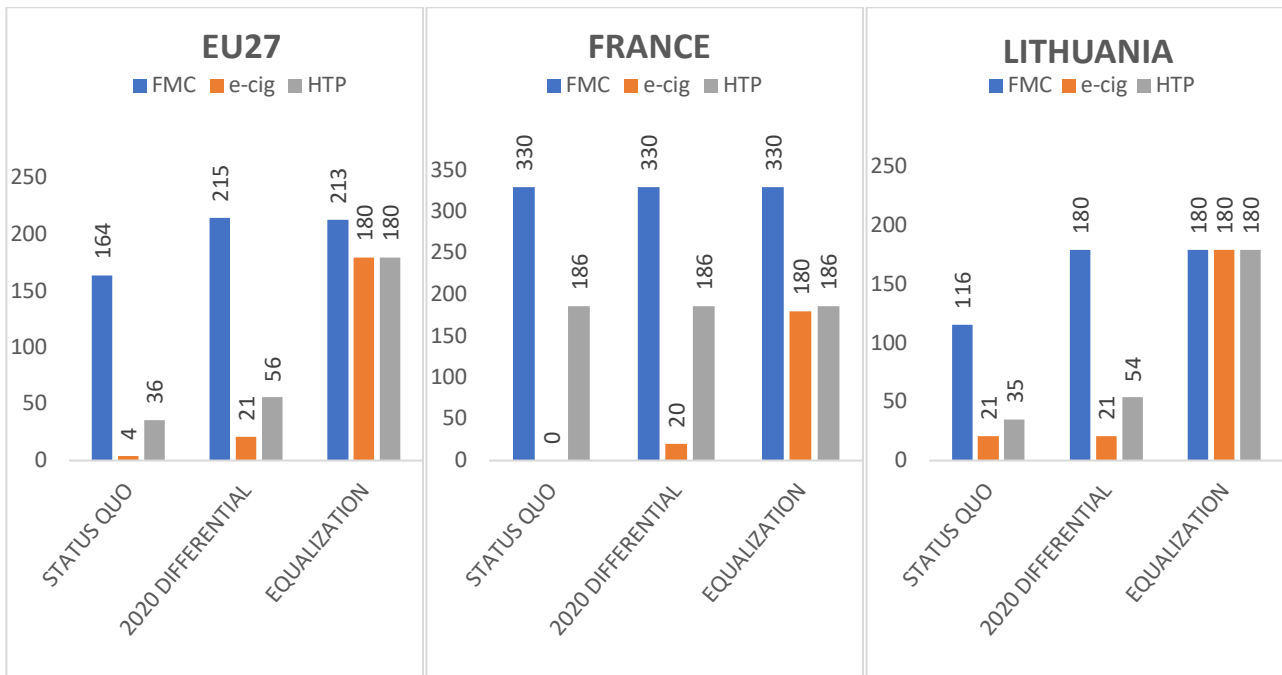


Figure 2: Evolution of Smoking prevalence in the EU27

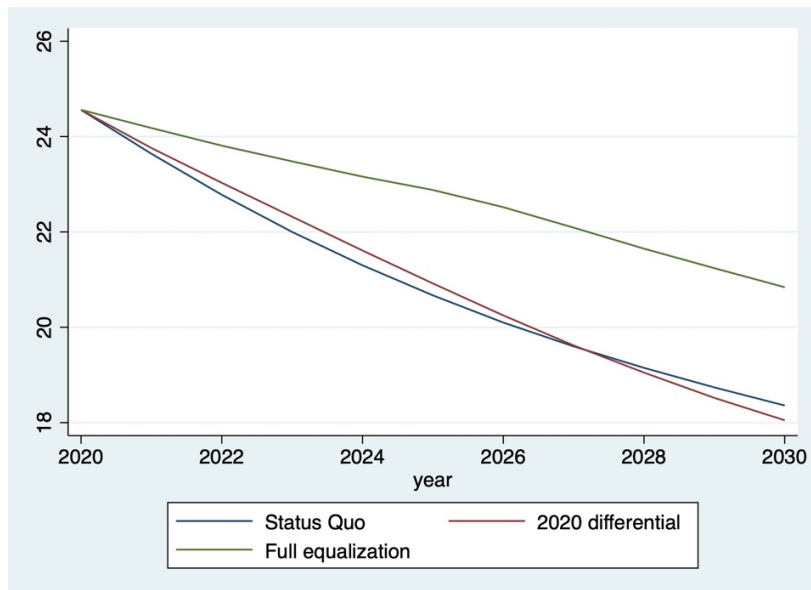
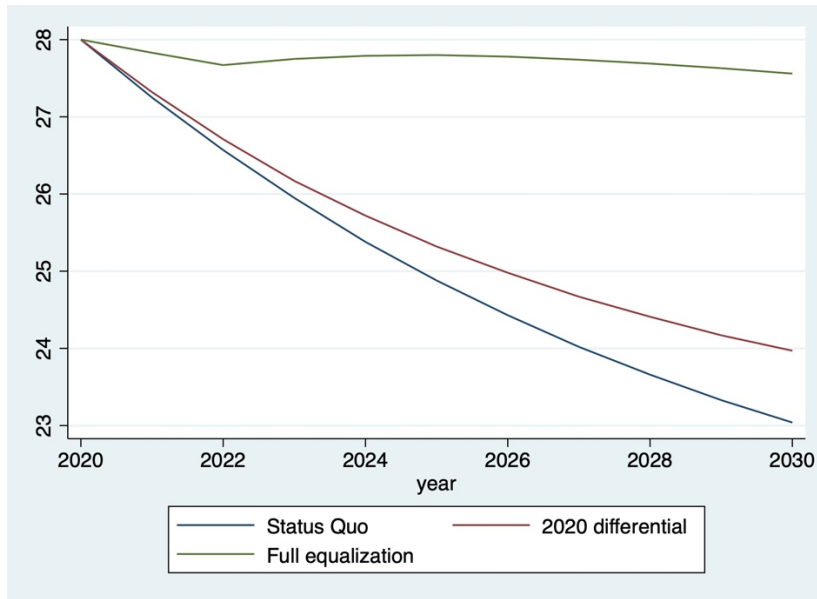


Figure 3: Evolution of Smoking prevalence in France



xw

Figure 4: Evolution of Smoking prevalence in Lithuania

