Understanding Variations in Tobacco Control Policies across European Countries

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**Abstract:** Since tobacco use is the leading preventable cause of death, disability and social inequality in health in the world, various policy instruments have been designed to fight the so-called tobacco epidemic. In 2003, the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) introduced policy design based on best practices in tobacco control and responsibility for tobacco control has shifted from individual countries to a global level with the WHO’s leading role. However, the implementation process shows quite a mixed picture both in terms of individual measures adopted and implementation rates across individual countries in the world and the same applies to Europe. Tobacco policies remain far from comprehensive in many countries and there is considerable variation in the timing and design not only within Europe but also among EU member states. In this paper, a systematic comparative approach is used in order to understand variations in tobacco control across European countries focusing on different paths by which policy design may emerge. Using a fuzzy set qualitative comparative analysis (fsQCA) of 28 European countries, I find little support for simple explanation using one or a few necessary or sufficient conditions. Quite the contrary, I argue that there is a great variation of conditions among European countries. The analysis confirms that both comprehensive and weak tobacco control cannot be explained by a single factor and they have multiple causes.

**Keywords:** tobacco control, policy design, Europe, fsQCA

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Introduction: Policy Instruments for Tobacco Control and Their Adoption in Europe

Since tobacco use is the leading preventable cause of death, disability and social inequality in health in the world, various policy instruments have been adopted at the local, national, and even global levels in order to fight the so-called tobacco epidemic. In tobacco policy, both demand and supply reduction strategies have been employed and individual tobacco control measures can be divided into five main categories (Cairney, Studlar, & Mamudu, 2012, p. 14; Studlar, 2006, p. 369):

1. Regulation of tobacco advertising and promotion, tobacco sales, smoking in public places, tobacco ingredients and customs control;
2. finance, including taxation, spending on health services, economic incentives and litigation against tobacco companies;
3. capacity-building, transfer of resources to anti-tobacco organizations;
4. public education, such as mass media campaigns and health warnings on cigarette packages; and
5. learning tools, such as funded scientific research, government reports, publication of tobacco industry documents from litigations.

Although not completely mutually exclusive, these categories follow an established classification of policy instruments and indicate differences in design and the degree of coercion. Various tobacco control regimes emerge from country-specific combinations of these policy tools ranging from low-control regimes to high-control regimes (Marmor & Lieberman, 2004, pp. 278–279).¹

Furthermore, concrete policy measures from all these categories are included in the World Health Organization Framework Convention on Tobacco Control (WHO FCTC), unanimously endorsed by all member states in 2003. The FCTC introduced policy design based on best practices in tobacco control modified by what could be agreed upon by the participating parties (Shibuya et al. 2003).² It was the first time WHO has used its constitutional authority in global public health and effectively started global action to control tobacco (Wipfli et al., 2004). As pointed out by Mamudu, Cairney and Studlar (2015, p. 860) the transnational nature of tobacco policy was formally recognized by the international community and responsibility for tobacco control shifted from individual countries to the global level with the WHO in the leading role.

Adoption of the WHO FCTC and the preceding negotiation process itself (Wipfli & Huang, 2011) have led to an overall rise in worldwide tobacco policy adoption. However, detailed analysis of the implementation process shows quite a mixed picture both in terms of individual measures adopted and implementation rates across individual countries. Comprehensive tobacco control can be found in only a very few leading countries while in the rest policy change is moderate at best and non-existent at worst (Cairney & Mamudu, 2014, p. 508; WHO, 2012). Overall, the country-by-country picture is mixed and simple distinctions such as ‘developed/developing’ fail to give us a reliable indicator or predictor of progress.

¹ Marmor and Lieberman (2004) also discern two extreme regimes – hands-off and prohibitionist.
² Following the FCTC, the mnemonic MPower measures have been promoted by WHO: Monitor tobacco use and prevention policies; Protect people from tobacco smoke; Offer help to quit tobacco use; Warn about the dangers of tobacco; Enforce bans on tobacco advertising, promotion and sponsorship; Raise taxes on tobacco.
The same applies to Europe where adoption of tobacco control policies has been a predominantly recent phenomenon in most countries with a notable overall trend towards more restrictive tobacco control since the late eighties. However, European tobacco policy remains far from comprehensive and there is considerable variation in the timing and substance of tobacco control within Europe, the EU and also within EU member states (Cairney et al., 2012, p. 72; Joossens & Raw, 2014). Despite this, the EU has been without doubt an influential player in tobacco policy both globally and within Europe. It has been present at FCTC Intergovernmental Negotiating Body meetings and has facilitated negotiations among individual member states with different positions on tobacco control (Mamudu & Studlar, 2009). The EU has the capacity to coordinate, complement, and support public health efforts in this area.

However, tobacco policy still remains within the jurisdiction of individual states and actual tobacco policy design is the result of the interaction between international and national actors and more or less dominated by domestic actors and conditions (Mamudu et al., 2015, p. 858). Thus, in order to understand what factors lead to certain policy design and how to explain variations among countries, analysts should combine detailed knowledge of individual countries, cross-national evidence and contextual knowledge in a systematic empirical analysis. This is a challenging task, usually undermined by lack of comparable data, small samples of cases and the dynamic and complex nature of policy processes. It is not surprising that studies systematically comparing tobacco policy design across various countries are rather rare. Moreover, these studies often employ a linear, additive approach (e.g. regression analysis) while evidence suggests that the effects of different factors may not be linear. Also because policy design may emerge by different paths and in different contexts, deterministic comparative analysis, examining complex causality patterns (e.g. equifinality and multifinality), seems to be well suited for improving our knowledge on what conditions lead to certain tobacco policy designs.

The aim of this paper is twofold: 1) to understand cross-national variation in the comprehensiveness of tobacco control and 2) to systematically assess the explanatory power of the various arguments about this variation. Using a fuzzy set qualitative comparative analysis (fsQCA) of 28 European countries, I find little support for simple explanation using one or a few necessary or sufficient conditions. Quite the contrary, I argue that there is a great variation of conditions among European countries. Although the first fsQCA indicates that there is the clear path towards comprehensive tobacco control through the conditions expected in scholarly literature (high presence of health advocacy groups, public support for tobacco control, higher GDP per capita, control of corruption and weak influence of the tobacco industry), other combinations of conditions may also be hypothesized for European countries not included in this path. The second analysis reveals four paths leading to weak tobacco control through several so-called INUS conditions, i.e. conditions that are an insufficient but necessary part of a configuration which is itself unnecessary but sufficient for the occurrence of the outcome (Mackie, 1965). The paper shows that these four paths are not only empirically relevant in that they explain a substantial proportion of the cases in the sample but they also broaden our theoretical understanding of the combinations of conditions that may be conducive to weak tobacco control in Europe. In a nutshell, the analysis confirms that both comprehensive and weak tobacco control cannot be explained by a single factor and they have multiple causes.

In the reminder of this paper, I provide a brief review of the main groups of explanations of tobacco control emphasizing socio-economic, political and public policy explanations and formulate
corresponding hypotheses regarding comprehensive tobacco control. The next section introduces fsQCA as a method of analysis, the variables and data sources. The section which follows presents the main steps of the analysis, model specifications, and results. The last section discusses the findings and limits of the approach and offers suggestions for future research.

Explaining Tobacco Control Design and Change
The origins of modern tobacco control were set in the first half of the 20th century when the causal link between smoking and lung cancer was identified and brought to public attention. Later on, in the early 1970s the health effects of inhaling second hand smoke were found equal to those caused by active smoking. However, until the mid-80s only a few countries adopted at least some controls and regulatory measures (e.g. partial advertising bans, minimum age of sale requirements, and basic health warnings on tobacco packaging) and the tobacco industry was encouraged and often subsidized through tariff barriers, research assistance, and loans in many countries. Since then, tobacco control has undergone substantial development which changed the design of tobacco policies not only in the several “developed” countries leading the process, but all over the world (Studlar, 2006, p. 368).

Socio-economic situation
Various theoretical approaches have been employed in order to explain variations in tobacco policy designs across different countries. Globally, the distinction between developed and developing countries is often stressed showing the progress made by the former group as a guide for the latter. Since this distinction masks significant variations in each category and thus provides a rather blurred picture (Mamudu et al., 2015, p. 865), other broad socio-economic factors have been employed in order to explain these variations. For example, Perkins and Neumayer (2014, p. 860) assume that health is a normal good and thus there is greater societal demand for smoke-free laws in countries with higher per capita income. Similarly, Gallet et al. expect that per capita income might determine the youth access restrictions adopted in different U.S. states (Gallet, Hoover, & Lee, 2009) and in Europe (Gallet & Catlin, 2009). And while in the U.S. states with higher per capita income are more likely to adopt youth access restrictions, the European situation is quite the opposite. Nevertheless globally, it seems that richer countries tend to ban smoking in restaurants and bars (Perkins & Neumayer, 2014).

Hypothesis 1: Higher GDP per capita is a necessary condition for adoption of comprehensive tobacco control.

In another study of EU member states, Bogdanovica et al. (2011) investigated the relationship between overall national tobacco control policy enactment (measured by the Tobacco Control Scale – TCS, see below) and a range of national characteristics including economic development, social inclusion and quality of life. However, they do not find any significant correlation between the TCS scores for smoke-free policies and countries’ socio-economic characteristics.

Smoking prevalence and public support for tobacco control
(Cairney & Mamudu, 2014, p. 510) argue that both smoking prevalence and public support play an important role in the process of tobacco control adoption. Several studies have established a relationship between public attitudes towards smoke-free policies and actual policy design adopted. For example, Martínez-Sánchez et al. (2010) find out that countries with a higher score in the TCS also
have higher support towards smoking bans. Gallet and Catlin (2009, p. 147) conclude that higher cigarette consumption increases the probability of smoking bans in schools and health care facilities. Cairney et al. (2012) find that countries in which smoking prevalence declines and public opinion becomes more favourable towards control tend to adopt stronger tobacco control measures. It also seems that adoption of tobacco control measures further encourages public support for even stricter control (Pacheco, 2013). Similarly, Willemsen et al. (2012, p. 1) find that smokers in EU member states with a higher TCS score are more concerned about environmental smoke harm and that support for tobacco control measures is higher in countries that have more of these concerned smokers.

Hypothesis 2: Public support for increasing taxes on tobacco products is a necessary condition for adoption of comprehensive tobacco control.

On the other hand, Bogdanovica et al. (2011) and Willemsen et al. (2012) report no significant relationship between the TCS and smoking prevalence for 27 EU member states and the same applies to the global level (Perkins & Neumayer, 2014). It is also unclear what mechanism could explain this relationship. As pointed out by Boyes and Marlow (1996) and Gallet and Catlin (2009), higher cigarette consumption might lead to greater governmental concerns about health and thus to stricter tobacco control. An opposite explanation is that higher smoking prevalence also means a larger constituency and thus greater political power of smokers motivated to resist tobacco control (Perkins & Neumayer, 2014). This explanation seems to be more valid in the US where smokers are less supportive of greater regulation of the tobacco industry than in Canada, Australia and the UK (Moore et al., 2012).

Hypothesis 3: Lower smoking prevalence is a necessary condition for adoption of comprehensive tobacco control.

Interest groups, political power and lobbying

This leads us to traditional political science explanations of variations in policies by means of the interest and power of political actors within a given policy domain. It is assumed that economic dependence on tobacco-related industries undermines the adoption of smoke-free laws (Toshkov, 2013). In tobacco control literature, the influence of tobacco growers and the manufacturing industry on policy adoption both at the national and supranational levels has been extensively studied and key industry tactics such as using ‘front groups’, securing credible allies, direct lobbying or publicity campaigns well documented (Balwicki, Stokosa, Balwicka-Szczyrba, & Tomczak, 2015; Peeters, Costa, Stuckler, McKee, & Gilmore, 2015; Savell, Gilmore, & Fooks, 2014; Smith et al., 2010; Smith, Savell, & Gilmore, 2013). In government, the interests of the tobacco industry are often represented through the ministries of finance, agriculture or trade (Cairney et al., 2012) which may be reluctant to support tobacco control policy using the importance of tobacco growing and manufacturing for the national economy as an argument against comprehensive tobacco control.

Toshkov (2013) points out that both sectors rely on slightly different mechanisms. In tobacco growing countries, the economic importance of tobacco growing can put direct electoral pressure on politicians while in the case of cigarette manufacturing, the influence is more likely to be exercised through lobbying. His empirical analysis shows that the presence of tobacco production in a country prolongs the time until a smoking ban is enacted, and decreases the probability that the ban will be comprehensive and rigidly enforced. On the other hand, Perkins and Neumayer (2014) do not find a significant relationship between tobacco control and tobacco production at the global level and the
same applies for tobacco growing and manufacturing in the EU-15 (Studlar, Christensen, & Sitasari, 2011).

_Hypothesis 4:_ Low presence of the tobacco industry is a necessary condition for adoption of comprehensive tobacco control.

In opposition to the “tobacco lobby”, anti-tobacco social movements have formed in many countries and have increased their influence substantially since the 1980s. Mamudu and Glantz (2009) suggest that civil society organisations advocating tobacco control which mobilised during the negotiation of the WHO FCTC (1999 – 2003) successfully influenced the parties’ policy positions and influenced the resulting convention. They have been guarding the FCTC implementation process and struggling to minimize tobacco industry influence (Mamudu et al., 2015). Similarly, based on qualitative semi-structured interviews with 35 stakeholders, Weishaar, Collin and Amos (2016) conclude that coalitions of supporters of comprehensive tobacco control policy have been crucial in achieving policy success not only internationally, but also at a national level.

_Hypothesis 5:_ The presence of active health advocacy groups is a necessary condition for adoption of comprehensive tobacco control.

Indeed, it is the overall political system that shapes the policy process in individual countries. For example, Albaek, Green-Pedersen and Nielsen (2007) compare the United States and Denmark and conclude that the structure of the political system has played a crucial role in the expansion of tobacco control issues from the public to the political agenda.

**Policy environment, party politics and corruption**

Tobacco control variations can thus be explained by other political factors and the overall policy environment of individual countries. Bosdriesz et al. (2015) analysed the relationship between TCS and both government political ideologies and effectiveness in various European countries with quite ambivalent results. While an association between left-wing governments and TCS was found over the period 1996–2003, this relationship was not valid over the whole period. Moreover, the association between government effectiveness and TCS was significant and negative over the whole period, but positive between 2001 and 2005. Thus, on the whole, there was only minor influence of national political factors on tobacco control in the in the 11 selected European countries. Nevertheless, the authors suggest that “left-wing governments were important for early adoption of tobacco control policy, and high government effectiveness was important in the phase of adopting innovative policies. However, since 2002, with the advent of international treaties, the influence of national politics has diminished.” (Bosdriesz et al., 2015, p. 190) Thus, government ideology is rather irrelevant and tobacco control does not represent a strongly partisan or electoral issue (Cairney et al., 2012; Studlar et al., 2011).

In spite of this, at a more general level, governments with greater involvement in the economy are hypothesized to be more likely to adopt tobacco control measures. In particular, higher health care expenditures may suggest a stronger health sector profiting from anti-smoking laws and thus having an inclination towards stricter tobacco control (Studlar et al., 2011). This explanation seems to be valid for US states (Shipan & Volden, 2006) and partially also for European countries (Studlar et al., 2011). Gallet and Catlin (Gallet & Catlin, 2009, p. 147) attribute the largest overall impact to the decision to adopt tobacco controls in health care spending, especially in the case of restrictions on tobacco sales.
to youths. However, overall government involvement in the economy, measured by the Heritage Foundation’s Index of Economic Freedom, appears to be insignificant (Gallet & Catlin, 2009). Also, contradictory results come into view if we try to establish a link between health care spending and tobacco control globally (Perkins & Neumayer, 2014).

The last but not least “environmental” factor influencing tobacco control adoption that can be found in academic literature is corruption. According to Bogdanovica et al., corruption (measured by Transparency International’s Corruption Perceptions Index) “appears to be an important risk factor for failure of national tobacco control activity in EU countries, and the extent to which key tobacco control policies have been implemented.” (2011, p. 1)

_Hypothesis 6_ Control of corruption is a necessary condition for adoption of comprehensive tobacco control.

**Policy transfer and learning**

The FCTC negotiation process has been a strong impetus for expansion of tobacco control policies worldwide. Wipfli and Huang (2011) suggest that the negotiation process itself coincided with a rise in domestic policy adoption in the direction advocated by the WHO. Mamudu, Cairney and Studlar (2015, p. 864) pointed out the active role of the WHO in sharing scientific knowledge, framing tobacco as a health issue, and promoting comprehensive tobacco control as an evidence-based and effective policy solution. In Europe, policy transfer is influenced by the EU which has strived for common tobacco control policy through directives and recommendations, accession rules for new members, tobacco control campaigns, and financial support for anti-tobacco NGOs etc. (Mamudu & Studlar, 2009). As such, the EU “acts increasingly as the hub for policy diffusion - setting a policy framework, passing regulations that member states are often obliged to adopt, and encouraging the wider process of voluntary transfer when member states and interest groups share ideas.” (Cairney et al., 2012, p. 73)

For example, Studlar et al. (2011) find policy diffusion to be a significant factor in EU tobacco control adoption. In particular, application for EU membership and later accession seem to strongly influence tobacco control in the accession countries towards more diverse policy measures and more comprehensive policy overall (Cairney et al., 2012, p. 76). However, there are still EU member states that have strongly opposed EU-wide tobacco restrictions (Duina & Kurzer, 2004). Also, as pointed out by Studlar (2015) in the case of Ireland, EU members may utilise diffusion of research and policy from other non-EU countries and organizations, especially within the English-speaking sphere. And finally, there are a few European countries that have quite comprehensive tobacco control despite the fact that they are not in the EU (e.g. Norway, Turkey and Ukraine). Another hypothesis thus would be that EU membership is not a necessary condition for adoption of comprehensive tobacco control. But such a hypothesis is not relevant here because of the low representation of non-EU countries in the sample (see Method and Data section below).

To conclude, several main explanations of variations in tobacco control policies can be found in the literature. Especially in policy science studies, these explanations are assessed together and the authors aim for a complex understanding of policy design and while this usually works for individual countries or very small-N comparisons (e.g. Albaek et al., 2007; Cairney, 2009; Currie & Clancy, 2011; Studlar, 2005, 2015), it is difficult to draw clear conclusions for Europe or even globally (Mamudu et al., 2015; Marmor & Lieberman, 2004).
Method and Data

Qualitative Comparative Analysis (QCA) was developed by Ragin (1987) as a middle course between qualitative and quantitative social research and has been widely applied in political science in general, and public policy analysis in particular (Rihoux, Rezsöhazy, & Bol, 2011). QCA embodies holism and thick description of complex cases as key strengths of the case-oriented approach and, at the same time, it allows for generalizations and is replicable (Kouba, 2011; Rihoux, 2006). The method is based on set-theoretic relations and is designed to detect how complex sets of conditions are related to the outcomes of interest. The basic units of analysis are the set and sub-sets of causal conditions and individual cases are considered in terms of membership in them (ranging from 0 – non-membership to 1 – full membership).

Causal relations are expressed in terms of necessity and sufficiency. In general, a condition is necessary if an outcome cannot be produced without it and sufficient when it can produce the outcome by itself. Relationships among sets are expressed in terms of the logical operators AND and OR. QCA is considered both as an analytical approach and as a set of techniques, namely crisp-set QCA, multi-value QCA and fuzzy-set QCA. The QCA procedure is similar for all three versions, with some specificities and enrichments for the latter two (Rihoux & Ragin, 2009; Schneider & Wagemann, 2012).

Assuming previous theoretical and empirical work and constitution of the population of cases, the first step in QCA is to produce a data table, in which each case displays a specific combination of conditions and an outcome. In the earliest versions (csQCA), variables were simply dichotomized according to the presence and absence of each condition. In a later version of the method (fsQCA), set membership need not be restricted to binary values but can be defined by intervals between full set membership and full set non-membership among both conditions and outcomes. Then, a ‘truth table’ is produced displaying the data as a list of configurations (a given combination of some conditions and an outcome). The table provides a first step towards synthesis of the data. The key following step is Boolean minimization shortening the truth table description to the minimal formula (a list of the prime implicants) and unveiling the regularities in the data. In the last step, the minimal formula is interpreted in terms of causality.

Outcome: comprehensive tobacco control

In policy design in a given policy subsystem, country and time can be seen as an outcome of the foregoing policy process. In tobacco control, the adoption of individual policy instruments such as advertising bans or health warning labels constitute specific (national) tobacco policy design. Such policy can be assessed for its comprehensiveness in terms of coverage and degree of concert with WHO recommendations. For example, Article 11 of the FCTC calls for labelling and packaging of tobacco products that carry health warnings describing the harmful effects of tobacco use which “should be 50% or more of the principal display areas but shall be no less than 30% of the principal display areas” (WHO, 2003, p. 10). Thus, for each country, we may ask whether labelling of tobacco products are adopted (coverage) and to what degree, e.g. what percentage of the display areas has to contain warnings.

In order to measure the adoption and implementation of tobacco control policies systematically at the country level, the so-called Tobacco Control Scale (TCS) was developed by Joossens and Raw (Joossens, 3 Due to space limitations, I do not provide a description of Boolean algebra and the related techniques here.)
TCS is based on expert evaluation of countries in six domains: 1) price increases through higher taxes on tobacco products, 2) bans/restrictions on smoking in public places and workplaces, 3) public information campaigns, 4) comprehensive bans on advertising and promotion of tobacco products, 5) large, direct, health warning labels on cigarette packages and 6) treatment to help dependent smokers quit, including medication (for more details, see Joossens, 2006; Joossens & Raw, 2014).

This study uses the total TSC score in 2013 as an outcome (dependent variable) indicating the comprehensiveness of tobacco control policies in a given country (the higher the TSC score, the more comprehensive tobacco control).

Causal conditions
Based on the hypotheses formulated in the theoretical section, I selected the following six causal conditions to be included in the fsQCA: public support, smoking prevalence, GDP per capita, corruption, tobacco industry presence and health advocacy groups.

Public support for tobacco control was measured by using data from public opinion surveys. In particular, support for increasing taxes on tobacco products was selected as a proxy variable related to both overall tobacco control support and support for the first domain of TSC (price increases through higher taxes on tobacco products). For the EU member states, I utilized data from the Special Eurobarometer 385: Attitudes of Europeans towards Tobacco from 2012. Croatia has been a member state from 1 July 2013 and is thus covered only in the later Special Eurobarometer 429 from 2014.4

Statistical data regarding daily smoking prevalence among adults and GDP per capita in current US$ (both for the year 2012) was retrieved from OECD Health Statistics and the World Bank respectively.

Several established measures of corruption can be found in the literature. For this analysis I used The Worldwide Governance Indicators (WGI), namely Control of Corruption (CC) which aggregates six representative and 16 non-representative sources into a single measure. CC captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. The WGI covers all countries and I used data for the year 2012.

Although there is no doubt about the existence of tobacco lobbying at the national and supranational levels (see above), it is hard to precisely estimate the influence of the tobacco industry. Direct lobbying expenditures and political contributions are tracked only in a few countries and more informal and disguised practices of executing influence such as strategic political relationships or payoffs have been revealed in recent litigations (e.g. Steele, Gilmore, McKee, & Stuckler, 2015). One way of promoting tobacco industry agendas and image is charitable donations. According to The Tobacco Atlas (Eriksen, Mackay, Schluger, Gomeshtapeh, & Drope, 2015), all major tobacco companies make such contributions in an effort to achieve “innocence by association”. Often, tobacco companies support projects that are in the interest of tobacco companies (e.g. an entrepreneurship program for young tobacco growers). The only global tobacco company providing data on its charitable giving in

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4 Question wording “Would you be in favour of or opposed to any of the following measures? Increasing taxes on tobacco products”.
comprehensive and publicly accessible form is Philip Morris International (PMI). I thus use the amount of charitable giving in the years 2009-2013 in US dollars (Eriksen et al., 2015).5

Another operationalization used in comparative studies focuses on tobacco growing as a part of a country’s economy. Tobacco production may generate not only employment, but also economic revenue for governments (Chaloupka, Yurekli, & Fong, 2012, p. 172). There are 16 tobacco growing countries in Europe and I use data on the quantity of tobacco produced in 2013 (official data or FAO estimates). Neither charitable giving nor tobacco growing can provide completely accurate information about tobacco industry influence on policymakers. These are just imperfect proxies but when combined together, they may at least roughly estimate tobacco industry presence in European countries. For this purpose, I recoded data into an ordinal scale ranging from 0 to 3 for both variables. In the case of charitable giving, value 3 is assigned to countries where PMI gave more than 1 million US dollars; value 2 for donations from 0.9 million to 101 thousand; value 1 for donations from 100 thousand to 400 thousand US dollars and value 0 for no donations at all. Regarding tobacco growing, value 3 is assigned to countries producing more than 20,000 tons, value 2 for production between 19,000 and 1,000 tons, value 1 for production between 999 and 1 ton, and value 0 for no production. Then, both variables were added up and calibrated for fsQCA (see Table 1).

While tobacco industry interests have to be ignored in order to achieve comprehensive tobacco control policy, support from medical and anti-smoking health advocacy groups is seen as crucial in achieving policy success nationally and internationally (Cairney & Mamudu, 2014; Weishaar et al., 2016). There are numerous health advocacy groups in European countries with various sizes and degrees of influence on national or supranational policymaking. To coordinate their efforts and increase their influence over the tobacco industry, anti-smoking/health promoting groups organize themselves in broader networks and umbrella organizations. Membership in such organization represents not only support for tobacco control but also willingness to actively participate in the cause and disseminate tobacco control ideas. For the purpose of my analysis, I selected the three most influential European umbrella organizations identified in tobacco control literature – the Framework Convention Alliance (FCA), the European Network for Smoking and Tobacco Prevention (ENSP) and the Smoke Free Partnership (SFP) – and counted up the number of members (FCA, ENSP) and partnering organizations (SFP) for each country.

To assign fuzzy set membership, I used the fs/QCA calibrate function which operates with three anchor points indicating 1) full membership in the set, 2) full non-membership in the set and 3) the point of maximum ambiguity, i.e. neither in nor out of the set (Ragin 2008). Table 1 displays the anchor points for the outcome and conditions.

**Table 1 – Calibration of the outcome and conditions**

<table>
<thead>
<tr>
<th>Outcome and conditions</th>
<th>Abbrev.</th>
<th>Membership function (anchor points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
<td>Abbrev.</td>
<td>Membership function (anchor points)</td>
</tr>
<tr>
<td>Tobacco Control Scale 2013 – total score</td>
<td>TCS</td>
<td>calibrate(tcs2013,70,50,35)</td>
</tr>
<tr>
<td>Conditions</td>
<td>Abbrev.</td>
<td>Membership function (anchor points)</td>
</tr>
<tr>
<td>Number of health advocacy groups</td>
<td>NGO</td>
<td>calibrate(ngo,10,4,5,0)</td>
</tr>
<tr>
<td>Public support for increasing tax on tobacco products</td>
<td>TAX</td>
<td>calibrate(taxsupport,70,50,35)</td>
</tr>
</tbody>
</table>

5 Although there are also other tobacco companies in Europe, PMI has the largest market share.
### Cases

The analysis includes 28 of the European countries covered by the latest TCS in 2013. Although the TCS 2013 covers 34 countries, six of them have been excluded from the analysis because complete data covering all conditions was not available: Iceland, Norway, Malta, Serbia, Turkey and Ukraine. There are 2 non-EU countries in the sample – Switzerland and Croatia (a member since 2014) and Switzerland is the only country which signed the WHO FCTC but has not ratified it yet. Overall, this selection follows common practice in an intermediate-N analysis and provides a good balance between the number of cases and the number of conditions (see Berg-Schlosser & De Meur, 2009).

Table 2 reports fuzzy scores for all variables and countries.

#### Table 2 – Fuzzy membership in the outcome and causal conditions

<table>
<thead>
<tr>
<th>Country</th>
<th>TCS</th>
<th>NGO</th>
<th>TAX</th>
<th>SMK</th>
<th>GDP</th>
<th>CCR</th>
<th>TBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>0.02</td>
<td>0.09</td>
<td>0.4</td>
<td>0.65</td>
<td>0.94</td>
<td>0.83</td>
<td>0.35</td>
</tr>
<tr>
<td>Belgium</td>
<td>0.35</td>
<td>0.69</td>
<td>0.82</td>
<td>0.52</td>
<td>0.92</td>
<td>0.9</td>
<td>0.14</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>0.31</td>
<td>0.42</td>
<td>0.57</td>
<td>0.86</td>
<td>0.07</td>
<td>0.2</td>
<td>0.61</td>
</tr>
<tr>
<td>Croatia</td>
<td>0.12</td>
<td>0.05</td>
<td>0.71</td>
<td>0.95</td>
<td>0.21</td>
<td>0.27</td>
<td>0.35</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0.03</td>
<td>0.09</td>
<td>0.88</td>
<td>0.76</td>
<td>0.71</td>
<td>0.8</td>
<td>0.05</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.04</td>
<td>0.42</td>
<td>0.65</td>
<td>0.64</td>
<td>0.48</td>
<td>0.35</td>
<td>0.61</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.31</td>
<td>0.27</td>
<td>0.93</td>
<td>0.14</td>
<td>0.98</td>
<td>0.98</td>
<td>0.05</td>
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<td>0.74</td>
<td>0.77</td>
<td>0.38</td>
<td>0.73</td>
<td>0.35</td>
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<td>0.27</td>
<td>0.96</td>
<td>0.14</td>
<td>0.94</td>
<td>0.97</td>
<td>0.05</td>
</tr>
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<td>France</td>
<td>0.74</td>
<td>0.95</td>
<td>0.27</td>
<td>0.69</td>
<td>0.89</td>
<td>0.86</td>
<td>0.61</td>
</tr>
<tr>
<td>Germany</td>
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<td>0.8</td>
<td>0.45</td>
<td>0.59</td>
<td>0.92</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>Greece</td>
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<td>0.42</td>
<td>0.08</td>
<td>0.98</td>
<td>0.56</td>
<td>0.17</td>
<td>0.95</td>
</tr>
<tr>
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<td>0.05</td>
<td>0.61</td>
<td>0.79</td>
<td>0.19</td>
<td>0.4</td>
<td>0.78</td>
</tr>
<tr>
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<td>0.69</td>
<td>0.9</td>
<td>0.69</td>
<td>0.95</td>
<td>0.86</td>
<td>0.05</td>
</tr>
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<td>0.16</td>
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<td>0.6</td>
<td>0.82</td>
<td>0.27</td>
<td>0.95</td>
</tr>
<tr>
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<td>0.05</td>
<td>0.23</td>
<td>0.83</td>
<td>0.22</td>
<td>0.35</td>
<td>0.35</td>
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<td>Lithuania</td>
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<td>0.27</td>
<td>0.2</td>
<td>0.59</td>
<td>0.24</td>
<td>0.4</td>
<td>0.35</td>
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<td>0.09</td>
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<td>0.05</td>
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<td>Netherlands</td>
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<td>0.68</td>
<td>0.28</td>
<td>0.95</td>
<td>0.96</td>
<td>0.35</td>
</tr>
<tr>
<td>Norway</td>
<td>0.84</td>
<td>0.16</td>
<td>0.82</td>
<td>0.08</td>
<td>1</td>
<td>0.97</td>
<td>0.14</td>
</tr>
<tr>
<td>Poland</td>
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<td>0.57</td>
<td>0.4</td>
<td>0.68</td>
<td>0.2</td>
<td>0.55</td>
<td>0.95</td>
</tr>
<tr>
<td>Portugal</td>
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<td>0.16</td>
<td>0.79</td>
<td>0.3</td>
<td>0.51</td>
<td>0.69</td>
<td>0.61</td>
</tr>
<tr>
<td>Romania</td>
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<td>0.69</td>
<td>0.68</td>
<td>0.52</td>
<td>0.09</td>
<td>0.17</td>
<td>0.78</td>
</tr>
<tr>
<td>Slovakia</td>
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<td>0.05</td>
<td>0.88</td>
<td>0.43</td>
<td>0.36</td>
<td>0.31</td>
<td>0.61</td>
</tr>
</tbody>
</table>
Results of fsQCA Analysis

The results are presented in equation form using letters as abbreviations for the conditions and the outcomes. TCS represents Tobacco Control Scale total score in 2013, NGO the presence of health advocacy in the country, TAX public support for increasing taxation of tobacco products, SMK daily smoking prevalence, CCR control of corruption, HEX total health expenditures and TBI the presence of the tobacco industry. Capital letters indicate the presence of a condition, while small letters indicate the absence of a condition (i.e. TCS means a high level of tobacco control while tcs means a low level).

For analysis, I used the fs/QCA 2.5 software (Ragin & Davey, 2014). First, I tested for necessary conditions for the outcome comprehensiveness of tobacco control (TCS). The conditions with the highest consistency are control of corruption (CCR) and GDP per capita (GDP), the first with a consistency value of 0.96 and the latter with a consistency value of 0.92 (see Table 3). In fuzzy sets, conditions with such high consistency are considered as necessary for producing the output (Ragin 2006). Also, both conditions are nontrivial (Goertz, 2003) and cover a substantial proportion of the outcomes (Ragin, 2006). However, I must point out that this finding is valid only for the given set of European countries. Countries such as Turkey or Ukraine, which were excluded from the analysis due to data availability (see Method and Data section), have achieved comprehensive tobacco control despite low control of corruption and GDP per capita. Thus, if included, they would be true logical contradictory cases (Schneider & Wagemann, 2012) and consistency would drop below the 0.90 threshold.

Table 3 – Analysis of necessary conditions for the outcome of comprehensive tobacco policy

<table>
<thead>
<tr>
<th>Condition tested</th>
<th>Consistency</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGO</td>
<td>0.74</td>
<td>0.63</td>
</tr>
<tr>
<td>TAX</td>
<td>0.88</td>
<td>0.40</td>
</tr>
<tr>
<td>smk</td>
<td>0.73</td>
<td>0.50</td>
</tr>
<tr>
<td>GDP</td>
<td><strong>0.92</strong></td>
<td>0.44</td>
</tr>
<tr>
<td>CCR</td>
<td><strong>0.96</strong></td>
<td>0.44</td>
</tr>
<tr>
<td>tbi</td>
<td>0.79</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Source: author

Then the truth table was generated in order to provide the distribution of the 28 cases across all logically possible combinations of causal conditions and each configuration’s empirical outcome (Ragin 2008). It reveals that 18 out of 64 logically possible configurations were empirically present leaving 46 logical remainders, i.e. configurations with no empirical observations. This means that the variation in

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*Capital letters indicate the presence of a condition and lower cases its absence.*
the data is limited, as not all possible configurations are observed empirically. Due to the quite high number of conditions used, the degree of limitedness is fairly high (72%).

Given the relatively low number of cases, the frequency threshold for selecting relevant configurations was set at 1, and the configurations with no cases were thus removed. The next step was to distinguish configurations that are consistent subsets of the outcome using the consistency value reported for each configuration (Ragin, 2008). The truth table shows imperfect consistency for all configurations ranging from 0.52 to 0.80 and thus indicates the presence of contradictory cases in each configuration. The consistency cut-off point was set at 0.79 which keeps only two configurations for further analysis, each with 2 cases.7

In the next step, I used Boolean minimization in order to identify the combinations of conditions sufficient for producing the outcome. This resulted in the complex solution shown below. The complex solution is the most conservative one because it doesn’t employ any simplifying assumptions regarding the hypothetical outcome of the logical reminders. As part of good practice, the parsimonious solution is also presented in a footnote (Schneider & Wagemann, 2012).8

In QCA notation, capital letters indicate the presence of a condition and lower cases its absence. Also, the symbol * refers to the intersection of sets (i.e. logical AND) and symbol + to the union of sets (i.e. logical OR). The fsQCA analysis reveals only one path leading to comprehensive tobacco control policy among European countries – the presence of health advocacy groups, public support for increasing tax on tobacco products, higher GDP, greater control of corruption and lower presence of the tobacco industry.

\[ \text{NGO}^*\text{TAX}^*\text{GDP}^*\text{CCR}^*\text{tbi} \rightarrow \text{TCS} \]

(coverage: 0.53, consistency: 0.78)9

However, this solution shows both quite low consistency and coverage.10 In particular, it covers only 53% of cases and among them, this combination of conditions is sufficient for producing comprehensive tobacco control in 78% of cases. Cases that are more in the set then out (i.e. with membership greater than 0.5) are the United Kingdom, Ireland, Belgium and the Netherlands.

Overall, the results confirm the expected inconsistency of conditions promoting adoption of comprehensive tobacco control policy. Nevertheless, one may ask what factors actually undermine adoption and thus lead to bad policy design? From a tobacco control perspective, this means that a country either has weak overall tobacco control or has adopted only a few strict instruments (e.g. higher tax for tobacco products) leaving other measures below the standard required by the WHO FCTC. Moreover, in reality, a majority of countries in Europe don’t even reach 50 points out of 100 on the TCS scale, and thus there are many more cases of poor tobacco control or even failure in some

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7 The next highest consistency score is 0.71. According to Ragin (2008) values below 0.75 indicate substantial inconsistency.
8 For the parsimonious solution, the positive cases are set as ‘true’, the negative cases as ‘false’, and the remainders as ‘don’t care’ (Vis, 2011, p. 244).
9 Parsimonious solution: NGO*TAX*GDP → TSC with coverage 0.62 and consistency 0.75.
10 Consistency assesses the degree to which the cases share a given condition or combination of conditions, i.e. how closely the subset relation is approximated, while coverage assesses the empirical relevance of a consistent subset (Ragin, 2006, p. 292).
countries. Such analysis is also relevant due to the asymmetric nature of concepts and causal relations. In a set-theoretic perspective, the explanation for the occurrence of the outcome cannot be simply used for explanation of the non-occurrence of the outcome (Schneider & Wagemann, 2012). In this case, one can expect quite different combinations of conditions when trying to understand the failure of tobacco control.

The fsQCA carries out this type of analysis by using the negation of an outcome variable. In fuzzy set, the negation is calculated as a simple subtraction of membership in a set from 1 (Ragin, 2008), i.e. tcs = 1 – TCS. Using the same conditions as in the previous analysis, the truth table reveals that 18 out of 64 logically possible configurations were empirically present (46 logical remainders, the degree of limitedness is 72%). The frequency threshold for selecting relevant configurations was set at 1 again, but contrary to previous analysis, the truth table shows quite high consistency for the remaining combinations (from 0.78 to 0.99). There are still contradictory cases present in each configuration but the consistency cut-off point can be set higher (0.93)\(^{11}\), which reveals 14 configurations covering 18 cases. The complex solution of Boolean minimization resulted in 8 combinations of conditions leading to weak tobacco control:

\[
\text{ngo*dailysmoking-fs*GDP*CCR + ngo*SMK*GDP*TBI + ngo*SMK*gdp*ccr*tbi + ngo*TAX*gdp*ccr*TBI + TAX*SMK*gdp*ccr*TBI + ngo*TAX*GDP*CCR*TBI + NGO*tax*SMK*Gdp*CCR*TBI + ngo*TAX*SMK*gdp*tbi} \rightarrow \text{tcs}
\]

(coverage: 0.61, consistency: 0.95)\(^{12}\)

In order to reduce the complexity of this solution, I employed a so-called intermediate solution since it is a preferable solution in an extensive fuzzy-set analysis (Ragin, 2008, p. 119). This solution is based on so-called easy counterfactuals (Ragin & Sonnett, 2005) aiming to simplify a complex solution without making unjustified assumptions. Easy counterfactuals have to correspond to the theoretical expectations about the expected contribution of each causal set to the outcome. For this purpose, I put forward the following assumptions based both on theory and empirical findings: TBI and SMK contribute to lower comprehensiveness of tobacco control while CCR, GDP, TAX and NGO lead to higher comprehensiveness. The intermediate solution resulted in 4 combinations of conditions leading to weak tobacco control:

\[
\text{SMK*ngo + TBI*ngo + TBI*SMK*ccr*gdp + TBI*SMK*gdp*tax} \rightarrow \text{tcs}
\]

(coverage: 0.66, consistency: 0.93)

This solution is highly consistent (0.93) and covers a satisfactory share of cases (66%). The four combinations that lead to weak tobacco control are 1) high smoking prevalence and low presence of health advocacy groups; 2) high presence of the tobacco industry and low presence of health advocacy groups; 3) high presence of the tobacco industry, high smoking prevalence, low control of corruption and low GDP per capita; and 4) high presence of the tobacco industry, high smoking prevalence, low GDP per capita and low public support for increasing tax on tobacco products. Any of the paths is sufficient, but not necessary, for producing the outcome.

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\(^{11}\) The next highest consistency score is 0.87
\(^{12}\) Parsimonious solution: gdp + ngo*SMK + ngo*TBI \rightarrow tsc with coverage 0.70 and consistency 0.90.
Table 4 – Four paths to weak tobacco control

<table>
<thead>
<tr>
<th>Path</th>
<th>SMK*ngo</th>
<th>TBI*ngo</th>
<th>TBI<em>SMK</em>ccr*gdp</th>
<th>TBI<em>SMK</em>gdp*tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries with greater than 0.5 membership in the set</td>
<td>Croatia, Latvia, Hungary, Estonia, Cyprus, Austria, Italy, Lithuania, Spain, Bulgaria, Greece, Czech Republic, Switzerland, Slovenia</td>
<td>Italy, Hungary, Switzerland, Portugal, Slovakia, Spain, Bulgaria, Greece, Czech Republic</td>
<td>Bulgaria, Hungary, Romania, Czech Republic</td>
<td>Poland</td>
</tr>
<tr>
<td>Consistency</td>
<td>0.93</td>
<td>0.93</td>
<td>0.99</td>
<td>0.98</td>
</tr>
<tr>
<td>Raw coverage</td>
<td>0.59</td>
<td>0.46</td>
<td>0.32</td>
<td>0.27</td>
</tr>
<tr>
<td>Unique coverage</td>
<td>0.18</td>
<td>0.05</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: author

Discussion and Concluding Remarks (preliminary)

The analysis of paths leading to different tobacco control policy designs reveals many interesting regularities and differences. First, there is a great variation of conditions among European countries which doesn’t allow for simple generalization and uncovering of tobacco control ‘determinants’. Although the first fsQCA indicates that there is a clear path towards comprehensive tobacco control (NGO*TAX*GDP*CCR*tbi → TCS), it is definitely not the only one. Other combinations of conditions may also be conducive to tobacco control as is seen in other countries with higher TCS score excluded from this path. This is France first of all, which has quite low support for increasing tax on tobacco products and high presence of the tobacco industry at the same time. This is also Spain with low presence of health advocacy groups and low support for increasing tax on tobacco products or Finland with a low presence of advocacy groups operating in a broader European context. I have also already mentioned Turkey and Ukraine which experience low control of corruption, low GDP per capita and high tobacco industry presence but still have got quite comprehensive tobacco control even in comparison to other European countries. This path, as a whole, seems to be sufficient but not necessary and the identified individual conditions can’t actually be considered as necessary for the outcome.

Second, there are no truly necessary conditions for weak tobacco control since there is no condition that is present in all four combinations of the intermediate solution. The conditions within the identified configurations are thus so-called INUS conditions, i.e. conditions that are insufficient but a necessary part of a configuration which is itself unnecessary but sufficient for the occurrence of the outcome (Mackie, 1965). For example, the condition SMK exerts its effect on tcs only in combination with the condition ngo. It is thus insufficient on its own but necessary to form a sufficient conjunction together with ngo. At the same time, the sufficient conjunction SMK*ngo is just one possible path to the outcome (i.e. unnecessary). Thus, the condition SMK alone is an INUS condition and the same applies to all other conditions. Nevertheless, the presence of SMK in 3 out of 4 combinations suggests that higher smoking prevalence often leads to weak tobacco control.

Third, an equally important (but still INUS) condition is presence of the tobacco industry (TBI). This can lead to weak tobacco control when combined with an absence of health advocacy groups or in more complex combinations with high smoking prevalence and low control of corruption and GDP per capita.
(combination 3) or low GDP per capita and low public support for increasing tax on tobacco products (combination 4). Similarly, an absence of health advocacy groups seems to be another important INUS conditions because it is included in both configurations with the highest raw coverage.

Fourth, while high GDP per capita and high control of corruption have been identified as very important conditions for comprehensive tobacco control (if not necessary – see Table 1 and the discussion which follows it), this relationship is not symmetrical to weak tobacco control. Low control of corruption is present only in one configuration producing weak tobacco control and both these conditions are included in configurations with the lowest coverage. This asymmetry in set relations is also evident for smoking prevalence. While it is not relevant for producing comprehensive tobacco control, it may contribute to weak tobacco control.

Last but not least, I would like to discuss several limitations of the analysis. TO BE ELABORATED

Suggestions for further research TO BE ELABORATED

References


Goertz, G. (2003). *Assessing the importance of necessary or sufficient conditions in fuzzy-set social science*.


