

Determinants of tax innovation: The case of environmental taxes in Flemish municipalities

John Ashworth^a, Benny Geys^b, Bruno Heyndels^{b,*}

^a*Department of Economics, University of Durham, 23-6 Old Elvet, Durham, DH1 3HY, United Kingdom*

^b*Department of Economics, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussel, Belgium*

Received 20 October 2003; accepted 8 March 2005

Available online 15 August 2005

Abstract

The setting of new taxes is a notably visible act that has potential political costs. This paper explores the setting of new environmental taxes across the 308 Flemish municipalities over the period 1991–1999. We find that first adoptions of a green tax are much less likely to occur during election years but are more likely if ones' peers/neighbours (defined both geographically and ideologically) already have the tax. In addition, whilst left-wing governments are more likely to set new taxes and coalitions are more likely to set the tax than single-party governments, the greater the fragmentation of the municipal government, the lower is the likelihood that a new tax will be set.

© 2005 Elsevier B.V. All rights reserved.

JEL classification: H23; H71

Keywords: Tax innovation; Policy diffusion; Flemish municipalities

1. Introduction

The introduction of environmental taxation at the municipal level in Flanders has been a remarkable fiscal success story. In 1990, three municipalities introduced a general green tax. This inspired many other authorities so that, by 1999, 70 of the 308 Flemish municipalities had imposed a similar tax. While the introduction of new municipal taxes is

* Corresponding author. Tel.: +32 2 6292117; fax: +32 2 6292060.

E-mail address: Bruno.Heyndels@vub.ac.be (B. Heyndels).

by no means exceptional in Flanders, the rapid diffusion of the green tax is unique. The present paper investigates the determinants of this diffusion process and, more generally, of the adoption of the green tax in Flemish municipalities.

Numerous studies have looked into the elements that lead governments to adopt new policies.^{1,2} However, most of these disregard the politically important issue of taxation. A likely explanation is that tax innovations are rare events (Berry and Berry, 1992). Nonetheless, answers to questions about tax adoptions shed light on political decision-making on a subject — taxation — that is intrinsically unpopular among the electorate. Generally, previous research has been supportive of the idea that politicians act in a way to minimise the political costs (in terms of votes lost at election time) of their actions.

The present paper analyses the elements that affect the decision to introduce an environmental tax. The empirical analysis is based on a panel of data for all 308 Flemish municipalities for the period 1991–1999. To the best of our knowledge, our analysis is the first encompassing empirical test of tax innovation hypotheses on non-US data.

The paper is structured as follows. Section 2 reviews the literature: while the research that concentrates explicitly on tax innovations is mainly empirical in nature, the underlying theoretical framework required for our analysis is well-developed in the tax choice literature (Hettich and Winer, 1999). Section 3 presents a stylised tax choice model integrating hypotheses from the tax adoption literature into the Hettich–Winer framework. Section 4 provides background information on the use of environmental taxes in Flanders. The empirical results are reported in Section 5. A summary and the main conclusions are set out in Section 6.

2. Tax innovation: a review of the literature

An *innovation* is “an idea, practice or object perceived as new by an individual” (Rogers and Shoemaker, 1971, 19). This does not necessarily mean that the idea or practice has to be new in an objective way as well. It may well have been in existence for quite some time. The crucial point is that the specific individual has never used it before. An innovation may thus be seen as a ‘first use’ of an idea or practice (Walker, 1969; Nice, 1994). Tax innovations thus refer to the adoption of a tax that is new to the jurisdiction. Such an adoption may involve economic, administrative as well as political risks:

¹ In a special issue on policy diffusion of *Publius, the Journal of Federalism*, Savage (1985) reports that more than 60 studies analysed policy diffusion in the American States between the path-breaking study of Walker (1969) and the mid-1980s.

² The fact that policy innovation is stimulated offers a strong normative argument in favour of decentralised government. In a federal system, the textbook argument goes, local authorities can experiment with new ideas that, if successful, diffuse among the other authorities. While the possibility of diffusion of new ideas is well-accepted, the normative case in defence of decentralisation has been questioned. Strumpf (2002) shows that innovativeness of local governments may be limited due to the public good component of successful policy experiments. Local governments may prefer to free ride and innovativeness may thus be higher under centralized decision-making.

incentive effects, administrative costs and the political acceptance by the electorate may be hard to forecast.

Up to the 1980s, little research was done on the question why governments choose to introduce a new tax. As [Berry \(1988\)](#) mentions, most studies did not proceed beyond a thorough description of the tax system of a certain area and related this to a number of characteristics of the area. Articles on policy innovation, such as [Walker \(1969\)](#) and [Gray \(1973\)](#), on the other hand exclude taxation. To our knowledge, [Mikesell \(1978\)](#) was the first to examine tax adoptions. His results—based on percentage figures of new introductions during the electoral cycle—suggest that tax adoptions in the US states between 1960 and 1977 were concentrated in the years immediately following an election. New taxation was least likely in the year of the election itself.

[Hansen \(1983\)](#) studies the effect of a number of variables on tax innovation, using a cross-sectional framework on the US states. Three types of taxation are regarded: general sales tax, personal income tax and corporate income tax. Her analysis focuses on bivariate relationships between the variables examined. Three important conclusions can be drawn from her study. Firstly, tax innovations are different from other policy innovations. Using a state's 'innovation score', it is shown that the "general propensity to innovate is not much help in explaining broad-based tax adoptions" ([Hansen, 1983](#), p.147). The innovation scores are based on the analysis of 88 different policy programs adopted by at least 20 states prior to 1965 ([Walker, 1969](#)). The earlier a state adopts new policies *on average*, the higher is its innovation score. However, contrary to Hansen's expectation, the correlation between this innovation score and the introduction of taxation is consistently *negative* for all three types of taxation.³ Secondly, economic considerations affect tax innovation. More precisely, economic crises reduce the political risks of introducing new taxes. [Hansen \(1983\)](#) shows that the introduction of (3 types of) taxation by US states cluster in the Depression years (early 1930s) and occur only infrequently in the prosperous 1920s and 1950s. Thirdly, the 'political opportunity' to innovate is a very important intermediary factor. [Hansen \(1983, p.153\)](#) argues that the existence of unified versus divided party control of the legislative and executive body in a state diminishes at least part of the 'institutional roadblocks' against policy implementation. As such, unified governments should be more likely to introduce taxes than divided governments. The data show some support for this hypothesis.

The first multivariate investigation of the different elements affecting tax innovation is provided in the work of [Berry \(1988\)](#). The data set covers the introduction of 7 types of taxes in the United States over two time periods: 1919–1939 and 1960–1972. The dependent variable in the regression analysis is a dummy variable equal to 1 if a state adopts at least one of these 7 taxes in a given year and 0 otherwise. The author finds that problematic public finances increase the likelihood of a 'new' tax being introduced. The opposite holds for proximity to an election. Election years, as well as the years immediately preceding an election, significantly reduce the probability of tax introduc-

³ [Nice \(1994, ch. 8\)](#), however, finds that broad need-based property tax relief programs are more likely to exist in states with high innovation scores.

tion.⁴ A simulation on the same data set indicates the presence of a (geographical) diffusion pattern in tax adoptions. More recently, the study by Heyndels et al. (1998) uses a simulation technique similar to that of Berry (1988) on Flemish municipal environmental tax adoption between 1990 and 1995. It is found that diffusion of environmental taxation among Flemish municipalities mainly occurred through municipalities with comparable income levels.

All in all, it is clear that only few scholars have analysed the elements that guide governments in their decision to implement a new tax. Still, previous research is generally supportive of the theoretical research of Hettich and Winer (1984, 1988), which argues that politicians act in a way to minimise the political costs (in terms of votes lost at election time) of their actions (see *infra*).⁵ A promising route has been suggested by Tyran and Sausgruber (2003), who analyse the tax innovation decision in an experimental setting and demonstrate that adoption propensities increase when decision-makers are informed about tax adoptions in other (experimental) jurisdictions.

3. Theory on tax introduction

3.1. A graphical exposition

Hettich and Winer (1984, 1988) provide a theoretical framework of tax choices. Four elements are essential in explaining these choices: the objectives of politicians, the voters' reactions to policy outcomes, the framework of political competition and the constraints faced by both politicians and taxpayers (Hettich and Winer, 1999, 43). The typical assumption is that the government maximises its expected votes. Electoral support for a party or government can then be expressed as a function of a party's policy platform, the opposition's policy platform and a number of exogenous factors. In the case of taxation, the probability of an individual voting for the governing party depends positively on the public services provided and negatively on the income loss of the individual due to taxation (i.e. tax payments as well as costs incurred in avoiding/evading taxation). This can be seen in Fig. 1 where we consider a situation in which a unique tax instrument (Tax 1) is available. The marginal cost curve in Fig. 1 (MC_1) reflects the amount of votes that a government loses (in the next election) for a given tax increase. The marginal cost curve is upward sloping and reflects that increasing tax rates become progressively more costly (in electoral terms) for politicians. The government will set its tax

⁴ The empirical analyses in Berry (1988) are thorough. Still, a weakness is that a standard probit estimation is made on the pooled data. It has been shown that ignoring the correlations across periods through such an approach is "consistent, though inefficient" and that "these values can be used as initial estimates" (Verbeek, 2004, 377). The later work by Berry and Berry (1992, 1994) avoids this weakness and performs panel probit estimations. The results are very much in line with Berry (1988).

⁵ A number of scholars have also analysed why some states adopt state lotteries to raise revenue while others do not (e.g. Filer et al., 1988; Berry and Berry, 1990, 1991; Davis et al., 1992; Alm et al., 1993; Caudill et al., 1995; Erikson et al., 1999). These studies too are in agreement with the idea that "the politician's support is given only if it is not politically expensive to do so" (Caudill et al., 1995, 555).

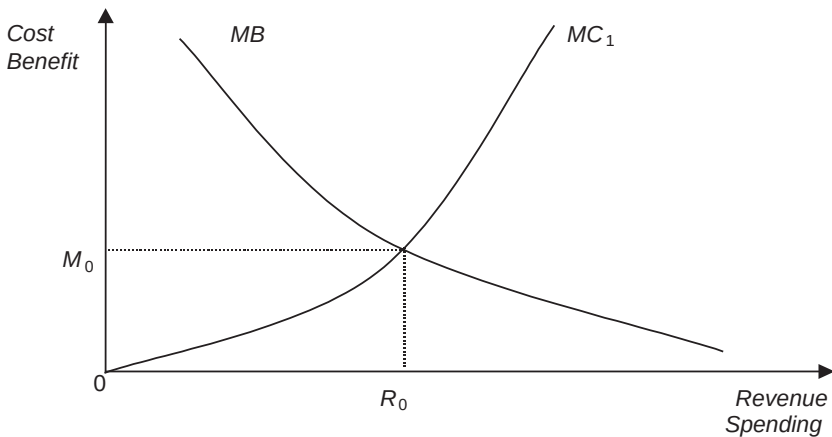


Fig. 1. Optimal taxation with one tax instrument.

rate in such a way that the electoral cost of taxation equals the marginal benefit from government spending. In Fig. 1, this corresponds with an expenditure (and tax) level R_0 .

The tax choice (and innovation) problem occurs when a second tax instrument becomes available. This situation is analysed in Fig. 2.⁶ We consider a second tax instrument with marginal political costs MC_2 . The tax choice of the government now crucially depends on the presence and size of introduction (set-up) costs associated with the use of a new tax instrument within the jurisdiction. Absent such introduction costs, marginal political costs of raising any given level of taxes decrease as diversification becomes possible. This can clearly be seen from Fig. 2 when horizontally summing the marginal cost curves of both taxes. To raise the same amount of revenue as before (R_0), marginal costs drop sharply from M_0 to M_1 . This revenue is now raised from both taxes ($R^1 + R^2 = R_0$).⁷ The mere availability of the second tax has an electoral benefit — a diversification benefit — that is given by the shaded area A in Fig. 2. This is the result of a classic optimisation problem in which the government, for any level of expenditures, will adjust the tax rates until the marginal political costs are equalised over the different tax instruments.

The assumption that there are no introduction costs for new taxes has been challenged. Hettich and Winer (1984, 71) explicitly refer to the presence of such “fixed costs”. They argue that such costs may indeed be very high if the adoption of new taxes provides political opponents with a readily identifiable issue that allows them to attack the government. The political costs of introducing a new tax (and, more generally, of changing the existing tax rates) are discussed in much detail in Rose and Karran (1987). These authors stress the dominating role of ‘fixed’ costs of tax reform. The impact of introduction costs can be illustrated in Fig. 2. Starting from a tax revenue of R_0 that is raised through one tax only, the government will decide to introduce the newly

⁶ Fig. 2 is drawn on the assumption that marginal political costs are independent across revenue sources (see Hettich and Winer, 1984, 70).

⁷ Note that absent introduction costs the availability of the second tax (and the corresponding rotation of the MC-curve) unambiguously implies that the equilibrium expenditure level increases.

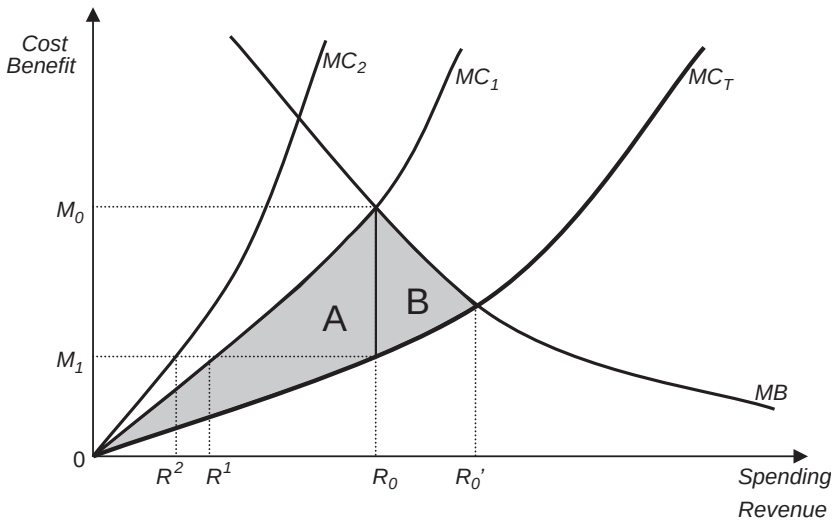


Fig. 2. Costs and benefits from a second tax instrument.

available tax 2 only if the costs of doing so are smaller than the benefits. The former corresponds to the set-up or introduction costs. These are nonsunk costs, only to be paid if the tax is actually used. The latter consists of two parts. A first benefit (shaded area *A* in Fig. 2) reflects the benefit from diversification: after the introduction of tax 2, it is politically less costly to raise the initial amount of revenue, R_0 (cfr. supra). Further, as the introduction of the new tax lowers marginal costs of taxation in general, there is a political net benefit (shaded area *B*) of raising and spending additional tax revenues ($R'_0 - R_0$). As long as (area *A*) + (area *B*) is larger than the introduction costs of the new tax, it is politically rewarding to introduce it (while at the same time lowering the existing taxes).

We assume that the costs are incurred in the following election only. So, the introduction of a new tax during a government's term will translate itself into an electoral loss for the incumbent at the first election that follows. The implication is that a government will only make use of the tax instrument if the introduction costs are offset by the availability of a sizeable benefit.

3.2. Hypotheses

The tax structure that is in place reflects the political equilibrium before a 'new' tax instrument becomes available. This equilibrium not only determines the amount of total tax revenues but also the composition among different tax instruments. The literature on tax innovation—and on policy innovation more generally—provides us with a number of testable hypotheses concerning the factors affecting tax innovation. We discuss each of these and integrate them into the expanded Hettich and Winer (1984, 1988) framework of tax choices presented above. Most of these hypotheses are generally applicable. That is, they hold independently of the type of taxation that is about to be introduced. However,

some hypotheses are special to the case of the environmental tax explored in the empirical section. Special attention will be drawn to this issue when it occurs.

Two sets of explanations for tax innovations have been suggested (Berry and Berry, 1994). *Internal determinants models* posit that innovation depends on the economic, social and political context within the jurisdiction. *Regional diffusion models* analyse how adoption depends on the prior use of (tax) instruments by neighbouring jurisdictions.⁸ In what follows, we derive hypotheses from both types of models.

Two distinct subsets of internal determinants of tax innovation can be identified. A first contains socio-economic characteristics of the jurisdiction; a second contains political and institutional characteristics. A first (internal determinants) hypothesis with respect to the likelihood that a government will make use of a newly available tax instrument is:

H1. Innovation is more likely the larger the initial per capita tax revenues.

This derives from Fig. 2: it can readily be seen that the benefits from introducing the new tax (given by area $A+B$) will be larger the larger is R_0 . As by assumption the introduction costs are fixed, i.e. unrelated to the size of the tax, a larger initial tax revenue implies a higher probability of introduction (as this corresponds with a higher value of $A+B$).⁹

The availability of a new tax rotates the initial marginal cost curve downward (see Fig. 2). The lower are the marginal political costs of the new tax, the stronger this rotation. As a result the area $A+B$ increases (making it more likely that the area is larger than the introduction cost of the new tax). The question then is what determines the shape of the political cost curve of the new tax. A number of hypotheses can be derived from the literature. It is important to note that some of these arguments not only explain the expected political benefits of *having* the new tax (the area $A+B$), but *also* the costs of *introducing* it.

The environmental situation of the jurisdiction is a second internal (socio-economic) determinant of the local government's decision to impose a green tax. It has been argued that the adoption of specific policy measures is more likely in states or districts "with more serious problems in the task environment that those innovations seek to address" (Nice, 1994, 23; see also Eyestone, 1977). We expect that public opinion will be more easily convinced (at lower electoral costs) of the need of a new environmental tax in jurisdictions where pollution in most general terms is (considered to be) a problem.¹⁰ So, a hypothesis that applies to the specific situation of the 'green tax' is:

H2. Adoption of a green tax is more likely in highly polluted jurisdictions.

⁸ In addition, *government interaction models* can be distinguished. These are a variant of the regional diffusion models. They assume that policies diffuse as a result of the interactions among political decision-makers from different jurisdictions (see Berry and Berry, 1994, 413).

⁹ The assumption that introduction costs are fixed is standard in the literature. Of course, it may be that the introduction cost has a fixed and variable component, the latter reflecting the fact that introducing a large tax leads to higher political introduction costs than introducing a small tax.

¹⁰ This will only be the case to the extent that the electorate is convinced that 'green tax' revenues are used to finance 'environmental expenditures' or if the tax has (incentive) effects on polluting behaviour.

Introducing and collecting a tax implies that administrative costs of collection are incurred. These costs depend on the scale at which taxes are collected. Administrative costs have been recognised as a crucial determinant of the tax structure (Musgrave, 1969, 133). The presence of fixed administrative costs lowers ‘net’ tax revenue. As a result, higher administrative costs will be associated with lower public expenditures and thus with higher political opposition. When tax collection is organised at a larger scale, these fixed administrative costs can be spread over the population. Hence, ‘net’ revenue will be higher in large jurisdictions compared to small ones. This makes the new tax more ‘productive’ from an electoral perspective in more populous areas:

H3. Adoption of a tax is more likely in larger jurisdictions.

A second subset of internal determinants of tax adoption relates to the political and institutional context. Three hypotheses are identified. First, the literature on political budget cycles suggests:

H4. Innovation is more likely the longer is the time until the next election.

It has been shown that politicians avoid tax adoptions when an election is imminent (Mikesell, 1978). More generally, Ben-Porath (1975), Tufte (1978), Pack (1988), Bizer and Durlauf (1990), Poterba (1994), Yoo (1998) and Royed and Borelli (1999) provide evidence for various countries and differing time periods that is supportive of the view that politicians manipulate the level of *existing* taxes for electoral purposes. Finally, Ashworth and Heyndels (2002) find that tax *structures* in OECD countries are changed significantly less in election years. This may suggest the presence of some kind of voter myopia. In the case of an introduction closer to an election, the electorate has less time to ‘forget’, making the introduction more costly.

A second political (internal) determinant is the government’s ideology. Left-wing parties are more in favour of government intervention, while right-wing parties more fiercely support the workings of the market. This generally accepted idea is likely captured by H1 as left-wing governments will then be more likely to have higher initial tax revenues. Still, the same argument may imply that leftist governments face lower political introduction costs. As a result, we expect:

H5. Innovation is more likely under left-wing governments.

In addition to this revenue-argument, politicians with partisan preferences for given tax *structures* (Pommerehne and Schneider, 1983) may choose to adopt specific new taxes when they are in power. As leftist voters tend to have a more positive attitude towards environmental policy in general (Daugbjerg and Svendsen, 2001; Thalmann, 2004), we expect that the environmental label of the tax is more convincing for them.

Apart from the election date and the ideological complexion of the parties in power, government fragmentation may also play a role. Fragmentation refers to the fact that power is dispersed among different parties. We expect:

H6. Innovation is less likely under fragmented government.

Different models in the political-economy literature suggest this hypothesis. The basic intuition is that, when more parties share power, conflicts result in government

indecisiveness or so-called gridlock effects (Boix, 1997). Game theory suggests that these conflicts are likely to increase in the number of parties (de Haan and Sturm, 1997). This type of indecisiveness lies at the heart of the weak government hypothesis that states that fragmented governments are less flexible in responding to exogenous macroeconomic shocks and therefore run higher budget deficits (Roubini and Sachs, 1989; Spolaore, 1993).¹¹ In two-party systems, government fragmentation takes the form of divided (instead of unified) government. As mentioned earlier, Hansen (1983) provides evidence that unified U.S. States' governments are more likely to introduce new taxes.

Fragmented governments differ from one-party governments in more than decision power or dispersed interests. Indeed, coalition members are—as a general rule—less certain about their position after the following elections. This uncertainty about future legislative power may affect their time perspective. The relevance of this is clear: while the introduction costs of a new tax are non-recurrent, the political benefits from the new tax (area $A+B$ in Fig. 2) are. So, a government with a time perspective that goes beyond the following election will also take the present value of political benefits after future election(s) into account. The longer the time perspective of the government, the more likely it is that net benefits are positive and, thus, the more likely it is that it will adopt the new tax. To the extent that coalition parties are less certain that they will be part of a future government, this idea supports H6.

The latter argument can, however, be generalised. Incumbent governments will be more certain to remain in power after the next election to the extent that they currently have a larger electoral margin ('excess votes' or 'excess seats'). This holds for single-party majorities as well as for coalitions. Indeed, coalitions with larger electoral margins may find it easier to continue the coalition after the next election. Still, for a given electoral margin, the uncertainty about future government participation will be larger for coalition parties (because of the unpredictability of the coalition process). This implies:

H7. Innovation is more likely the larger the electoral margin of government. This effect is stronger under single-party governments.

The fact that budgetary behaviour is affected by electoral margin is well-established (Frey and Schneider, 1978). Parties in power spend more to the extent that their likelihood of electoral victory increases (Caplan, 2001). In tax policy, Solé Ollé (2003) finds that tax

¹¹ An alternative view on H6 would be based on the assumption that marginal political costs of individual tax instruments differ between parties. In an extreme scenario, each party's electorate pays one specific tax and does not contribute to the other taxes. The implication is that—for each party—marginal political costs are positive for one tax only. In the more general case this means that marginal political costs are highest for that tax. If a given party is in power, the tax levied on its voters will not be used and tax revenues will have to come from the remaining tax instruments. Consider the case where we have n political parties each having an electorate paying only one of n different taxes. Then, if the coalition is composed of k out of n parties, we expect tax revenues to come from $n-k$ different tax sources. Thus, the larger is the number of coalition parties, the smaller is the amount of tax instruments that is used as each party will veto the use of the tax paid by its voters. In terms of a newly available tax instrument, this means that the more parties there are in the coalition, the less likely it is that a newly available tax instrument will be chosen (as the probability of a veto against the adoption by one of the coalition members is higher).

rates are higher and reactions to neighbours' tax rates lower in jurisdictions where the ruling government has a larger electoral margin.

While internal determinants models focus on the factors within the jurisdiction that affect innovative behaviour, regional diffusion models concentrate on how an innovation is picked up by other jurisdictions. The basic intuition is that the probability of a given jurisdiction to adopt a new tax depends positively on the number of 'peers' that have adopted the tax previously: "Decision makers are likely to adopt new programs, therefore, when they become convinced that their state is relatively deprived, or that some need exists to which other states in their 'league' have already responded" (Walker, 1969, 897). This translates into:

H8. Innovation is more likely if neighbouring municipalities have already introduced a similar tax.

As mentioned, the adoption of a new tax involves economic, administrative as well as political uncertainty. This uncertainty can be lowered considerably if similar jurisdictions have adopted the tax already (and thus create informational externalities for political decision-makers). Not only the uncertainty for political decision-makers is lowered, the opposition by the electorate might also be tempered if politicians can refer to 'peers'/'neighbours' that have made similar decisions (Hettich and Winer, 1984; Berry and Berry, 1992). Mimicking behaviour—jurisdictions copying each other's tax policies—may result.

The intuition behind Walker's hypothesis, and behind H 8, was recently addressed more systematically in the literature on yardstick competition in the political sphere (Salmon, 1987). Mimicking is seen as a rational decision in a context of yardstick competition where the behaviour of one government inflicts *informational externalities* on politicians elsewhere: voters compare policies among jurisdictions to overcome information asymmetries in distinguishing 'good' from 'bad' politicians (Besley and Case, 1995). A number of recent publications have demonstrated the existence of tax mimicking behaviour in different contexts (Brueckner, 2003).¹² Heyndels and Vuchelen (1998) find evidence of tax mimicking among Flemish municipalities with respect to the two main local taxes: the local income tax and the local property tax. A revealing illustration of the role of information in other jurisdictions within a context of tax adoptions is provided by the experimental work in Tyran and Sausgruber (2003). These authors find that the probability that an internalisation tax is adopted increases when subjects are informed about similar innovations in other (experimental) jurisdictions.

4. Environmental taxes in Flemish municipalities

Flemish municipalities have a wide-ranging autonomy when it concerns their tax policy. Not only are they free to set tax rates on the existing taxes, they also have a

¹² It is noteworthy that the existing literature on mimicking behaviour has focused mainly on continuous choices (tax rates and/or tax burden) whereas our analysis deals with a discrete choice (whether or not to adopt a new tax).

considerable liberty to introduce new taxes. While 80% of local tax revenues are raised through local income and local property taxes, a most visible consequence of Flemish municipalities' fiscal autonomy is the enormous diversity of tax structures. Currently, about 120 different taxes are being used and the average municipality levies 20 different taxes. Among these, the most 'exotic' taxes can be found: taxes on private swimming pools, on balconies, on transportation of drunken persons, on dogs, boats and so on.

In the empirical section of this paper we analyse the introduction of a general 'green tax' levied on inhabitants of the municipalities.¹³ These inhabitants can be households as well as firms. Most often, taxation occurs in the form of a lump-sum tax to be paid by every household and/or firm. The latter implies that the green tax is not used as an active policy instrument intended to induce behavioural changes. The link to environmental policy exists in the sense that revenues collected through the green tax are (said to be) used to finance municipal measures in the field. Very often such earmarking of green taxes for environmental expenditures was mentioned explicitly at their introduction. There is a general view that the earmarking or labelling is used in order to make the adoption of new taxes politically less costly (Moesen and Van Rompuy, 1997). Still, there are no formal legal grounds that allow the green tax to form an exception on the universality condition that applies to all taxes. Actually, environmental pressure groups have protested against municipal governments' misuse of the green label of the tax to collect revenues that are not used for environmental expenditures.¹⁴

Though tax innovation is characterised by specific risks, it should be observed that in the case of the environmental tax under consideration the economic and administrative risks of adopting the tax were minimal. This is the result of its lump-sum character that minimizes behavioural reactions by the taxpayers at the same time making it relatively easy to predict expected revenues. Heyndels (1998) shows that revenue predictions for the environmental tax were actually more accurate than for the other municipal taxes. If any risk was involved in introducing the new tax, it was of a political nature. The case of Mechelen (one of the three municipalities that introduced the tax in 1990) clearly demonstrates this. The introduction of the tax initiated a sizeable political rally that was, as far as we know, unique in recent Belgian local tax history. Moreover, the city of Mechelen was forced to take legal action as about 6% of the taxpayers refused to pay the new tax. The lump-sum character of the tax, reminding of (Thatcher's) poll tax that had led to huge political turmoil in the U.K., was a major obstacle for (some of) Mechelen's taxpayers.

Despite these political upheavals, the popularity of this form of taxation has increased enormously among local politicians since its introduction in 1990. By 1999, 70 of the 308

¹³ In the municipal accounts, this tax has the following code: 04036317 ('Milieubelasting'). As of 1995, this code replaces two separate codes, viz. 04036311 ('Milieubijdrage gezinnen en bedrijven') and 04036436 ('Milieubelasting algemeen').

¹⁴ A report by the 'Bond Beter Leefmilieu', an environmentalist pressure group, cited in *De Financieel Economische Tijd* (01-06-1991) gives the example of the city of Mechelen. Total revenue from the environmental tax (184.5 million Belgian francs) by far exceeds the city's spending on environment-related programs broadly defined.

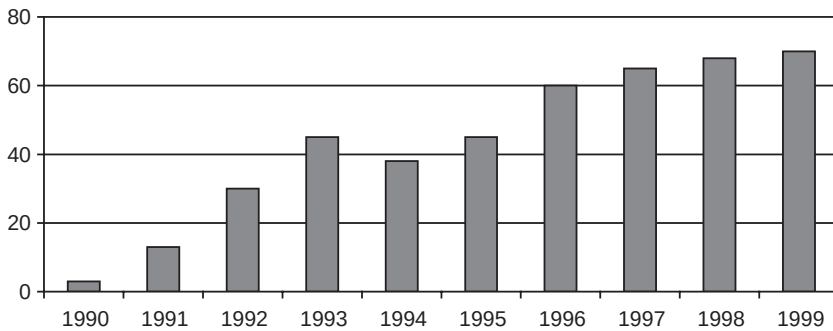


Fig. 3. Number of municipalities with environmental taxation, 1990–1999. Source: Flemish Ministry of Internal Affairs.

municipalities used a general green tax. This classifies it as a remarkable fiscal success story. The evolution from year-to-year is shown in Fig. 3.¹⁵ The tax generated about 1.35% of total local tax revenues in 1999 (8.30% if we disregard revenues obtained from surcharges on regional and federal taxation). This makes it the sixth largest tax revenue source for Flemish municipalities (third if we disregard surcharges).

Fig. 3 indicates that during the first few years of its existence, the green tax found its way to the accounts of the Flemish municipalities at an increasing speed. The number of municipalities levying the tax increased with 3, 10, 17 and 15 for the first four years respectively. This rapid rise is then suddenly stopped and even reversed in 1994. It is noteworthy that this was an election year. As of 1995, there once again is a steady growth in the number of municipalities that levy the tax. However, the increase now is much more moderate. Hence, Fig. 3 shows the traditional S-shape one finds in numerous studies on innovation diffusion (e.g. Griliches, 1971; Gray, 1973).

As can also be derived from Fig. 3, some municipalities have discontinued the use of the green tax. Hence, the (net) year-to-year rise or fall in the number of municipalities with an environmental tax represented in Fig. 3 is the sum of the amount of introductions and abolitions of the tax. A more detailed representation is provided in Fig. 4 where we represent the number of introductions and abolitions separately for all years in our sample. The dark-grey histograms in Fig. 4 refer to introductions while light-grey histograms indicate abolitions in a given year.

As in Fig. 3, it is clear that the number of municipalities introducing environmental taxation increases rapidly in the first years, while the number of abolitions remains very low. The picture reverses in 1994. Apparently, municipal governments are somewhat reluctant to introduce the green tax in the year of an election, but are relatively keen to abolish it (see also Mikesell, 1978; Berry and Berry, 1992). Note, moreover, that the number of changes (introduction and abolitions) in 1994 is lower than in any of the two years preceding and any of the two years following the election. This is in line with

¹⁵ The figure is based on data from the municipal accounts. This explains the minor differences between these data and those presented in the study by Heyndels et al. (1998) where budgetary data are used. Still, account data allowed us to generate a data set comprising a larger number of years.

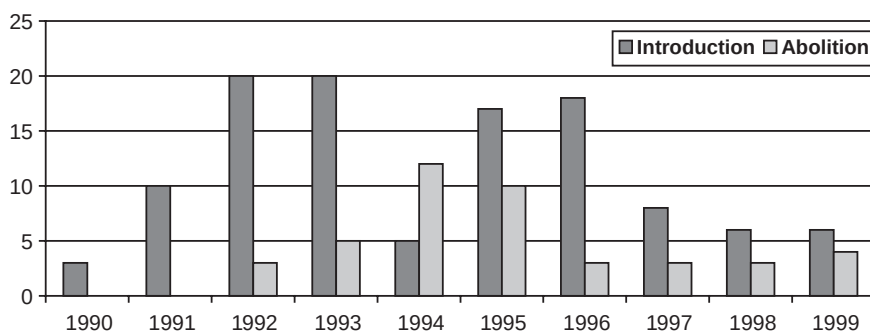


Fig. 4. Number of municipalities introducing/abolishing environmental taxation, 1990–1999. Source: Flemish Ministry of Internal Affairs.

Ashworth and Heyndels (2002), who show that tax structure manipulation (in either direction) tends to be at a minimum in election years (for OECD countries).

Note that the number of introductions in Fig. 4 is not necessarily equal to the number of “first-time adoptions”. In fact, some municipalities at times re-introduce the environmental tax after having abolished it in the recent past. This means that the actual number of “first-time adoptions” is (slightly) lower than the adoption figures presented in Fig. 4.

5. Empirical analysis

5.1. Empirical model

In order to examine the questions raised in Section 3, consideration is made of the decision to adopt a general green tax. Data are available to allow an analysis for the period 1991–1999 and are based on the municipal accounts. The hypotheses above suggest the following (reduced form) model to be estimated:¹⁶

$$TAX_{i,t}^* = F(TAXR_{i,t}, WASTE_{i,t}, POP_{i,t}, ELECT_{i,t}, ICG_{i,t}, FRAG_{i,t}, MAJ_{i,t}, PRN_{i,t-1}) \quad (1)$$

where the variables explaining TAX^* aim to test the hypotheses of Section 3.2. One assumes that the decision to adopt a green tax is given by some unobservable variable, TAX^* . If $TAX^* > 0$, the tax is adopted and $TAX = 1$. If $TAX^* = 0$, the tax is not adopted and $TAX = 0$.

$TAXR$ is the per capita revenue raised from all other non-environmental taxes and tests H1. The ‘environmental necessity’ for the introduction of the new tax is examined via the $WASTE$ -variable (H2); the amount of waste per capita. In addition, the quality of the

¹⁶ Most data are available for 1990, with the exception of $WASTE$. It is clearly possible to supplement this function with other variables to consider a wider range of hypotheses. For example, the effect of a change of government; the “green” pressure; previous setting of other green related taxes are possibilities which were explored. In all cases, such variables proved to be insignificant.

air (measured negatively in terms of the precipitation of nitrous and sulphur oxide) was also added.¹⁷ The greater the perceived ‘necessity of action’, the potentially lower the political cost of introducing the tax. For the scale argument (H3), population of the municipality is used.

With respect to H4, two approaches are examined. Firstly, a dummy variable is introduced for the election year (ELECT1) and secondly, a direct consideration of the hypothesis H4 using the time to the next election. This variable, ELECT2, gives the years until the election (and so ranges from 0 in election years to 5 in the first post-election year). This approach is in line with the work of [Berry and Berry \(1992\)](#) who find strong effects for the election year variable but (much) less clear results for the ‘election cycle’. They interpret this as evidence of strong voter myopia.

To examine H5, we introduce the Ideological Complexion of the Government (ICG, [Kontopoulos and Perotti, 1999](#)), defined as the weighted average ‘complexion’ of coalition parties. Complexion refers to a party’s ideological position on a scale from 0 (extreme Left) to 10 (extreme Right).¹⁸ In order to test for a fragmentation effect (H6), we introduce the number of parties in the coalition (NUMPARG) and, to examine possible non-linearities, its squared value (NUMPARG²).¹⁹ An alternative approach — using NUMPARG along with a dummy variable for one-party majorities (SOLE) — was also considered as a direct test of the effect of one-party majorities. The degree of multicollinearity was such that these approaches had to be considered in a non-nested fashion and examples of both sets of results are given. For the excess power hypothesis (H7), the majority of the ruling party/parties is used together with a cross-product term for the effect of single-party rule.

To test for the ‘peer’/‘neighbour’ effect (H8), we introduce the percentage of neighbouring municipalities with an environmental tax (PRN1) in the previous year. To test for further reaching neighbour effects, we also examine a possible effect from second order neighbours (neighbours of neighbours) (PRN2). The idea here is that not only direct geographical neighbours may influence one’s policy, but also governments ‘around the next corner’ ([Heyndels and Vuchelen, 1998](#)). Consideration of second order neighbours is especially relevant as the average size of Flemish municipalities is small (about 44 km² on average). We lag these neighbourhood variables by one year as governments are assumed to only observe a change in another government’s policy once it has been put into effect. As Flemish local governments decide on their taxes once a year, they must wait one year to act on any information. Note that this effect is also extended to consider whether there is

¹⁷ An alternative measure using waste burnt or dumped was also examined with similar results. The selection of these variables was driven by data availability. Still, they do relate to major responsibilities of the Flemish municipalities (garbage collection, sewage provision) or may be taken to reflect determinants of the salience of environmental issues (‘quality of air’).

¹⁸ The data concerning a party’s ideological position were obtained from [Deschouwer \(1996\)](#). They are based on a self-placement survey. Data were obtained by asking presidents and spokesmen of the parties in the municipalities to locate their party on an ideological scale between 0 (Left) and 10 (Right). The figures range from 2.8 (SP) to 5.6 (VLD) in 1988 and from 2.6 (Agalev) to 6.1 (VLD) in 1994.

¹⁹ We also tested H6 by examining the ‘effective’ number of parties in the coalition. This is the inverse of the Herfindahl-index based on the percentage of alderman from each party (p_i), or $\sum_{i=1}^n p_i^2$, with n equal to the number of parties in the coalition ([Laakso and Taagepera, 1979](#)). Similar results were obtained using this variable, but the best fit of the model was obtained with the currently employed variable.

any form of ‘neighbour’ effect from politically like-minded authorities. Specifically, a variable was constructed measuring the ideological distance of local authorities from those authorities that had adopted the tax in the last time period (IDPROX).^{20,21}

Having discussed the variables affecting the adoption of the green tax, it is necessary to discuss the appropriate estimating technique that takes into account the specific nature of the dependent variable. Since the real interest here is the timing of the tax introduction decision, we consider a discrete-time hazard model. The reason is that municipalities that adopt the tax early give us more information on the determinants of tax adoption than other municipalities, and municipalities adopting the tax later or not at all, provide more information about the determinants of non-adoption. In a hazard model, data on independent variables in a given year are used to determine the probability of tax adoption in that year.²² The likelihood function for the discrete-time hazard model is made up of two types of probabilities. Firstly, the probability that the municipality i adopts the tax in time period t

$$P(T_i = t) = P_{it} \prod_{j=1}^{t-1} (1 - P_{ij}), \quad (2)$$

which is the probability of the municipality adopting the tax in time t multiplied by the probabilities that the tax was not adopted in periods 1 through to $t-1$. For any municipality that has not adopted the tax throughout the sample, there is the second expression

$$P(T_i > T) = \prod_{j=1}^T (1 - P_{ij}). \quad (3)$$

²⁰ We are grateful to an anonymous referee for suggesting that we explore ideological neighbours, in addition to spatial neighbours. Next to IDPROX, various other variables to examine these issues were constructed. Firstly, an examination was made of a left/right split (defined as ICG below/above the middle of the ideological scale and relative to the average ideology of Flanders) and the effect of adopting authorities and adopting neighbours defined in this manner. Secondly, a nested-test was constructed by creating cross-product terms of the proportion of neighbours who are ‘right’ (PRNR) and the proportion who are ‘left’ (PRNL), multiplied by PRN1 (and PRN2), was examined. Given that PRNR+PRNL=1, it is easy to see that adding PRNL*PRN1 to the basic regressions including PRN1 will test if there is a significant difference between the effect of a greater proportion of ‘right’ or ‘left’ adopters. Finally, a third version was set-up where a division was made in terms of like-minded (PRNS) and ideologically different neighbours (PRND). In all these cases, the effect proved to be insignificant. As an example of these results, the final case, as it is one of the nearest to present in the table, is provided in Table 1. Other results are available from the authors on request.

²¹ We also examined the effect of neighbours within the electoral cycle (PRN1 * ELECT2). As can be seen from Table 1, this cross-product term is insignificant. Clearly, the list of possible interactions could be extended further to include, for example, the fact that fragmented governments may be less certain about their future and so may react differently with respect to impending elections (COAL * ELECT2 or NUMPARG * ELECT2). Testing this proposition also proved to be insignificant.

²² Whilst hazard functions are widely used in economics, the use of discrete-time hazard models is less widespread though, as will be seen, de facto they have been used. In principle, it would be possible to introduce a normal error term. However, the hazard function does not simplify as neatly under those circumstances, hence we assume the standard logistic distribution. The probability of a tax being introduced is then given by the familiar logit formula.

Table 1
Discrete hazard estimation of environmental tax introduction, 1991–1999

Independent variable	Variable name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept		–4.502 (1.048)	–6.695 (1.151)	–4.583 (1.004)	–4.383(0.903)	–4.045 (1.006)	–5.954 (1.019)	–3.987 (1.056)	–3.207 (0.867)
Revenue from other taxes	TAXR	–0.017 (0.038)		–0.034 (0.038)		–0.004 (0.034)		–0.004 (0.034)	
Waste	WASTE	0.0016 (0.0011)		0.0016 (0.0011)		0.0017 (0.0011)		0.0014 (0.0011)	
Emissions	AIRQUAL	–0.007 (0.024)		0.003 (0.024)		–0.002 (0.023)		–0.003 (0.024)	
Population	POP	–0.010 (0.009)		–0.010 (0.009)		–0.012 (0.009)		–0.012 (0.009)	
Time before election	ELECT2	0.190 (0.092)	0.216 (0.089)	0.215 (0.092)	0.215 (0.089)				
Election	ELECT1					–2.119 (1.037)	–1.725 (0.609)	–1.935 (1.053)	–1.316 (0.593)
Single-party	SOLE			–0.980 (0.550)	–1.184 (0.507)				
Excess seats	MAJ	0.004 (0.013)		0.004 (0.013)		0.004 (0.013)		0.005 (0.013)	
Excess seats* coalition	MAJ*SOLE	0.007 (0.023)		0.008 (0.024)		0.007 (0.024)		0.007 (0.023)	
Number of parties in government	NUMPARG	2.207 (1.068)	2.117 (0.901)	–0.657 (0.397)	–0.720 (0.397)	1.979 (1.065)	2.120 (0.905)	1.915 (1.064)	1.990 (0.904)
Number of parties in government squared	NUMPARG ²	–0.562 (0.267)	–0.547 (0.243)			–0.521 (0.267)	–0.552 (0.245)	–0.507 (0.266)	–0.523 (0.243)
Ideology	ICG	–0.234 (0.126)	–0.269 (0.110)	–0.265 (0.120)	–0.267 (0.111)	–0.214 (0.103)	–0.244 (0.099)	–0.119 (0.144)	
Average ideological distance from authorities that have adopted	IDPROX	–0.699 (0.401)	–0.726 (0.359)	–0.699 (0.400)	–0.721 (0.330)	–0.687 (0.365)	–0.665 (0.363)	–0.667 (0.367)	–0.644 (0.372)
First-order neighbours with tax last year	PRN1	1.787 (0.747)	1.952 (0.626)	1.355 (0.674)	1.937 (0.625)	1.855 (0.746)	2.007 (0.620)	1.411 (0.674)	2.147 (0.566)
Second-order neighbours with tax last year	PRN2	0.426 (1.067)		1.308 (0.925)		0.414 (1.051)		0.593 (1.069)	
Proportion of like-minded neighbours who have adopted	PRN1 * PRNS	0.876 (0.811)		1.146 (1.406)		0.702 (0.944)		0.612 (0.857)	

Effect of neighbours in the electoral cycle	PRN1 *ELECT2	–2.749 (3.535)		–2.438 (3.661)		–2.003 (2.563)		–1.845 (2.755)	
Time	TIME							–0.475 (0.260)	–0.483 (0.168)
LL		–355.716	–358.862	–356.062	–359.297	–353.065	–355.523	–352.521	–354.636
LR0		–368.368	–368.368	–368.368	–368.368	–368.368	–368.368	–368.368	–368.368
χ^2		25.304 (15)	19.012 (6)	24.612 (15)	18.142 (6)	30.606 (15)	25.691 (6)	31.694 (16)	27.463 (6)
$\chi^2(R)$			6.292 (9)		6.470 (9)		4.916 (9)		4.231 (10)
Exogeneity		3.743	0.922	3.743	0.711	3.442	0.444	3.221	0.266
Sargan		2.771	1.002	1.331	1.002	1.891	0.992	2.017	0.887
Diagnostic tests									
<i>J</i> -test col 6 (col 8)							1.447		1.725
<i>J</i> -test col 2 (col 4)			0.993		1.227				
RESET ²		1.886	1.904	1.868	2.114	3.117	1.977	1.815	3.311
RESET ³		1.741	1.366	1.442	1.883	2.874	1.449	1.424	3.110
Heteroskedasticity									
White		77.855 (118)	24.886 (20)	82.117 (119)	29.771 (21)	92.164 (118)	24.882 (20)	74.353 (118)	26.221 (20)

Estimated standard errors are in parentheses; LL is the maximised value of the log-likelihood function; LL0 is the log-likelihood computed with only the constant term; χ^2 is the test of overall significance of the equation; $\chi^2(R)$ is the test of the omission of variables from the general model with *R* the number of omitted variables. The test of exogeneity of the neighbours uses the test proposed by [Grogger \(1990\)](#) using the same variables lagged one further period as the instruments; it is a variant of a [Hausman \(1978\)](#) test in the case of a logit model. Sargan is test of misspecification of the instruments chosen. Diagnostic tests are computed following [Pagan and Vella \(1989\)](#) and follow a *t*-distribution. The only exceptions are those for White unknown form heteroskedasticity test which are computed following [Chesher and Irish \(1987\)](#) and follow a χ^2 distribution with degrees of freedom as indicated. Time is the natural logarithm of time, in line with the usual hazard function formulation (the use of the level of time does not affect the main tenor of the results). As indicated in the text, the results are representative of those that may be examined to investigate a number of related themes (available on request).

The likelihood function for the entire sample is the product of the probabilities:

$$L = \prod_{i=1}^N [P(T_i = t)]^{c_i} P[(T_i > T)]^{1-c_i} \quad (4)$$

where $c_i = 1$ if local authority i adopted the tax and $c_i = 0$ if local authority i did not adopt the taxes. Assuming that the probabilities are expressed as a logit model, as Allison (1982) and Caudill et al. (1995) show, the model can be estimated as a standard (pooled) logit model.²³ It should be noted that an important part of the analysis is that the observations for a given municipality are cut off once that municipality adopts the tax.²⁴

5.2. Empirical results

The results of our estimation are presented in Table 1. The first factor of note is that the estimations are well-specified. The underlying assumptions of the estimating equations are not contradicted by the diagnostic tests available. The results can therefore be taken as offering tentative explanation of the green tax phenomenon within Flanders.²⁵ The results are presented such that the most general specification is followed by more restricted versions. In the latter, insignificant variables have been omitted in order to make a more efficient model without compromising the diagnostic tests.

Turning to the results in Table 1, it can be seen that two basic functional forms were examined. They differ by the inclusion of (the logarithm) of a time trend TIME to examine the presence of a ‘bandwagon’ effect (see last two columns in Table 1). The general tendency in adoption models is for negative duration dependence. This would reflect that municipalities with a predisposition to adopt a green tax will do so early, leaving only those with a predisposition to non-adoption (in contrast to the ‘bandwagon’ effect found with lottery adoptions in the US, see Alm et al. (1993) and Erikson et al. (1999)). The addition of the trend ‘casts some mist’ over the estimation. Both of the

²³ Similar analyses are undertaken by Alm et al. (1993) and Erikson et al. (1999) with respect to lottery adoption in the US.

²⁴ The work undertaken here can also be extended. This initial estimation considers the first adoption of the taxes — that is, even if the tax is subsequently withdrawn in a municipality, this fact is ignored. In this case, the 43 municipalities that remove the tax (one or more times) are ‘re-started’ with new hazards. The general tenor of these results indicates that there is no significant new hazard: the likelihood of re-introducing the tax is higher but not significantly so. The other implications are unaffected. We also analysed the decision to ‘drop’ the tax by the 43 authorities (cf. Mueller and Comer, 1983; Nice, Ch. 9). The indications are that this is positively affected by an impending election, a change of government and the presence of greater fragmentation. Air quality and the proportion of the green vote tend to significantly affect the keeping of environmental taxes.

²⁵ Sixteen municipalities had to be removed from the dataset due to an incomplete series of accounts. In addition, Mechelen, Lokeren and St Niklaas are removed from the tax setting hazard as they had introduced the green tax in 1990. To accommodate for the possibility that decision lags make the proportion of neighbours having already adopted the tax endogenous, Hausman (1978) style tests of exogeneity, following Grogger (1990) were examined using the neighbours’ variables lagged one further period as the instruments. In all cases, the adapted Sargan test of misspecification of the instruments indicates that the choice is satisfactory, following Davidson and MacKinnon (1993). The Grogger test indicates exogeneity and so the results presented are from the estimation without instruments. However, some caution must be exercised over these Grogger tests, see Dagenais (1999) and Lucchetti (2002).

resulting ‘preferred equations’ are well-specified in that the Davidson and MacKinnon (1993) *J*-test does not identify one or other form as being superior. However, modelling of the duration effect makes the ideology variable insignificant. Thus any interpretation with respect to this variable must be taken with caution. In what follows below, interpretation is given to the estimation without the trend though the comments of this paragraph should not be forgotten.

Initially, we consider those variables that are insignificant. It can be seen that there is no effect from the other tax revenue sources.²⁶ In addition, population size has no effect, which points to the absence of scale effects in setting the green tax. There is also only limited support for the pollution effect. It appears that municipalities with more waste per capita have a higher likelihood of adopting an environmental tax — the ‘waste’ variable always has the anticipated sign — but it only approaches 10% significance. Air quality is not significant. So, generally, the likelihood of green tax adoption is unaffected by environmental problems in the municipality. Finally, there is no support for the proposition that a larger majority leads to a greater likelihood of setting the tax. The excess seats variable has the anticipated positive effect but this is not significant and there is no differential effect depending on the fragmentation of the government. The latter result is at odds with empirical evidence presented in Caplan (2001) and Solé Ollé (2003). These authors show that tax revenues per capita are higher in US states where the electoral victory of the incumbents is more certain (Caplan, 2001) and that tax rates in Spanish municipalities are higher when the local government has a larger electoral margin (Solé Ollé, 2003).

Notwithstanding the above, the results do give support to a number of our hypotheses. First of all, both the *election* variables have the expected sign and are statistically significant. Generally, the presence of elections has a strong negative effect on the likelihood of introducing the tax. Also, the further in time from an election, the more likely it is that the green tax will be installed. Comparing columns 2 and 6 in Table 1, it can be seen that the fit of the model is better when we take the election year dummy. This could point to a strong form of voter myopia. The *ideological* complexion of the government (ICG) has the expected negative sign and, in the absence of the time trend, is significant. This means that more leftist governments (as lower numbers refer to more leftist orientation) are more likely to introduce an environmental tax. This may reflect one of two things. First, the fixed costs of introduction may be lower for leftist parties. Second, it is possible that, in the specific case of the green tax, the marginal cost curve lies lower for leftist parties. This may be the case because the green tax is (said to be) earmarked for environmental expenditures, a field that is more prevalent among the leftist electorate.

We also find support for the ‘neighbours’ effect. Both the (relative) number of direct neighbours and the (relative) number of second order neighbours that had an environmental tax in the previous year have the expected positive sign. A rise in the proportion of neighbours already setting the green tax leads to a rise in the likelihood of

²⁶ As an alternative, income per head as well as local income and property tax rates were examined. These also proved to be insignificant. The inclusion of these variables did not affect the significance or implications of the variables of interest.

setting that same tax. Overall, it can be seen that the first order neighbours are the dominant factors in the setting of the tax (a *J*-test against an equation containing only second order neighbours confirming this) with multicollinearity present with both sets of neighbours included. Further, this neighbour effect offsets the negative disposition effect of the time trend though the long-term effect is for non-adoption.

The effect of ideological ‘neighbours’, as opposed to spatial neighbours, can also be seen to have an effect. The closer is the ideology of those authorities that have adopted the tax to the ideology of a given authority, the more likely it is that the authority will adopt the tax. However, it is of interest that this effect does not have a greater effect when combined with spatial neighbours (PRN1*PRNS).²⁷ There is no additional effect of ideological closeness from spatial neighbours. The fact that the ideological and spatial neighbour effects do not interact to produce a greater effect than the sum may be due to the size of Flanders; a matter that would need to be explored with a larger country.

Finally, we look at the *fragmentation* variables. Whether the non-linear version consisting of the number of parties and its squared value or a dummy for sole power augmented by the number of parties is used, the implications are the same. Still, the results are not very clear-cut. The effect of a one-party government is to lower the likelihood of adoption of the tax while coalitions are more likely to adopt the new tax (as the turning point in the non-linear version is just below 2 parties). This is in contrast to Hypothesis 7. A possible explanation for this finding is the observation that fragmented governments have higher spending levels and thus are in more need of finances (Ashworth et al., 2002). This could lead them to accept new taxes more easily. Moreover, as suggested by the ‘clarity of responsibility hypothesis’ (Powell and Whitten, 1993), the electorate may not be able to identify which party in a coalition has ‘caused’ the introduction of a new tax. As such, the political cost of tax innovation may be smaller. In other words, fragmented governments may be less hesitant to introduce new taxes as each member of the coalition can ‘blame’ the other coalition partners for the introduction (see also Anderson, 2000 and Nadeau et al., 2002). Finally, coalition governments may reflect a broader representation of the various groups in the population leading to higher acceptance of political reforms (such as changes to the tax system). However, and crucially, there is a significant offsetting effect when the number of parties in the municipal government becomes larger. Indeed, there is a lower probability of introducing the new tax the more fragmented the government; a robust finding in all specifications. This is in support of our general hypothesis that fragmented governments are more likely to be gridlocked.

It thus appears that there are two conflicting effects from fragmentation. *Firstly*, the ‘clarity of responsibility’ is lower in coalition governments. Voters cannot distinguish which party is to ‘blame’ for the new tax. This decreases the costs of unpopular actions for each given party and increases the likelihood to introduce new taxation. *However*, though larger coalitions may agree on the need for new revenue sources, they may be unable to decide on the form of taxation as each will veto a tax levied on its voters (cfr. Tsebelis,

²⁷ This variable had to be created by a counterfactual in that not all authorities had neighbours who had adopted. However, save for a very small number of observations, 4, non-adopting authorities had a neighbour who had not adopted.

1995a,b). A similar status quo bias arises in Howitt and Wintrobe (1995): parties refrain from bringing a policy issue on the political agenda as they fear that their preferred solution to the problem will be defeated by other parties' solutions. This becomes increasingly problematic as the number of parties in the coalition increases. Larger coalitions are thus less likely to introduce a new tax than small coalitions.

6. Conclusions

This paper has considered policy innovation in the field of taxation. The adoption of green taxes by Flemish municipalities clearly demonstrates the role of politics on environmental tax policy. Tax adoption follows a pattern dictated by the electoral constraints under which incumbent governments work. The case under consideration — the green tax — is of particular interest. Indeed, whilst all new taxes can be considered to have a political cost, the green tax will have a degree of favour amongst some of the voters as the tax is (often) earmarked to expenditures in the field of environmental policy. Despite this, it very clearly is a tax and thus a 'bad' for the voter.

The findings here are that political factors are highly significant in the introduction of the tax. The presence of an election clearly discourages innovation. Post-election years appear to be the most popular to adopt a green tax. Further, neighbour effects are crucial: the greater the adoption of the tax amongst neighbours, the greater the probability that a given municipality will introduce the tax; a factor that is augmented by like-minded politicians setting the tax. This is despite a trend over time towards non-adoption once the committed have innovated. We find evidence that coalition governments are more likely to set the new tax. Still, this result is driven by the smaller (two-party) coalitions. Indeed, the more fragmented the government, the less likely will be green tax innovation. Thus there is some evidence of dispersed political costs though there is also gridlocked decision-making.

The adoption of green taxes seems to depend more heavily on the political institutional context than, for example, on the environmental situation of the jurisdiction. The green tax is not more likely to be adopted in highly polluted municipalities. This, of course, may be a consequence of the specific nature of the municipal green tax in Flanders. It is essentially a lump-sum tax, clearly not an instrument to induce taxpayers' behavioural reactions.

The study raises a number of other issues that remain to be explored. In this work, the first innovation by a municipality is the matter of importance. From innovation to long-term adoption is not straightforward as can be seen from the number of municipalities that discontinue the use of the green tax (sometimes to re-introduce it afterwards). The nature of these 'false starts' and the dynamic process needs to be modelled more fully than has been possible in this paper.

Acknowledgements

Previous versions of this paper were presented at the 2003 EPCS conference in Aarhus, Denmark, the 2004 PCS conference in Baltimore, and at seminars in Philips-University of

Marburg, Germany and University College, Dublin. We thank the participants, and especially Lars Feld, for their valuable comments. We also thank anonymous referees of this journal for helpful comments.

Appendix A

Table A.1

Definitions, predicted signs and data source for dependent variables

Variable	Definition	Source	Predicted sign
TAX	Dummy. 0 until year of introduction of green tax, 1 in year of introduction, no data afterwards	Municipal account data provided by Flemish Ministry of Internal Affairs	
POP	Size of population	National Institute for Statistics (NIS/INS)	+
WASTE	Total waste (in kg/capita)	Openbare Vlaamse Afvalstoffenmaatschappij (OVAM)	+
AIRQUAL	Emission of NOx and Sox (in kg/km ²)	Vlaamse Milieumaatschappij (VMM)	+
ELECT1	Dummy. 1 in election year (1994), 0 otherwise		–
ELECT2	0 in election year, 1 in pre-election year, ..., 5 in post-election year		+
TAXR	Total per capita tax revenue-deflated (1981=100)	Municipal budget data provided by Flemish Ministry of Internal Affairs	+
NUMPARG	Number of parties in government	Department of Political Science (POLI) Vrije Universiteit Brussel	–
PRN1	Share of neighbours with green tax	Own calculation	+
PRN2	Share of neighbours of neighbours with green tax	Own calculation	+
PRNS	Share of ideologically like-minded neighbours with green tax	Own calculation	+
IDPROX	Average ideological distance from municipalities with green tax	Own calculation	–
SOLE	Dummy. 1 if single-party majority, 0 otherwise	Department of Political Science (POLI) Vrije Universiteit Brussel	+
MAJ	Number of seats coalition parties hold in the council in excess of simple majority (in %)	Own calculations using data from Department of Political Science (POLI) Vrije Universiteit Brussel	+
ICG	Ideological complexion of coalition	Own calculations using data from Department of Political Science (POLI) Vrije Universiteit Brussel	–
TIME	Time trend		±

References

- Allison, P.D., 1982. Discrete-time methods for the analysis of event histories. *Sociological Methodology* 13, 61–98.
- Alm, J., McKee, M., Skidmore, M., 1993. Fiscal pressure, tax competition and the introduction of state lotteries. *National Tax Journal* 46, 463–476.

- Anderson, C.J., 2000. Economic voting and political context: a comparative perspective. *Electoral Studies* 19, 151–170.
- Ashworth, J., Heyndels, B., 2002. Tax structure turbulence in OECD countries. *Public Choice* 111, 347–376.
- Ashworth, J., Heyndels, B., Smolders, C., 2002. Redistribution as a local public good: an empirical test for Flemish municipalities. *Kyklos* 55, 27–56.
- Ben-Porath, Y., 1975. The years of plenty and the years of famine — a political business cycle? *Kyklos* 28, 400–403.
- Berry, F.S., 1988. Tax policy innovation in the American states. Ph.D dissertation, University of Michigan, Ann Arbor, Michigan.
- Berry, F.S., Berry, W.D., 1990. State lottery adoptions as political innovations: an event history analysis. *American Political Science Review* 84, 395–415.
- Berry, F.S., Berry, W.D., 1991. Specifying a model of state policy innovation. *American Political Science Review* 85, 571–579.
- Berry, F.S., Berry, W.D., 1992. Tax innovation in the states: capitalizing on political opportunity. *American Journal of Political Science* 36, 715–742.
- Berry, F.S., Berry, W.D., 1994. The politics of tax increases in the States. *American Journal of Political Science* 38, 855–859.
- Besley, T., Case, A., 1995. Incumbent behavior: vote-seeking, tax-setting and yardstick competition. *American Economic Review* 85, 25–45.
- Bizer, D.S., Durlauf, S.N., 1990. Testing the positive theory of government finance. *Journal of Monetary Economics* 26, 123–141.
- Boix, C., 1997. Privatizing the public business sector in the eighties: economic performance, partisan responses and divided governments. *British Journal of Political Science* 27, 473–496.
- Brueckner, J., 2003. Strategic interaction among governments: an overview of empirical studies. *International Regional Science Review* 26, 175–188.
- Caplan, B., 2001. Has Leviathan been bound?: a theory of imperfectly constrained government with evidence from the States. *Southern Economic Journal* 67, 825–847.
- Caudill, S.B., Ford, J.M., Mixon Jr., F.G., Peng, T.C., 1995. A discrete-time hazard model of lottery adoption. *Applied Economics* 27, 555–561.
- Chesher, A., Irish, M., 1987. Residual analysis in the grouped and censored normal linear model. *Journal of Econometrics* 34, 33–61.
- Dagenais, M.G., 1999. Inconsistency of a proposed non-linear instrumental variables estimator for probit and logit models with endogenous regressors. *Economics Letters* 63, 19–21.
- Daugbjerg, C., Svensen, G.T., 2001. Green Taxation in Question: Politics and Economic Efficiency in Environmental Regulation. Palgrave, Basingstoke.
- Davidson, R., MacKinnon, J.G., 1993. Estimation and Inference in Econometrics. Blackwell, Oxford.
- Davis, J.R., Filer, J.E., Moak, L.D., 1992. The lottery as an alternative source of revenue. *Atlantic Economic Journal* 20, 1–9.
- de Haan, J., Sturm, J.-E., 1997. Political and economic determinants of OECD budget deficits and government expenditures: a reinvestigation. *European Journal of Political Economy* 13, 739–750.
- Deschouwer, K., 1996. Nationale partijen en gemeenteraadsverkiezingen. In: Buelens, J., Deschouwer, K. (Eds.), *De Dorpsstraat is de Wetstraat niet*. VUBPress, Brussel, pp. 13–25.
- Erekson, O.H., Platt, G., Whistler, C., Ziegert, A.L., 1999. Factors influencing the adoption of State lotteries. *Applied Economics* 31, 875–884.
- Eyestone, R., 1977. Confusion, diffusion and innovation. *American Political Science Review* 71, 441–447.
- Filer, J.E., Moak, L.D., Uze, B., 1988. Why some States adopt lotteries and others don't. *Public Finance Quarterly* 16, 259–283.
- Frey, B., Schneider, F., 1978. An empirical study of politico-economic interaction in the United States. *Review of Economics and Statistics* 60, 174–195.
- Gray, V., 1973. Innovation in the States: a diffusion study. *American Political Science Review* 67, 1174–1185.
- Griliches, Z., 1971. Hybrid corn and the economics of innovation. In: Rosenberg, N. (Ed.), *The Economics of Technological Change*. Penguin Books, London, pp. 211–228.
- Grogger, J., 1990. A simple test for exogeneity in probit, logit and Poisson regression models. *Economics Letters* 33, 329–332.

- Hansen, S.B., 1983. *The Politics of Taxation*. Praeger, Westport.
- Hausman, J., 1978. Specification tests in econometrics. *Econometrica* 46, 1251–1271.
- Hettich, W., Winer, S., 1984. A positive model of tax structure. *Journal of Public Economics* 24, 67–87.
- Hettich, W., Winer, S., 1988. Economic and political foundations of tax structure. *American Economic Review* 78, 701–712.
- Hettich, W., Winer, S., 1999. *Democratic Choice and Taxation, A Theoretical and Empirical Analysis*. Cambridge University Press, Cambridge.
- Heyndels, B., 1998. De realisatiegraad van nieuwe belastingen: de gemeentelijke milieubelasting in Vlaanderen. In: De Rynck, F. (Ed.), *Overheid in Beweging (deel 2)*. Kluwer Editorial, Brussel, pp. 1–20.
- Heyndels, B., Vuchelen, J., 1998. Tax mimicking among Belgian municipalities. *National Tax Journal* 51, 89–100.
- Heyndels, B., Van Driessche, F., van Puyenbroeck, T., 1998. Bestuurlijke decentralisatie, informatie en innovatie: de diffusie van gemeentelijke milieubelastingen in Vlaanderen. In: De Bondt, R., Veugelers, R. (Eds.), *Informatie en Kennis in de Economie*. Universitaire Pers Leuven, Leuven, pp. 373–393.
- Howitt, P., Wintrobe, R., 1995. The political economy of inaction. *Journal of Public Economics* 56, 329–353.
- Kontopoulos, Y., Perotti, R., 1999. Government fragmentation and fiscal policy outcomes: evidence from OECD countries. In: Poterba, J.M., Von Hagen, J. (Eds.), *Fiscal Institutions and Fiscal Performance (NBER Conference Report)*. University of Chicago Press, Chicago, pp. 81–102.
- Laakso, M., Taagepera, R., 1979. ‘Effective’ number of parties: a measure with application to West Europe’. *Comparative Political Studies* 12, 3–27.
- Lucchetti, R., 2002. Inconsistency of naïve GMM estimation of QR models with endogenous regressors. *Economics Letters* 75, 179–185.
- Mikesell, J.L., 1978. Election periods and state tax policy cycles. *Public Choice* 33, 99–105.
- Moesen, W., Van Rompuy, V., 1997. *Handboek Openbare Financiën*. ACCO, Leuven.
- Mueller, K., Comer, J., 1983. Disinnovation in the American states: policy towards health systems agencies. *Journal of Sociology and Social Welfare* 10, 189–202.
- Musgrave, R.A., 1969. *Fiscal Systems*. Yale University Press, Oxford.
- Nadeau, R., Niemi, R.G., Yoshinaka, A., 2002. A cross-national analysis of economic voting: taking account of the political context across time and nations. *Electoral Studies* 21, 403–423.
- Nice, D.C., 1994. *Policy Innovation in State Government*. Iowa State University Press, Ames.
- Pack, J.R., 1988. The congress and fiscal policy. *Public Choice* 58, 101–122.
- Pagan, A., Vella, F., 1989. Diagnostic tests for models on individual data: a survey. *Journal of Applied Econometrics* 4, S29–S59.
- Pommerehne, W.W., Schneider, W., 1983. Does government in a representative democracy follow a majority of voters’ preferences?: an empirical examination. In: Hanush, H. (Ed.), *Anatomy of Government Deficiencies*. Springer Verlag, Berlin Heidelberg, pp. 61–88.
- Poterba, J.M., 1994. State responses to fiscal crises: the effects of budgetary institutions and politics. *Journal of Political Economy* 102, 799–821.
- Powell, G.B., Whitten, G.D., 1993. A cross-national analysis of economic voting: taking account of the political context. *American Journal of Political Science* 37, 391–414.
- Rogers, E.M., Shoemaker, F.F., 1971. *Communication of Innovations: A Cross-Cultural Approach*. The Free Press, New York.
- Rose, R., Karran, T., 1987. *Taxation by Political Inertia*. Allen and Unwin, London.
- Roubini, N., Sachs, J.D., 1989. Political and economic determinants of budget deficits in the industrial democracies. *European Economic Review* 33, 903–938.
- Royed, T.J., Borelli, S.A., 1999. The politics and economics of revenue growth: a cross-national analysis. *European Journal of Political Research* 36, 87–118.
- Salmon, P., 1987. Decentralisation as an incentive scheme. *Oxford Review of Economic Policy* 3, 24–43.
- Savage, R.L., 1985. Diffusion research traditions and the spread of policy innovations in a federal system. *Publius the Journal of Federalism* 15, 1–27.
- Solé Ollé, A., 2003. Electoral accountability and tax mimicking: the effects of electoral margins, coalition government and ideology. *European Journal of Political Economy* 19, 685–713.
- Spolaore, E., 1993. Policy making systems and economic efficiency: coalition governments versus majority governments. ECARE, Université Libre de Bruxelles, mimeo.

- Strumpf, K.S., 2002. Does government decentralization increase or decrease innovation? *Journal of Public Economic Theory* 4, 207–241.
- Thalmann, P., 2004. The public acceptance of green taxes: 2 million voters express their opinion. *Public Choice* 119, 179–217.
- Tsebelis, G., 1995a. Decision-making in political systems: veto players in presidentialism, parliamentarism, multicameralism and multipartyism. *British Journal of Political Science* 25, 289–325.
- Tsebelis, G., 1995b. Veto players and law production in parliamentary democracies. In: Döring, H. (Ed.), *Parliaments and Majority Rule in Western Europe*. Campus-Verlag, Frankfurt, pp. 83–111.
- Tufte, E., 1978. *Political Control of the Economy*. Princeton University Press, Princeton.
- Tyran, J.-R., Sausgruber, R., 2003. The diffusion of policy innovations. An experimental investigation. University of St Gallen. Department of Economics, Discussion Paper, pp. 2003–2014.
- Verbeek, M., 2004. *A Guide to Modern Econometrics*. John Wiley and Sons, Chichester.
- Walker, J.L., 1969. The diffusion of innovations among the American states. *American Political Science Review* 63, 880–899.
- Yoo, K.-R., 1998. Intervention analysis of electoral tax cycle: the case of Japan. *Public Choice* 96, 241–258.