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Earmarked Taxation for Financing Public Investments Projects

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Earmarked Taxation for Financing Public Investments Projects

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Abstract

This paper deals with the earmarked taxation employed by local governments for financing public investments projects carried on with some Public-Private Partnerships configurations. First, we analyse the theoretical profiles of earmarked taxation by using the tax-benefit approach, and the theory of political competition and accountability. Second, on the ground of the P-P-P literature, we examine the trade-off between financing mechanisms based on public subsidies to the concessionaire firm, financed by a earmarked tax, and mechanisms based on users-fees. Then, we discuss cases where the first solution turns out to be, even partially, preferred. Finally, we consider the potential role of earmarked taxation on the Italian institutional context, emerging from the recent legislation on fiscal federalism and municipalities taxation.

Keywords: Earmarked taxes, cost of public funds, subsidies, public investments

JEL Classification: H23, H54, H71, R42

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1 Introduction

Earmarked taxation is one of the main novelties of the recent Fiscal Federalism reform in Italy. The new legislation explicitly emphasizes tax autonomy, by referring to some own taxes which allow the municipalities to establish and apply them for specific purposes, such as the realization of public works and multi-years investments in social services or for meeting the costs due to great touristic flows and urban mobility. According to this rule what should identify a earmarked tax is not the taxable base, but the structural and accounting link with a given public intervention, especially a socially relevant investment. The idea is to approximate an application of a user-fee principle, according to which the individual consumer pays a price for some services provided by the public sector as in the case of private goods purchased on the market. Using a user-fee principle can indeed increases welfare because individual consumers choose their preferred amount of goods provided by the public sector. Earmarking is an approximation of this principle as it provides a direct link between the aggregate revenue of a particular tax and the aggregate expenditure for a particular public service. However, although earmarking does not correspond to an individual cost-benefit principle and generally does not necessarily lead to the same result, it may be used to improve the efficiency of the public sector performance.

For instance, when voters are uncertain about politicians' motivations, the range of potential taxes which could be used may become very limited, and so earmarked taxes can play an active role as a signalling device to affect the voters' beliefs on their unobserved type. This is particularly true when environmental taxes are earmarked taxes as well, because it is possible that earmarking leads to taxes which are higher than they otherwise would be. Moreover, in an institutional set-up where parties cannot commit to their campaign promises before the election and there is a link between tax earmarking and parties' probability of winning the elections, earmarking may endogenously results as a tool used by governments to make credible promises and then to increase their accountability.

Earmarked taxes may also be inserted in a Public-Private Partnership contract for building and managing a public infrastructure. In general, it socially optimal to try to extend as much as possible the share of user fees financing, but, for the so-called cold works, there is still room for using suitably taxation. In these cases, the problem is to choose the best form of earmarked tax for limiting the diversion of funds from the project non-benevolent politicians might carry on.

The plan of the paper is as follows. In section 2 we examine earmarked

taxation in the context of modern Political Economy theory, trying to stress the link between such a form of taxation and a political competition framework. In section 3, we analyse a model to explain how and when a earmarked tax could be beneficial for financing a PPP contract. In section 4, we consider the main forms of earmarked taxes, referring to some Italian cases which will be particularly meaningful in applying the Fiscal Federalism reform. Section 5 concludes.

2 Earmarked taxation, political competition and accountability

Tax earmarking or tax hypothecation "refers to the assigning of receipts either from a single tax base, or as a proportion from a wider pool of revenue, to a specific end use" (Wilkinson (1994) p. 119). In the real world, there are many examples. Both in the EU and the US, there are environmental taxes which are earmarked for pollution abatement; in the US and in Japan, taxes on fuels and motor vehicles have to be spent for highways (Anesi (2006)).

Tax earmarking is in sharp contrast with the traditional principle of general taxation which does not provide a link between revenue of a particular tax and a particular public expenditure. On the one hand, such general taxation allows the maximum degree of freedom to policymakers who can more easily pursue redistributional and stabilizational objectives (Bös (2000)). On the other hand, a political economy point of view stresses the fact that general taxation can distort public expenditures from the citizens' preferences in favour of those of politicians. Thus, even if from a traditional perspective earmarking taxation constitutes an additional constraint to the government's problem, yielding to a suboptimal solution, it has been recently advocated as a mean to counter people's disaffection from the state. Supporters of earmarking consider it as a tool to encourage citizens to pay for better public services, making their cost transparent to voters, thus facilitating more informed choices and more democracy (Wilkinson (1994), Jackson (2005), Schaltegger and Torgler (2008)).

Notice, however, that earmarking provides a direct link between the aggregate revenue of a particular tax and the aggregate expenditure for a particular public service (Bös (2000)). Consequently, earmarking does not correspond to an individual cost-benefit principle, i.e. it is not an application of a user-fee principle. According to the latter, the individual consumer pays a price for some services provided by the public sector as in the case of private goods purchased on the market. Using a user-fee principle can

3

thus increases welfare because individual consumers choose their preferred amount of goods provided by the public sector. Using earmarked taxation does not necessarily leads to the same result.[1]

A pioneering contribution on earmarking taxation is Buchanan (1963). This paper shows that a more efficient allocation is obtained with earmarking than general-tax funding. The reason for this result is due to the fact that the government is not considered as a monolithic planner, who takes decisions on both taxes and public goods, as in the traditional public finance literature. On the contrary, by using a simple two-public-good model, Buchanan analyses the political process as a multi-agent process. In his view, general-tax funding implies that first, a budgetary authority decides on the relative shares of public goods (budget mix), and then the budget size is determined by majority voting, taking as given such shares. The intuition of his result is that the decision of the median voter is constrained by the decision of the budgetary authority while this is not the case with earmarking because the median voter can choose both the amounts of the publicly provided public goods and their tax prices.

Such a set-up is, however, modified by Bös (2000). In his view, earmarking does not imply that any decision is only taken by the median voter: the voting process is organized by an agency which has a personal interest in affecting the decision. Indeed, in representative democracies, a earmarked tax is usually levied by one agent (finance minister), while the amount of a publicly provided public good is decided by another agent (a spending minister).[2] More precisely, by using a principal-agent approach, the author assumes that the parliament (principal) takes the basic decisions on taxation and public expenditures. Such decisions are taken by the incumbent party to maximise expected votes. Further, decisions taken by the parliament have to be executed by a taxing minister and a spending minister. These are modeled as self-interested agents who are interested in getting more income, exerting less effort, and obtaining more bureaucratic power, by means of their private informations. Within such a planner-taxer-spender approach, earmarking results in an endogenous way. In particular, Bös shows that earmarking is less likely to be optimal compared with the traditional public finance literature where the planner acts as a monolithic fully informed agent. Further, By comparing a parliament which either maximises welfare or expected votes, Bös shows that in the latter case earmarking is more

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[1] Only for the median voter, earmarked taxation and user-fee principle are identical (Bös (2000)).

[2] In a coalition government, the two ministers may come from different parties.

probably chosen but at the price of inefficiently high costs.

On the basis of such results, Bös discusses the implications of his analysis with respect to the arguments in favour of earmarking. First, earmarking has been advocated as a mean to allow citizens better understand the rationale of taxation. However, if taxpayers are supposed rationale, they could anticipate the link between general taxation and the various public goods financed. Second, supporters of earmarking stress the fact that public expenditures could be chosen in closer accordance with voters preferences. But, since earmarked taxes are not user-fees, i.e. they are not the price of public goods, and earmarking implies a link between the expected value of a public good and the tax revenue (revenues are spent after taxes have been raised), each consumer cannot buy the preferred amount of a public good. Finally, earmarking does not seem to act as an incentive for the government to act more efficiently because of asymmetric informations problems and multi-agent approach.

Different conclusions are, however, obtained by Brett and Keen (2000) in a paper which shows that earmarking may emerge when voters are uncertain about the motivations of the policymakers to whom they delegate the power of choosing fiscal policies. Specifically, when policymakers retain some discretion in the ex post ways of using tax revenue, and have different preferences with respect to voters, they could have incentives to divert such revenues. Thus, in the case of environmental issues, Pigovian taxes although ex post efficient may not be politically sustainable because policymakers could divert such revenues towards projects which are not valued by voters, but are valued by themselves. In this set-up, earmarked taxes could be able to eliminate such a risk. Earmarking can thus "be used by incumbents as a way to restrict the behaviour of successors who have different objectives, or as a way to implement a tax which, although desirable on efficiency grounds, may have damaging effects on their reputations" (Brett and Keen (2000) p. 336). Indeed, when voters are uncertain about politicians' motivations, the range of potential taxes which could be used may become very limited, and so earmarked taxes can play an active role, notwithstanding some efficiency losses as those stressed by Bös (2000). In other words, earmarking can be used by politicians as a signalling device to affect the voters' beliefs on their unobserved type. In particular, it is possible that earmarking leads to environmental taxes which are higher than they otherwise would be, but still lower than the Pigovian level. Further, the authors point out that earmarked taxes can also be used as a signalling device of an environmental problem towards citizens. "When the potential environmental damage is high, but citizens view catastrophe as unlikely, earmarking

5

serves as a way of signaling both the type of incumbent and the level of environmental damage" (Brett and Keen (2000) p. 336).

The argument elaborated in Brett and Keen (2000) has been recently re-examined by Anesi (2006) which also stresses the importance of the electoral process as a determining factor of earmarking. In particular, the link between tax earmarking and parties' probability of winning the elections is examined when parties cannot commit to their campaign promises before the election. Earmarking thus results endogenously as a tool used by governments to make credible promises. Therefore, by this way, the accountability of politicians tends to increase as well as the efficiency outcomes. In order to analyse better such a result, we provide a brief presentation of the model in what follows.

Consider a two-period probabilistic voting model with a continuum of mass 1 of heterogenous individuals, acting as consumers and voters. Every individual is characterized by a preference parameter $\alpha \in [0, 1]$ distributed according to a probability measure $\mathbf{F}$. Further, there are two competing parties A and B, whose preferences are exogenous, and without loss of generality it is assumed that $\alpha_A > \alpha_B$. The timing of the game is as follows. First, in period 1, the incumbent party decides whether to earmark or not a part η of period 2 tax revenue to finance public good g_1. Second, at the start of period 2, elections take place. Voters perfectly anticipate the policy that each party will undergo in period 2 because there is no uncertainty on parties' preferences, and under the assumption that parties cannot commit to their campaign promises. Finally, the elected party chooses the amount g_1 and g_2 of the two public goods for period 2. Under the assumption that it takes a sufficiently long time to change constitutional rules, the earmarking constraint acts as a constitutional rule, which cannot be modified by the elected party. Thus, period 2 elected party policy (g_1, g_2) has to satisfy the following earmarking constraint

$$g_1 \geqslant \eta g \quad \text{with } \eta \in [0, 1] \text{ and } g_1 + g_2 \equiv g$$

Notice that all the earmarked revenues have to finance the designated public good g_1 which, however, can be also financed by other revenues, in accordance with what we observe in reality. The incumbent party chooses the level of earmarking not only on the basis of its preferences, but also to increase its probability of re-election.

An individual of type α has the following preferences

$$\widetilde{V}(g_1, g_2; \alpha) = V(g_1, g_2; \alpha) + (b^\alpha + \theta)\varphi^B,$$

where $b^\alpha \in \mathbf{B}_\alpha$ represents an individual-specific parameter which measures α's ideological bias in favor of party B; $\theta \in \Theta$ denotes party B's general popularity advantage; φ^B represents a binary variable (equal to 0 if B is not in office and 1 otherwise); and the function V denotes the indirect utility function for a voter of type α, namely

$$V(g_1, g_2; \alpha) = Y - g + \alpha u(g_1) + (1 - \alpha)u(g_2),$$

with Y denoting the exogenous income (the same for all individuals), and $u(.)$ is a strictly increasing, strictly concave, at least three times differentiable function.

By assumption, the actual value of θ realizes after the period 1 decision is taken and just before the elections. This means that earmarking is chosen by the incumbent in period 1 without knowing the future winner of the elections. Given the value of η chosen at period 1, an individual of type α will compare his expected payoff upon the re-election of the incumbent and that following the election of a challenger, i.e. he will vote in favor of party A if and only if

$$V\left(g^A(\eta); \alpha\right) > V\left(g^B(\eta); \alpha\right) + (b^\alpha + \theta).$$

Suppose first that party B is in office in period 1. Its maximisation problem obtains as

$$\max_{\eta \in [0,1]} \left\{ p(\eta) V(g^A(\eta); \alpha_B) + [1 - p(\eta)] V(g^B(\eta); \alpha_B) \right\}.$$

At the decisive point $\bar{\eta}(\alpha_B)$, the FOC of the above problem yields

$$-p'(\eta) \left[V\left(g^B(\eta); \alpha_B\right) - V(g^A(\eta); \alpha_B) \right] + [1 - p(\eta)] \frac{dV\left(g^B(\eta); \alpha_B\right)}{d\eta} = 0. \tag{1}$$

Such a condition explains the trade-off which party B has to solve. On the one hand, the first term of (1) represents the marginal gain for party B of a marginal increase of the earmarking η, in terms of increased probability of re-election, times the gap between B's payoff if it is elected and its payoff if it is not. On the other hand, the second term denotes the marginal cost which party B has to bear because of a deviation from its bliss point due to the binding earmarking constraint. Thus, it is possible to find conditions on voters' preferences, under which earmarking results endogenously, i.e. it is convenient for party B to constrain itself, if its gain in terms of increased probability of re-election more than compensates the loss due to the departure from its ideal policy. "What is the most striking in this result is that

7

party B may thus be led to assign tax revenues to the public good that it values the less" under certain condition on voters' preferences (Anesi (2006) p. 691). For example, policy-makers who care little about environmental issues may have incentives to earmark environmental taxes.

Suppose now that party A is in office in period 1. Its maximisation problem obtains as

$$\max_{\eta \in [0,1]} \left\{ p(\eta) V(g^A(\eta); \alpha_A) + [1 - p(\eta)] V(g^B(\eta); \alpha_A) \right\},$$

and the FOC of this problem results as

$$p'(\eta) \left[V \left(g^A(\eta); \alpha_A \right) - V(g^B(\eta); \alpha_A) \right] + [1 - p(\eta)] \frac{dV \left(g^B(\eta); \alpha_A \right)}{d\eta} = 0.$$

Accordingly, at the decisive point $\overline{\eta}(\alpha_A)$, depending on voters' preferences, $p'(\eta) < (>)0$, i.e. constraining earmarking decreases (increases) party A's probability of victory. Thus, the first negative (positive) term represents the decrease (increase) of the probability of re-election times the loss of not being re-elected, while the second term corresponds to the expected gain of constraining the future elected party. When $p'(\eta) < 0$, party A has an incentive to earmark tax revenues if it gains enough from party B's being constrained. When, instead, $p'(\eta) > 0$, earmarking allows party A both to constrain party B and to increase its probability of re-election.

In sum, this paper shows that "incumbent parties that need to secure their re-election should sometimes assign tax receipts to the provision of the public good they value the less. To the extent that a majority of voters would like the public good in question to be provided beyond what the incumbent wishes, binding earmarking rules, by allowing this latter to credibly commit to some levels of provision, will raise its chances of re-election. Alternatively, even if earmarking may seem very attractive for a party that favors a particular public good, it may engender important electoral losses. For this to occur, conditions on parties' probability of winning the election must be satisfied, so that voters are more inclined to elect the rival challenger when earmarking rules have been imposed" (Anesi (2006) p. 694).

3 Private-Public Projects for public investment, uncertainty and earmarked taxation

Traditional literature explores the choice between tariffs on users and taxation for financing public investments on services production and provision

(Feehn and Matsumoto (2000)), but the link with the rationale of Public-Private Partnership (PPP) contracts is rather neglected. This section aims to analyse such an issue.

Let us suppose that a local government wants to build an infrastructure and to transfer the public service provision to a private enterprise through a PPP contract. As well known (Bennett and Iossa (2006), Sadka (2007) and Balduzzi (2011)), the main feature of this single long term contract is the bundling of investment and service provision (Build-and-Operate). In this respect, in what follows, we examine the following questions on the way of financing a risky public project.

1. How should a local risk-neutral government choice on the composition between users fees and a public subsidy (a earmarked tax) in financing a demand-risky project be modelled?

2. For what kind of projects a earmarked tax is a desirable instrument of funding?

3. At what conditions does a project financed by earmarked taxation still remain socially optimal, although the tax-distortion?

3.1 The governmental choice of funding means

To answer the previous questions, we present a re-elaboration of the model by Engel et al. (2008). Let $v > 0$ denote the discounted private marginal willingness to pay (MWP) for the project's services, i.e. the value the consumers attribute to the investment and also a proxy of the level of demand. Demand uncertainty is summarized by a probability density function over v, $f(v)$, with c.d.f. $F(v)$. This density is bounded from below by v_{min} and from above by v_{max}.

Let $\Pi(v)$ denote producer (builder and concessionaire) surplus in state v and $0 \leqslant \epsilon \leqslant 1$ the weight that the politician gives to producer surplus in its pay-off function. Given an exogenous and certain initial cost I, the producer surplus in state v is given as follows:

$$\Pi(v) = R(v) + T(v) - I, \tag{2}$$

where $R(v)$ denotes the present value of user fees revenues collected by the concessionaire, in each state v, and $T(v)$ denotes the present value of the subsidy it receives. Further, $T(v)$ is financed by taxation and takes the form of a cash payment over-time, contingent on v, to supplement revenue from the project under a Build-Operate-and-Transfer (BOT) contract, with a minimum revenue guarantee (MRG).

Since the concessionaire receives $R(v)$ in state v, the local government receives the difference between the present value of MWP and the present value of revenues of the concessionaire: $v - R(v)$, with $0 \leq R(v) \leq v$. If the term of the concession is finite and $v - R(v) > 0$, these funds are used to reduce distortionary taxation elsewhere in the economy. If the term of the concession is infinite, $v = R(v)$. Since there is a (hard) government budget constraint, 1€ of the repayment is worth $1 + \lambda$ (the marginal cost of public funds), while 1€ of taxation costs $(1 + \lambda)(1 + \zeta)$. The parameters λ and ζ represent two types of distortions. The first one is the cost of getting money from private tax-payers, and the second one captures the administrative costs of the government agency managing public service. $\zeta > 0$ means that some of the resources from government to the concessionaire are wasted in the process, for agency problems, or for collecting procedures within the local public organization. The main problem is the possible diversion of funds raised by the earmarked tax to other expenditures purposes outside the project.

Let us now present a simple formalization of the micro-foundation of λ and ζ. Suppose that the local government in its regular activity chooses local taxes, $T_k \geqslant 0$, $k = 1, ..., K$, and the allocation of public expenditure in n items (and agencies), $g_i > 0$, $i = 1, .., n$, in order to

$$\max \sum_i \left[\Gamma_i(g_i) - (g_i + Z_i(g_i))\right] - \sum_k \Psi_k(T_k) - \mu \left(\sum_i g_i + Z_i(g_i) - \sum_k T_k\right),$$
(3)

where $\Gamma_i(g_i)$ denotes the benefit of public expenditure g_i, with marginal benefit given by $\Gamma_i'(g_i) \equiv t_i$; $g_i + Z_i(g_i)$ represents the total cost for giving this benefit to local citizens. It comprises a production cost, g_i, and an agency cost, $Z_i(g_i)$, with marginal cost given by $Z_i'(g_i) \equiv \zeta_i$; $T_k + \Psi_k(T_k)$ denotes the total cost borne by tax-payers for paying an amount of tax T_k, with $\Psi_k(T_k)$ representing the social cost of taxation, in terms of distortion. Finally, $\Psi_k'(T_k) \equiv \lambda_k$ denotes the marginal cost of taxation due to tax T_k, and $(1 + \lambda_k)$ denotes the marginal cost of public funds raised with such a tax.

The F.O.C. of problem in (3) w.r.t. $T_k \geqslant 0$ and $g_i > 0$, $i = 1, .., n$, obtain as follows

$$\lambda_k \geqslant \mu,$$
$$t_i - 1 - \zeta_i - \mu(1 + \zeta_i) = 0.$$

The first condition shows that there is at least a tax T_k for which $T_k > 0$, $\lambda_k = \mu$, i.e. with the minimum cost. Hence for this tax, $\mu = \lambda \equiv \min \lambda_k$.

By substituting the first condition into the second one, we have

$$t_i = (1 + \lambda)(1 + \zeta_i).$$

The marginal surplus created by 1 € of spending by agency i equals the (minimum) marginal cost of public funds times the relative efficiency of spending money in government agency i.

Now, let us analyse the consumers' surplus of the activity of the project. $S(v)$ is given by the difference between users' MWP in state v, and the total amount transferred to the concessionaire, but plus the reduction in distortionary taxes due to the increase in the revenue collected by the government at the end of the concession (the final repayment). Moreover, let us assume that this project can generate an externality ω. Therefore, the consumers' surplus obtains as

$$
\begin{aligned}
S(v) &= v - [R(v) + (1 + \lambda)(1 + \zeta)T(v)] + \lambda[v - R(v)] + \omega = \\
&= (1 + \lambda)[v - R(v)] - (1 + \lambda)(1 + \zeta)T(v) + \omega
\end{aligned}
$$

The optimal values of $R(v)$ and $T(v)$ for a benevolent local government are given by the maximization of the social surplus subject to the concessionaire participation constraint, otherwise she is not available to sign the PPP contract. Thus, its problem is

$$
\max_{R(v),T(v)} \int [S(v) + \epsilon \Pi(v)] f(v) dv
$$

$$
s.t. \quad \int \Pi(v) f(v) dv \geqslant \overline{u}, \quad 0 \leqslant R(v) \leqslant v, \quad T(v) \geqslant 0,
$$

where $\overline{u}$ denotes the opportunity cost of the concessionaire. By substituting the term for $S(v)$ and $\Pi(v)$,[3] the above program may be re-written as the minimisation of net social cost due to the means of funding the project

$$
\min_{R(v),T(v)} \int \{(1 + \lambda - \epsilon)R(v) + [(1 + \lambda)(1 + \zeta) - \epsilon]T(v)\}. \tag{4}
$$

According to the solution of the above problem, it turns out that the terms of the PPP contract depend on outside parameters such as ϵ, λ, and μ.

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[3]Dropping all the variables not depending on government' choice, which are $\omega, \alpha I$ and $(1 + \lambda)v$.

3.2 The earmarked taxation as a desirable instrument

From (4), it is easy to check that, if $\zeta > 0$, user fees are a more efficient instrument for compensating the concessionaire than the subsidy. The cost to society of 1 € of user fees is $1 + \lambda - \epsilon$, while a subsidy costs $(1 + \lambda)(1 + \zeta)$. However, if the project's social value exceeds I, and user fees revenue is insufficient to compensate the concessionaire, in low demand states, the subsidy becomes beneficial as an insurance repayment, and $\zeta > 0$ determines the structure of this optimal risk-sharing contract. When $\zeta > 0$, the trade-off faced by the local government is the following. On the one hand, it would like to utilize user fees revenues as much as possible to compensate the concessionaire in order to avoid paying distortionary subsidies. On the other hand, if using only user fees, the concessionaire may run an excessive risk. Thus, an efficient contract should insure the concessionaire against low demand states through subsidies.

It can be shown (Engel et al. (2008)) that the optimal contract is characterized by a "minimum revenue guarantee", m, and a "revenue cap", M, with $m < M$.

Thus, there are projects such that $M < v$, where the concessionaire collects M in present discounted user fees, while the government collects the remaining $v - M$. No subsidies are paid and the end of the concession is finite. These projects are called *hot works*.

Then, there are projects such that $m \leq v \leq M$, the concession lasts indefinitely and no subsidies are paid. Indeed, the total revenue accrued to the concessionaire in present value is equal to v, and the government budget is unaffected by the concession. These projects are in some sense intermediate.

Finally, there are projects with $v < m$, the concession lasts indefinitely, and the government grants a subsidy of $m - v$ to the concessionaire. These are called *cold works*.

In these cases, $v_{max} < I$ and then $m = I$, because with $m > I$ the concessionaire participation constraint holds with slack, and with $m < I$ it cannot be satisfied. Thus, the optimal contract subsidizes the concessionaire in all demand states to ensure that total revenue is equal to the cost of the project. Then, $R(v) + T(v) = I$ for all v, and the government pays a subsidy equal to $I - v$ in each state. This is the present value of earmarked tax for state v. The expected value of the earmarked tax is given by the difference between the fixed cost and the expected present value of MWP:

$$E[T(v)] = I - \int v f(v) dv.$$

3.3 A socially optimal project although financed by distortionary earmarked taxation

Let us suppose that the entire private willingness to pay cannot be collected by charging users fees over the life of the infrastructure project because of their unpopularity. Let β be the fraction which instead can be collected. Thus, if γv is the maximum which could be transferred to the concessionaire under a PPP contract, $\beta \leq \gamma$.

When $R^*(v)$ and $T^*(v)$ are the chosen means, the expected social value of the project is

$$SV \equiv \int [\lambda\beta + 1]v - (1 + \gamma - \epsilon)R^*(v) + \\ -[(1 + \lambda)(1 + \zeta) - \epsilon]T^*(v) - \epsilon I f(v)dv + \omega. \tag{5}$$

Now, in case of *cold works,* the following conditions hold:

$$
\begin{aligned}
I &> \gamma v_{max}, \\
R^*(v) + T^*(v) &= I, \\
R^*(v) &= \gamma v, \\
T^*(v) &= I - \gamma v.
\end{aligned}
$$

Thus, by substituting (5) we obtain that the project is socially worthwhile if and only if

$$SV \equiv \int \left\{ (\lambda\beta + 1)v - (1 + \lambda)I - (1 + \lambda)(1 + \zeta)(I - \gamma v) \right\} f(v)dv + \omega \gtreqless 0.$$

This implies that SV is decreasing in λ and ζ, while it is increasing in β if $\gamma > \beta$. Thus, in general, it is socially optimal to try to extend as much as possible the share of users fees. Moreover, it is worth to arrange the institutional conditions in order to have a low λ, by choosing the best form of earmarked tax, and a low ζ, by limiting the diversion of funds from the project, with a fairly accountable decision making.

4 Earmarked taxation perspective and fiscal federalism reforms in Italy

In Italy, art. 12, Comma 1 (d) of the bill LD 42/2009 on Fiscal Federalism reform explicitly refers to earmarked taxation. In particular, it plans to introduce the "...one or more own taxes which, emphasizing tax autonomy, allow the municipalities to establish and apply them for specific purposes,

such as the realization of public works and multi-years investments in social services or for meeting the costs due to particular events provoking great touristic flows and urban mobility". According to this rule what should identify a earmarked tax is not the taxable base, but the structural and accounting link with a given public intervention, especially a socially relevant investment.

However, not all taxes can be used for financing specific purposes in such a way: "Only taxes that are transparent should be earmarked. This is because the earmarking principle is based on the benefit approach and people take decisions by voting, or less directly through their representatives, on the tax price they wish to pay for public goods" (Wilkinson (1994) p. 127). Therefore, it is fundamental to clearly single out who bears the tax burden, and consequently to limit the possibility of shifting and exporting it. A personal progressive income tax, a general expenditure tax, and a TVA could be only partially used. Any tax, whose basis is directly or even indirectly linked to the benefit of the provided public service can, instead, become a good earmarked tax. In what follows, we analyse three types of earmarked taxation which have been used in the past, and could be more extensively applied in Italy according to the new fiscal federalism legislation.

4.1 The Accommodation tax for financing the costs of tourism

AT is a tax on all people who stay temporally in a location different from that of residence for various reasons and ways. The tax follows two basic principles: the benefit principle and the principle applied for Pigovian taxation devoted to correct negative externalities ("...who pollutes pays"). As far as the first principle is concerned, there is a direct link between the benefits enjoyed by tourists and the additional costs they provoke for historical cities maintenance. Indeed, there are rival goods used by tourists whose prices can be suitably managed through a structure of discriminated tariffs, while for other rival, but non-excludable goods, the benefit-approach cannot be directly applied. For the latters, it is possible to apply an AT for re-establishing a link between the benefits tourists receive and the cost they bear in a similar way as a price-system. As far as the second principle is concerned, we know that tourists' activities create a set of social and environmental costs, congestion costs and costs for damaging the artistic heritage of the city they visit.

This environmental tax becomes a good earmarked tax as the yield can be exclusively devoted to funding the investments for maintaining the public heritage of the city. There are many examples of this earmarked taxation.

The most meaningful examples are those of Switzerland and France where, at a sub-national level, a visitor poll tax is applied according to the typology of the accommodation itself.

In general, the level of an AT should be linked to the marginal damage created by tourism, but it must limited in order to control the phenomenon of fiscal competition among municipalities. Moreover, it should be fixed according to the elasticity of demand for touristic visits with respect to the price of accommodation, comprehensive of the tax, and according to a Ramsey formula perspective. In order to stress the role of a earmarked tax, its revenues usually finance a fund specifically devoted to capital expenditure for projects decided by a particular Commission whose members are named by the local government and by representatives of hotel tenants. These projects mainly refer to town promotion policies, touristic infrastructures, environmental ameliorations and conservations.

In France, this type of AT - *la taxe de sèjour,* working since more than 100 years - is applied in about 2000 municipalities, independently to their nature and dimension. It is a specific tax because it is calculated with respect to the number of nights, and not to the whole hotel expenditure. There is also *la taxe de sèjour forfaitaire* applied with the same rates to rents of buildings for touristic purposes of long stay.

In Italy, the recent DLGS 14.3.2011 n.23 on "Municipale Federalism" has established the faculty of introducing a tax (AT) similar to *la taxe de sèjour,* with the limit of no more than 5 euro for room daily. Such a tax is however limited to chief towns, municipalities unions and municipalities included on the list of touristic cities. Following this new institutional set-up, several proposals of introducing AT in touristic towns, like Venice, Rome and Florence, have been recently presented. In this respect, the experiment of Florence is particularly interesting.

First, we have to underline that the length of stay in Florence is enough limited: the average value of days tourists stay in the city is lower than 3. The greater part of overnight stays comes from the foreigners (74%), with an increasing percentage with respect to the qualitative level of the hotel (83% for 5 stars hotels). Tourists are a constant presence in Florence during the whole year, as the fluctuation between the most requested months of the year (during spring and fall) and the less requested (during winter) does not exceed the ratio 2 to 1. Further, 83% of touristic stays are in hotel, and 17% in other structures.

The competition in the market of tourism of art is very limited. In a town like Florence, the uniqueness of its artistic heritage gives it a relevant monopolistic position. Some competition may arise within the internal local

market among hotel-keepers, but it is plausible that many barriers to entry, and a natural incentive to collusion increase the hotels' market power. Thus, tariffs are little competitive. The consequence is that the demand for all touristic services is quite rigid in Florence, certainly more than in other touristic towns in Italy and around the world. To have an idea of this, we may recall that the effect of a global shock like that one of 11th September 2001, reduced the demand of touristic flow less than 10%. Consequently, AT should have a limited distortionary effect.

As far as the annual costs of tourism are concerned they have been estimated by the Municipality of Florence: about 10 millions euro for garbage collection, 8,5 millions euro for public transport service, 1,5 millions euro for information offices, and 1 million euro for other general services maintenance and surveillance costs.

The proposed tax applies for the whole stay in the accommodation, but it could be also imagined decreasing in time. The tax-payers are non-resident people who stays at least for an overnight, excluded children less than 12 years old. The most frequent hypothesis implies a tariff of 1 euro for each hotel "accomodation-star" (1 euro for a 1 star hotel, and so on up to 5 euro for a 5 stars hotel), and 3 euro daily for Agri-touristic structures.

Estimations show that the yield of this AT could be at least 15 millions euro (70-75% from 3-4 stars hotels). However, even if we imagine a less optimistic result around 10 millions, municipal public investments could be increased by 12%. This yield could be devoted towards culture, viability and public transport services, territory management and environment care.

4.2 The taxes on property and value accruals of real estate

Another way of financing local public investments which is coherent with the logic of earmarked taxation, and is well-tested around the world, is the taxation of capital gains, due to a new public infrastructure (e.g. a Metro line). In the past, we had a tax of this type in Italy, the so-called *Contributo di miglioria*. The idea was to approximate the accrual of value of a building and then to tax it for compensating the municipality. However, this type of earmarked tax encounters some problems of implementation. The first one refers to the approximation of the true accrual of value which is not an easy task, especially ex-ante, i.e. before the starting of the public work. The second one is a consequence of the first one, as it refers to the discrepancy which may result between the revenue dynamics of the tax during the time and the actual necessity in terms of funds for paying public work costs, the initial ones as well those inserted in the cash flow. For the accrual evaluation,

we may calculate it yearly or estimate it at the end of the work. On the one hand, this second option seems preferable because it allows a deeper consideration of all factors influencing the houses prices in the long period of the building activity, without taking into account all contingent factors. On the other hand, in the long run, many factors outside the infrastructure may influence the market value of a house and the final accrual. Moreover, there could be some losses of value due to some shortcomings of the public work itself, which should be considered, because in theory the tax applies on the net accrual of value. If the tax revenues are the only way to finance the public work, problems of liquidity can grow up during the building time and also afterwards during the management of the service entrusted in concession.

Until 1998 in Italy there was a specific tax on value accrual of real estate, called INVIM. It was paid by the seller of the house at the moment of the transaction. This tax, although perfectly linked to benefit-principle, was never used as a earmarked tax for financing specific investments. INVIM was substituted by ICI in 1998, a tax on the value of real estate, not in the accrual.

With the law 27.12.2006, n. 296, the ICI could be applied as a earmarked tax for a series of public works of municipalities and with the Dlgs 14.3.2011 n. 23 the application has been extended to further types of works. The allowed period of time of application has been established in 10 years and the tax can also entirely pay the cost of the investment. By confirming the prescription of law 296/2006, Dlgs n. 23 specifies that, in the case of unsuccessful work with no start of the building, the tax must be paid back to the tax-payers. In 2014, ICI will be substituted by IMU which will have more or less the same tax base, thus the function of earmarked tax will be got by this new tax.

However IMU (as well ICI) encounters, as a earmarked tax, a meaningful shortcoming. As from the tax base the property values of the houses where the owners live are deducted, IMU is property tax on "second houses" and on firms real estate. However, we have to underline that the owners are the ones who benefit most from public services financed by this tax and then are inappropriately exempted.

Another type of tax, linked to real estate, avoiding this contradiction is the Municipal service tax. This tax was proposed during the parliamentary debate on the institution of IMU, but at the moment it has not yet been introduced. The object of this tax is represented by the residence, the stay in a apartment and the domicile in municipal territory. The services which should be financed are collective goods, non directly chargeable, provided by the municipality in favor of citizens, resident or simply domiciled in its

territory. Tax-payers are those persons who reside or are stably domiciled in the municipal territory, having signed a location contract over 1 year, and the owners of buildings used for habitation or freely available. The tax base is given by the area of the habitation, corrected by a double index linked, for the first part, to the features of the real estate, and for the second part, to quantitative and qualitative level of public services provided by the municipality collecting the revenue. Given its characteristics, this tax could be an excellent earmarked tax.

4.3 Road pricing and congestion charges

Road pricing can be considered as an instrument for controlling the urban traffic as well as a earmarked tax. The structure of urban streets in a town can be considered a congested public good (a case of *commons*). Consequently the private choices in terms of using motor vehicles are sub-optimal as they do not take into account the fact that an additional vehicle reduces the possibility of circulation by all others.

In Italy as well elsewhere, for contrasting the increase of urban traffic, the solutions generally carried on by local public administrations, have been those of limiting the volume of traffic by allowing only to permitted vehicles to enter the center of town. For facilitating the control, many municipalities around the world have experimented electronic systems of physical traffic limitation. By means of a structure of tariffs and charges to explicit the costs associated to the externalities generated by the choices of internal mobility, the system of Electronic Road pricing, like *Telepass ticket*, may allow a better solution to the problem of excessive use of the streets structure of the center of cities.

We analyse the rational of this charge referring, first, to the general structure of road pricing. The optimal charge t for a given distance in a specific area could be found through a standard model like the following (Johanson-Stenman (2006)).

The utility function of a representative citizen-consumer positively depends on his own travelled distance per time unit (or flow) q, the environmental quality E, leisure l, and private consumption of a composite good x:

$$U = u(q, E, l, x). \tag{6}$$

For a given level of labour time, $L = \overline{L}$, the overall time constraint is

$$l = L_0 - \overline{L} - \frac{q}{s},$$

18

where L_0 denotes the total amount of available time (24 hours), s represents the speed (endogenously determined) of the vehicle, so q/s is the time spent on travelling. The resource constraint is given as follows

$$x + z(s)q = w\overline{L},$$

where w denotes the wage rate per hour of labour and $z(s)$ represents the travel cost, decreasing with speed. For modeling environmental damage, we may use the following standard emission function: $E = q\sigma(s)\phi(\delta)$, where $\sigma(s)$ measures the emissions per distance unity (the emission factor strictu sensu) as a decreasing function of speed, and $\phi(\delta)$ denotes the exposure, i.e. the fraction of the emission that is inhaled by people, as an increasing function of population density close to the vehicles where the emission occurs, δ. It is supposed that also density varies with congestion and average speed: when congestion increases and speed decreases the vehicles come closer together. Speed, in its turn, is given by a speed-flow relationship: $s(q)$. Thus, after some substitutions, (6) can be re-written as follows

$$U = u\left(q, q\sigma(s(q))\phi(\delta(s(q))), L_0 - \overline{L} - \frac{q}{s(q)}, w\overline{L} - z(s(q))\right).$$

Maximizing the above function w.r.t. q, we obtain the optimal social level q^*. However, at a Nash equilibrium, a utility-maximizer individual disregards the external costs caused to others and hence treats E and s as given, but takes into account a road charge per distance t, a Pigovian tax imposed by the municipality. The private budget constrain is given as follows

$$x + (z(\overline{s}) + t)q = w\overline{L} + R,$$

where R is a lump sum transfer. The consumer will consequently maximise the following utility function

$$U = u\left(q, \overline{E}, L_0 - \overline{L} - \frac{q}{\overline{s}}, w\overline{L} + R - z(\overline{s})q - tq\right).$$

By combining the private and social optimum conditions, Johanson-Stenman (2006) show that the optimal value of t is given by five components.

A first term reflects the time costs that each car-user, on the margin, imposes on other users. This cost may be approximated by the opportunity cost given by the wage multiplied by the time spent in traveling. A second term reflects others' increased private costs in terms of fuel consumption

and wear and tear, caused by additional congestion, due to an additional vehicle.

A third term reflects the marginal damage of pollution from each vehicle, weighted by $MRS_{Ex} \equiv \frac{\partial u}{\partial E} / \frac{\partial u}{\partial x}$, the marginal willingness to pay for increased environmental quality in terms of the numeraire. Therefore, the third term is increasing with traffic intensity, as reflected by the speed, because emission factors as well as the surrounding local population density vary with speed.

A fourth term reflects the fact that other vehicles will become more polluting, following an extra vehicle. An extra Km by user A will cause other cars, including B's car, to slow down, and to pollute more. The increased emissions will cause a cost to the rest of society, including C who is not a car-user. But at the optimum, others including B will pay an equally large charge to the municipality, and then to the rest of local society, to correct for this increased externality. Hence C and the rest of society are theoretically indifferent to whether A drives in the street, as long as A, B and others pay for the increased emissions. However, the other car-users, such as B, are not indifferent, since the additional km by A implies that they will have to pay larger emission charges. This is the social cost reflected by the forth term.

A fifth term similarly reflects the fact that the increase in congestion, and the corresponding decrease in speed of an additional vehicle cause the local population density to increase. This, in its turn, increases the exposure per emission unit, implying that the others' emissions become more damaging. Consequently, other car-users will have to pay correspondingly higher charges, and the motivation behind this term is thus analogous to the one behind the forth term.

In order to apply this model to find an optimal ticket for allowing a vehicle entering a center town (the *Ecopass*) we have to transform q as a dichotomized choice out-in: $q = [0,1]$. Thus, an additional car entering the center is socially optimal if

$$u\left(1, \sigma(s)\phi(\delta(s)), L_0 - \overline{L} - \frac{1}{s}, w\overline{L} - z(s)\right) > u\left(0, \overline{E}, l, x\right),$$

and a consumer prefers to enter and to pay the ticket t if

$$u\left(1, \overline{E}, L_0 - \overline{L} - \frac{1}{\overline{s}}, w\overline{L} + R - z(\overline{s}) - t\right) > u\left(0, \overline{E}, l, x\right).$$

Thus, optimal ticket *Ecopass* $t > 0$ solves the following equation

$$u\left(1, \sigma(s)\phi(\delta(s)), L_0 - \overline{L} - \frac{1}{s}, w\overline{L} - z(s)\right) =$$
$$= u\left(1, \overline{E}, L_0 - \overline{L} - \frac{1}{\overline{s}}, w\overline{L} + R - z(\overline{s}) - t\right).$$

The chosen Ecopass has the same components linked to polluting control and external costs as before.

However, this is theory. Practical road-pricing systems must reflects trade-off between allocative efficiency and simplicity and hence cannot take into account all previous theoretical components; nevertheless, it is valuable to know the benchmark solution.

4.4 Controlling externalities through a earmarked tax

Beside the role of controlling externalities, Accommodation tax and Road pricing Ecopass become earmarked taxes when their revenues are strictly used for financing infrastructure investments in heritage maintenance, urban mobility and public transport service improvements. Their revenues, in other words, would be ended to have a better structures of streets, a better feasibility and provision of the considered public good subjected to congestion, and to supply public alternatives to private motor vehicle, for instance by building new tram and metro lines.

Further, it is commonplace for environmental taxes to be earmarked, in the sense that their revenues being pre-committed to specific expenditure programs. There are many examples in U.S.A. and Europe (Brett and Keen 2000). However, the destination of (Pigovian) environmental tax revenues has always been a problem for efficient policies. Indeed, there is no general reason to suppose that the revenue from some efficient corrective tax on some polluting activity will exactly equal the efficient level of expenditure on mitigating the harm suffered.

Let us suppose for example that some activity level ε generates private benefits $B(\varepsilon)$, $B'(\varepsilon) > 0$ and social benefit $B(\varepsilon) - \psi(c)\varepsilon - c$, where ψ is the extent of damage and c the level of clean-up expenditure, with $\psi' < 0$. The net private benefit of the activity becomes $B(\varepsilon) - t\varepsilon$, when a Pigovian tax t is introduced. Its equilibrium scale is determined from $B'(\varepsilon) = t$. Now, maximizing the net social benefit over ε and c, we have the following F.O.C.

$$B'(\varepsilon) - \psi(c) = 0,$$
$$-\psi'(c)\varepsilon - 1 = 0.$$

Therefore we have that $t = \psi(c)$ and $\varepsilon = -(1/\psi'(c))$. Hence $T = t\varepsilon = \psi(c)\varepsilon = c$, i.e. the revenue from the optimal corrective tax exactly finances the optimal level of c, only if $\psi(c) = -\psi'(c)c$.

We may think that the idea of devoting Pigovian tax revenues to finance activities reducing damages runs strikingly counter to the fashionable notion that there are substantial social gains to be had by raising environmental taxes and using the proceeds to reduce reliance on distorting taxes. The "double dividend" notion pushes towards reducing taxes elsewhere rather than to increase expenditures in specific environmental measures.

Politicians, if they retain some discretion in the ex post use of funds, may be able to divert the revenue raised by the AT or road pricing charges to projects which they value but voters do not. There is then a commitment problem which can prevent the politically sustainability of earmarketing policy. Thus road pricing Ecopass, as all earmarked taxes, must be credibly introduced and set as close as possible to the efficient level, so that the social gain from this compensates the usual inefficiency from tying-up funds. The municipal administration must be very clear and rigid in this sense.

In Italy, an example of road pricing is the Ecopass introduced in Milan at the beginning of 2008, for the moment only in an experimental way. According to it, to enter the center of the town, vehicles have to pay a ticket, the amount of which depends on the degree of pollution caused by the vehicle, and on whether it is used to transport people or goods. For example, the amount of a daily ticket varies between 2 and 10 euro, even if it is possible to purchase cards which allow several admittances. Further, the ticket has not to be paid by some categories of vehicle which do not pollute or have installed some device to reduce pollution, as for example electric and natural gas vehicles. The per-year yield of the Ecopass for the municipality of Milan is about 10 million euro plus other 10 millions euro from fines. On June 2011, there has been a consultative referendum on the Ecopass: residents in Milan have voted in favour of an enlargement of the Ecopass area, in favour of a strengthening of public transports, and in favour of the transformation of the Ecopass pricing. In particular, the ticket should not be anymore linked to the pollution caused by the vehicle, but it should be fixed (from a pollution to a congestion ticket). The idea being that cars should pay a ticket of 5 euro and vans should pay a ticket of 10 euro. The re-organisation of the Ecopass in Milan will be one of the major issues for the new mayor.

5 Concluding remarks

In this paper we have analysed the earmarked taxation employed by local governments for financing public investments projects carried on, for instance, with some Public-Private Partnerships configurations. First, we have presented the political economy profile of earmarked taxation in the context of the tax-benefit approach, and the theory of political competition and accountability. Second, on the ground of the PPP literature, we have examined the trade-off between financing mechanisms based on a earmarked tax used to finance public subsidies to the concessionaire firm, and mechanisms based on users-fees. In general, it is socially optimal to try to extend as much as possible the share of user fees financing, but, for the so-called cold works, the first solution turns out to be, even partially, preferred. Third, we have considered the role of earmarked taxation on the Italian institutional context, as it emerges from the recent legislation on fiscal federalism and municipalities taxation. In particular, we have treated the advantages of the accommodation tax, recently introduced in Rome and in Florence, and the taxes on property and value accruals of real estate, like ICI and IMU. Finally, an interesting case is earmarked taxation carried on for environmental issues, like the Ecopass introduced in 2008 for admitting vehicles to enter the center of Milan.

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