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A POLITICAL ECONOMY APPROACH TO RESOURCE TAXATION: WEAK SUSTAINABILITY, REVENUE RECYCLING AND REGIONAL PLANNING

Massimiliano Mazzanti & Roberto Zoboli¹

Abstract

We present conceptual and empirical insights on the issue of resource taxation, an intrinsic regional environmental policy. It deals with the implementation of environmental taxes and environmental planning at regional level, as tools aimed at achieving weak sustainability for non renewable resources like aggregates, extracted for a diverse set of economic aims. We frame the discussion in the spirit of refreshing the need of ecological and resource tax reforms at national and regional level-. We do note and discuss the intrinsic peculiarities of resource taxes with respect to emission taxes, namely the integration with regional planning, the use of revenue for weak sustainability objectives, the different role by played technology and efficiency. Factors that are to be taken into account in any specific implementation. We empirically investigate resource taxation issues by focusing on aggregate extraction management and policy of two large Northern Italian regions, Lombardy and Emilia-Romagna. We conclude that the possible effects of extraction charges for the aggregate market development in Italy can be very limited. The level of charges is generally too low to be expected to have an effect on demand (through aggregate prices) and supply of aggregates. The environmental objectives of planning are, at least for the moment, other than reducing extraction, and they generally consist of minimising external impacts, to support sustainable management of landscapes, and to provide multi-value public goods within the local area. The evidence shows that even more for resource taxes a political economy analysis that encompasses institutional and planning issues is needed to effectively shape environmental policies. The complementarity of land use planning and economic instruments is a key driver of sustainability performances and witness reciprocal influences. The unintended effects of economic instruments are also a crucial thing for evaluating effectiveness and efficiency. Those include positive effects of 'institutional kind' on the governance and organizational performance of the integrated policy-planning framework.

Keywords: Resource tax reforms, Aggregates, environmental charges, regional planning, sustainability, ex post compensations, Political economy, unintended effects, environmental federalism

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1. ECOLOGICAL TAX REFORMS, ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY

Ecological tax reform (ETR) is an essential element in long-term sustainable growth/development and it will also help the EU to further strengthen its global leadership in the eco-efficient use of energy and resources. The current competitive advantage of the EU in terms of resource efficiency (Bleischwitz et al., 2009), especially for carbon is on the one hand dependant on a stronger reaction to past oil crises, and on the other hand on a strategic decision of (northern) EU countries of implementing environmental policy (waste, pollution related) and green fiscal reforms (Scandinavia in early 90's, UK), that have been completed and has supported green investments by private firms. A new emphasis on ETR is needed even in countries that had adopted them significantly, given recent evidence shows how the share of environmental tax revenue on GDP is decreasing (in real terms) in most countries. This may happen if taxes are not implemented in accordance to a pre defined 'escalator' or if inflation of high growth periods erodes the real value. Even in the UK, some taxes (climate change levy) were frozen in the past years and only projected to grow with inflation in the current years since 2007-2008. The current economic stagnation which mainly in the EU has persisted since 2008 provides a rationale for increasing such taxes from the very current low levels – decreasing in real terms since the 90's - in the EU. The political acceptability of environmental taxes is still extremely low and the multiple static and dynamic gains for society are not effectively understood and communicated. Political economy analyses are needed on theoretical and applied grounds (Aidt, 2010). The way revenue recycling is designed and proposed matters in order to enhance the understanding of both economic and environmental values of ETR.

Ecological tax reform represents an umbrella under which market-based instruments can be designed optimally and implemented coherently. Tax reform can contribute to a more sustainable healthy environment. A gradual shift of the tax base away from taxing 'good resources' such as investment and labour, towards taxing 'bad resources' such as pollution and inefficient use of energy, would also help to internalise external costs into service and product prices. This would in turn create more realistic market price signals. Similar conclusions have been reached by the OECD in their many publications on ETR, culminating in 'The Political Economy of Environmentally Related Taxes'. The Council of Ministers have also endorsed ETR in their recent review of the EU Sustainable Development Strategy: 'Member States should consider further steps to shift taxation from labour to resource and energy consumption and/or pollution, to contribute to the EU goals of increasing employment and reducing negative environmental impacts in a cost –effective way.' (Review of the SD Strategy, Council of Ministers, 9 June 2006).

According to Andersen and Ekins (2009) and Andersen et al. (2007), the implementation of carbon taxes and/or auctioned permits is a fruitful way to reconcile in this recession environmental and economic performances, where ETR can be shaped on a real 'policy based' target perspective: set up to finance specific EU (competitiveness) aims. As debated in the rich discussion on the effects of Environmental Tax Reform (ETR) in the 90's, double and triple dividends could emerge (Busquet, 2000).

The characteristics of the current economic crisis may be very appealing and favouring a more extended application of ETR, in both northern and southern EU countries. In fact, if the scale effect is trivially beneficial to the environment in the short run, the ultimate end of environmental policy is to target environmental efficiency and overall productivity of the economy in the long run, even 'taking advantage' of the crisis. A sustainable economy is thus a greener (and fairer) economy that increases its social and economic performances in the broadest meaning. The implementation of extensive ETR policies in this scenario is an effective way to coherently link short term (sustain economic growth through labor and income tax cuts) and long run objectives (sustainable economic and environmental growth, by reducing externalities, having prices reflecting relative scarcity of all resources, and inducing/financing resource efficiency through innovation). ETR can be targeted and tailored to those different but potentially complementary short and long term social needs.

Thus a strong rationale for environmental fiscal policy emerges on the basis of the following joint elements: structurally Changing relative prices for higher resource efficiency with a medium long run perspective in mind (we refer to the 'Resource efficiency roadmap launched by the EU in September 2011 which presents as key word 'Sustainable consumption and production and links to green fiscal reforms in the EU'), supporting Green investments to boost current cycle and rebalance future growth/ demand.

Given that the opposition to fiscal measures from a political perspective has always mainly been rooted on the inflationary effects (and circumscribed costs accruing to certain parts of society that bear higher production costs, partly transferred to consumers), this economic situation is indeed unrepeatable in terms of political acceptability and macro economic necessity: deflation (EU prices will be increasing at around 1.5% in 2013 back to 2009 levels). High unemployment and recession fears call for anti-inflationary expansionary measures (mainly at EU but also regional levels), and fiscal stimulus to economic growth. ETR can provide short and long term impacts to economic growth and welfare.

Clinch and Dunne (2006) present clear discussion on Ireland of the difficulties of implementing ETR double dividends reforms (Patuelli et al., 2006) when economic growth and inflation are high and unemployment and public budget necessity are low. That is maybe the reason why after the emphasis in the early 90's such reforms were frozen both by theoretical critical arguments and by an unfavourable macroeconomic environment. The current time is very favourable for ETR reforms at Eu or national and regional levels (Ekins et al., 2011).

The paper begins with the case for ETR and then extends the discussion to more specific resource taxation reforms (RTR), namely taxes on resources such as waste, water, minerals, aggregates, a relatively and strangely – given its role in 'environmental & natural resource economics field' more neglected area of study, even though eminent scholars recently hold attention to resources (Baumol, 2010). RTR are embedded within ETR and presents idiosyncratic features that we analyse, especially the complementarity with environmental planning and weak sustainability based policy. They can generate 'bottom up' ETR reforms and stimulate at the same time regional development given their intrinsic relationships with 'environmental policy decentralisation' dynamics.

In anticipating some results, the papers concludes that after decades of partial failure of introducing EU based environmental taxes (e.g. carbon taxes that were not introduced due to unanimity rules), resource taxation, that is intrinsically an issue which has to do with 'environmental federalism' and policy decentralisation, is possibly a new framework for green taxation reforms. Resource taxation can also spur the implementation of other taxes from bottom up. The rationale is strong. Even though scarcity itself is often not the primary issue, and as a consequence the political / social resistance could be a fact (e.g. among other examples, Scotland land planning can be at first sight not coherent with taxation given abundance of resources), the rationale for resource taxation is high when taking a broad sustainability perspective. Intended and unintended effects of such taxes matter. RTR highlight the role of environmental policy even if minor externalities are at stake. More important, they generate revenue - more than other taxes due to lower demand elasticity - which is needed to lower labour taxes, extending the rationale of revenue neutral reforms. We could witness regionally based RTR implemented by leading local actors (major regions). This is possible in many 'federal' EU states such as Germany, Spain, and Italy. As example, in Italy revenue neutral RTR could help lowering the fiscal wedge, by abating the 'tax on economic activity' (IRAP) which amounts to 30 billion€ and primarily funds the health system. Andersen et al. (2011) estimate that ETR in Italy - including the removal of environmentally harmful subsidies - may weight 35billions of € in 2015 (beginning with 8 billions in 2012). Within it, pollution and resource taxes, now amounting around 1 billion, may be increased to around 7-8 billions (0.5% of GDP).

Paragraph 2 comments on the general rationale in support of RTR. Paragraphs 3 and 4 circumscribe the discussion to the 'aggregate' resources and presents empirical evidence based on case studies on the Italian regional policy and planning framework. Paragraph 5 concludes.

2. FROM ETR TO RESOURCE TAX REFORMS (RTR) – RATIONALE AND ISSUES IN RESOURCE TAXATION

The section presents a conceptual discussion on resource tax reforms with a special emphasis on EU potential implementation. We claim that the rationale for investigating resource tax reforms in isolation from ETR in general terms is the different framework. We refer to ETC/SCP (2012) for a survey of the literature and an extended analysis of main figures of resource use and productivity. Among others, recent papers on resource taxation issues have appeared on the most consolidated theoretical side (Baumol, 2010; Bento and Jacobsen, 2007; Boadway and Keen, 2009; Bretschger and Valente 2010; Groth and Schout, 2007; Garnaut, 2010; Pittel and Bretschger 2010), but also others that provide new empirical evidence on 'resource management' and sustainability issues at local and global scales (Bornhorst et al., 2007; Harkness, 2009; Hamilton et al., 2005; Kolstad and Wiig, 2009; Segal, 2011; Papyrakis and Gerlagh, 2004), with insights on aggregates (Soderholm, 2011). Some of this papers take a political economy perspective into account (Dresner and Ekins, 2010; Ekins et al., 2009; Kolstadt and Wiig, 2009; van der Ploeg, 2010; Deroubaix and Leveque, 2006; Dresner et al., 2006) in their resource taxation proposals.

We note that framework that is relevantly coherent with a 'political economy' approach, where the analysis of externality generated by extraction (of water, soil, minerals) and related rents cannot be disjointed from reasoning around the distribution of rents capture and the reinvestment of rents. Efficiency reasoning (optimality of rents, optimality of extraction) are entangled with reasoning on effectiveness and distributional impacts (dividends) arising from the dynamic management of resources. The existence of rents as related to property rights on (land) resources make a political economy approach (opposed to a purely economics one) more robust. A capital based approach to sustainability (weak or strongly defined) is also a key pillar of such framework, enriched by issues of rent distribution and bargaining power of involved stakeholders over resource use (O'Connor, 2007). Summing up, efficiency and distributional issues should be brought together in a full dynamic scenario where the analyses of the 'use' of the resource (its extraction) and 'the use of rents' the reinvestments and its multiple aims are jointed. This perspective needs to take into account more than one paradigm on sustainability, both centred on natural capital and its services and functions to society but with different flavour and different weights attached to efficiency, effectiveness, distribution of value, political bargaining over resource value: Sustainability as non-diminishing aggregate consumption (or societal utility) underpinned by natural capital, as in the neoclassical economics modelling conventions, and sustainability as a complex systems co-evolution engaging four major classes of organizational forms, the economic, biophysical, social and political spheres.

The rationale for a resource tax reform (RTR) in the EU embedded in a more general ETR (Soderholm, 2006), is highly motivated by the very low level of taxation in most countries on 'land based' resources such as waste, materials, water, and by the consequential low presence of substantial earmarking of revenues. Both pillars (higher taxes and earmarking) are key in the light of linking sustainability, in its aspects of optimality of use of resources and effectiveness of investments accruing from rents generation. Earmarking and rent capture/distribution is evidently the political economy side of this framework. Following Baumol (2010) in his re-visitation of the Cost disease under an environmental point of view, we can highlight that resource taxes are socially useful to rebalance the production costs in favour of environmental services based activity (vs manufacturing, energy and construction, which heavily depends on direct resource use), such as services offered by nature, environmental services supporting manufacturing, all activities with high labour/environmental capital content and thus exposed to rising cost prices. Resource taxation and its earmarking (subsidy) could tackle this critical point of society and economic development. Institutional challenge can help achieving sound sustainable development path inspired by rent taxation. How (efficacy), when (timing) and where (scope, aims) money are spent matters.

When we apply the theoretical reasoning developed in the ETR literature to real world Resource taxation, some points should be kept in mind to understand the effective 'political economy' framework and the final effects and objectives of such taxes.

Specific fields such as aggregate extraction, minerals are investigated. It is often the case that the focus is on 'taxes on non renewable' resources that pose the well known problem of (optimal) resource taxation for rents capture. Efficiency and distribution issues are analysed. Insofar extraction activity involves emission

production; resource tax could be aimed at internalising different externalities: emission and land use related to extraction. Static and inter temporal externalities should also be dealt with. Within a more general ETR, then, the need of applying diverse instruments could arise if objectives of environmental policy making are multiple.

Rent capture and distributional issues, incentive based mechanisms and dynamic efficiency, interaction with other fiscal measures, comparison of efficiency and effectiveness associated with resource use and consumption based tools are among the main investigated issues. Dynamic issues are at the core of any reasoning around resource taxation.

When we apply the theoretical reasoning developed in the ETR literature to real world Resource taxation, some points should be kept in mind to understand the effective 'political economy' framework and the final effects and objectives of such taxes. What it maybe lacks is a series of papers comprehensively describing the potential structure of a 'resource tax reform' as disentangled from ETR in general.

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3. A CASE STUDY ON AGGREGATE RESOURCE TAXATION

3.1 THE ECONOMIC, POLICY AND INSTITUTIONAL CONTEXTS

The present section deals with the implementation of environmental taxes and environmental planning at regional level, as tools aimed at achieving weak sustainability for non renewable resources like aggregates, extracted for a diverse set of economic aims (figure 1). It is focused on two large Northern Italian regions, Lombardy and Emilia-Romagna, that together account for over 12 million inhabitants and more than 22% of national GDP. The Italian aggregates industry is the fourth largest in Europe in terms of extraction, after Germany, Spain, and France. The focus on the two main regions depend upon pragmatic reasons (e.g. data availability, policy makers availability). One main aim is to compare the economic and institutional policy settings, and the eventual performances of the two natural resource 'policy systems'. We mainly analyse the economic and institutional settings and the outcomes they generate by relying on the elaboration of data sources and other qualitative information derived from stakeholder's interviews (namely policy makers, engineers, planners). Though some figures on aggregate extraction, charges and regional income are available for some years, other tools such as econometric analysis are not feasibly and robustly

implementable due to too a limited pool of data. The econometric analysis of aggregated drivers and policy analysis is scope for further research.

The construction industry's activities constitute the main driver of aggregates demand. Residential and non-residential constructions represent 55% of end usage. The other important sector is road construction (27%). Infrastructures account for less than 10% of the total. These shares are influenced by the different phases of the business and public investment cycles, as the implementation of the ambitious plans for infrastructural investments in Italy could work to increase total demand and also to shift the relative share in favour of infrastructures and roads. However, very large projects usually lead to the opening of so called 'temporary quarries', which are specific to the project and supply most of its demand. Since 1997-98, Italy has experienced a very significant and extensive cycle of construction activity, both residential and non residential.

In 2004, the Italian aggregates industry was composed of around 1.796 companies, representing around 12% of the total for the UEPG countries. They operated across 2.460 sites, 9% of the European total. Data suggest that the average size of companies is smaller than the European average. Total estimated production is 358 million tons, 12,5% of the European total. This share shows that average production per site and per company in Italy is higher than the European average. Unlike in other UEPG countries, the greater part of production is represented by sand and gravel (220 million tons) not crushed rocks (135 million tons). Italy accounts for 16% of total sand and gravel produced in the UEPG countries, which suggest its relative specialisation in these products. The amount of recycled aggregates produced is extremely low, 3 million tons, which represents only 2% of the UEPG total. Other national estimates for 2004 indicate 3,7 million/tons.

Figure 1 here

The economic instrument in force in Italy is a charge per cubic metre of aggregate extracted. The application is highly decentralized. There is no common national rate, and every region can apply a different rate and in different ways at provincial and municipal levels. The revenue from the charges for the most part accrues to municipalities and should be earmarked for 'compensatory investments' in localities of quarrying activity. The charge on aggregates is only one element of the very complex planning, authorisation, and regulation system related to quarrying activities prevailing in Italy; thus analysis of the effectiveness of aggregate charges cannot be performed in isolation from the other features and working of the administrative system.

This country study on Italy is based on the original reconstruction of data and information from interviews with industrial actors and public officers involved in the aggregates industry. Probably because of the very decentralised administrative system related to the quarrying of aggregates, national level records of quantities extracted, industry turnover and production costs, market prices, international trade,

breakdown of end-uses, and of other key economic variables are not comprehensive. In contrast, in terms of the number and location of individual quarries, and their features, planned and actual aggregates extraction, charges and other variables at the local level (regions, provinces, municipalities) information is extremely detailed. However, this detailed information has not been integrated into country-level databases, regular reports, or general studies. The current case study takes a general country-level perspective to the extent allowed by the information available and develops some specific in-depth analyses of extraction activities and their administration at the regional/provincial level, including the specific role of extraction charges. Analyses derive from both qualitative approaches (interviews to experts in private and public sectors) and quantitative examinations of some datasets we originally reconstructed from official sources

The economic instrument applied in Italy is a charge per cubic metre of aggregates extracted. There is neither a common rate nor a minimum/maximum rate established at the national level. Regions can apply different rates based on different features within the complex planning and authorisation framework described below².

The Analyses of two major regions (Lombardy and Emilia-Romagna, that account for barely 30-35% of Italian GDP and 15 millions of people), which we take in this section as leading case studies, highlight the economic and institutional framework summarised below .

In Lombardy, The right to exploit quarries belongs to the owner of the site, who is authorised by the Province to exploit it. The authorisation is conditional on the signing of an agreement between the applicant and the Municipality/Municipalities involved. The agreement *should* follow the guidelines prepared by the Regional Council³. Through the agreement, the applicant agrees to certain conditions.

- a) To pay an annual extraction charge to the Municipality, in order to cover some of the costs of rehabilitation of the areas directly or indirectly affected by the exploiting activities.
- b) The fee is proportional to the type and amount of material extracted in a year, in compliance with the tariffs fixed by the Regional Council.
- c) The Regional Council is required to fix: (i) the amount to be paid to cover the expenses related to the evaluation of the application; (ii) the charge for exploitation rights, which is based on the commodity sectors and the amount of extracted materials (except for ornamental stone, where the tariff applies to commercialised materials). Municipalities allocate 15% of the above-mentioned sums to the Province, which can use them for the rehabilitation and improvement of areas affected.

² A detailed analysis of the legislation on aggregates and quarrying in Italy, not presented here, is available upon request.

³ The agreement is in Italy a private law contract between two parties, wherein the municipality operates as an intermediary. It is a bargaining process wherein the municipality may play its part in order to maximise its benefits. The inclusion in the bargaining of side payments that increase the total cost and are aimed at funding for compensatory local public goods may be in line with the weak sustainability rule implicit in the aggregate tax implementation.

- d) If the extractive activities take place (even partially) within the boundaries of a regional park, a fee (not higher than 1/3 of the charge) must be paid to the park's managing body, in order to cover a part of the costs involved in rehabilitation of the areas surrounding the quarry.
- e) The applicant must, at his own expense and before the closure of the quarry, carry out any rehabilitation work necessary to make the area suitable for the re-use foreseen in the provincial plan, according to the conditions specified in the agreement.

The mechanism in Emilia Romagna is also based on the rights of the site owner and the authorisation to excavate⁴, which is conditional upon the signing of an agreement between the applicant and the appropriate Municipality. The agreement is based on the guidelines prepared by the Regional Council. In signing this agreement, the applicant commits: (a) to carry out any work that is necessary to connect the quarry to the public road; (b) to carry out any work that is necessary to prevent damage to other goods/activities; (c) to correctly implement the exploitation plan; (d) to carry out any work necessary for site rehabilitation; (e) to pay an annual charge to the Municipality. This charge is aimed at covering some of the costs arising from public works additional to those mentioned above. Municipalities must allocate 20% and 5% respectively of the fee to the relevant Province and Region⁵. The Regions and Provinces may use these sums for rehabilitation and improvements to add value to the areas affected by the quarrying activities and for planning, monitoring, and research related to extraction activities. In practice, there is no binding law requirements; the revenues have generally be used to cover for additional administrative expenses including direct and indirect monitoring activities.

The level of the charge in Emilia Romagna since its introduction in 1991-1992 has been between 0,46€ and 0,57€ per cubic meter extracted (see Table 2a for more detail). The Municipality can add other costs within agreements to bring the total cost of exploitation to around 1€ per cubic metre. Emilia Romagna is now examining and revising charges and new levels should be set for 2007 (see below)⁶. According to regional level policy makers, there should be economic incentives which differentiate the tax levied according to the land's (ecological) value. This ecological value is already estimated as part of the planning procedures. A differentiated tax could integrate some recognition of the heterogeneity in land use and values, complementing a preliminary stage of (economic) evaluation with a consequential stage where price mechanisms play a role.

Tables 1- 2-3 here

⁴ This lasts on average 5 years.

⁵ The regional share of the tax revenue was 554.106€ in 2006, representing 5% of the total revenue derived from the aggregate tax.

⁶ 2007 sees the first updating of aggregate charges since their introduction in 1991. The revision is likely to be based on past inflation, in order to restore levels to 1991 real term values. See Table 2.

In their present configuration, extraction and other charges are designed to cover the (presumed) direct and indirect costs of land resource modifications induced by quarrying. In principle, Italian charges are aimed at maintaining the 'natural capital' in the quarry location area. However: (a) the costs reflected in the fee are not established through a specific 'natural capital' calculation, and they are slow to come through because of the lengthy administrative processes; (b) while the results of the restoration charges (after closure) are visible, how the extraction charge revenues are used by local administrations requires monitoring. Available information also indicates that, in the contractual agreements with quarry owners, Municipalities often ask for finance for activities not linked to land preservation.

The charge is not aimed at controlling and regulating the quantities extracted; these are established by the Provincial quarrying plans. In both Emilia Romagna and Lombardy there is a trend towards limiting the opening of new quarries and exploiting existing ones more efficiently.

The fee also is not designed to create incentives for recycling and substitution of recycled aggregates or C&D waste for virgin aggregates. According to bills, charges must be earmarked for ex post compensation. Actually, compensation is paid through a "market" bargaining process and is effectively on top of the tax paid by municipalities and operators. The actual tax is constituted by a formal charge levied by provinces and municipalities, and an informal charge which is open to bargaining at local level, which is used to finance local public goods and compensate for full environmental externalities from quarrying activities.

3.2 Evidence from Italian case studies

3.2.1 Revenues from aggregates charges

Based on the charges per ton levied in the regions of Emilia Romagna and Lombardy (around 0,31 €/ton, or 0,46-0,57 €/m³), a total extracted quantity of 358 million tons of aggregate in Italy represents a total charge value of 110 million€⁷. The additional costs related to the compensatory investments demanded by municipalities are difficult to estimate. Information from interviews suggests that these extra charges can double the initial charge, thus suggesting total revenues of 220 million€. The estimated turnover of the aggregates industry in Italy is around 2,2 billion € (ANEPLA, 2003). Extraction charges can represent around 5% of total turnover, and charges plus other costs can be as much as 10% of total turnover.

Even the distribution of charge revenue among the various institutions varies from region to region, making a country-wide picture impossible. In the province of Bologna (capital of Emilia-Romagna) the sharing of an estimated total revenue of 1,5 million/€ is: 75% to the Municipality, 20% to the Province (estimated amount 300.000€), 5% to the Region. This revenue is generally used for restoration of closed quarry sites (in the past many sites were not fully restored by the owners) and for general land

⁷ For comparison, the estimated revenue in France is around 50-60 million/€ .

conservation purposes. In a region such as Emilia-Romagna the total revenue can be around 10-15 million/€.

In short, the economic and financial burden of the extraction charges seems to be a relatively small, although not negligible, as a component of the industry production costs. It is unlikely that quantity decisions are taken based on savings on extraction charges. Even demand for new quarries seems to be barely influenced by these charges.

Another critical issue for social costs and conservation of natural capital is site restoration after quarry closures. Although progress is being made, it is difficult to get an overall picture of the quality of the rehabilitation that takes place. Various public officials and environmental managers that were interviewed felt strongly that the quality of site restorations must now be a key priority. However, the available figures on site restoration do not show clear evidence of innovative trends. Table 4 shows the mix of after-closure restoration categories in the Province of Bologna for 1990-2005. In fact, agricultural exploitation of former quarries, generally associated with lower environmental value, tends to dominate over other options which could perhaps provide wider public good benefits. According to policy makers in the sector, options such as forestation, creation of wetlands, lakes and reservoirs should be prioritised in planning scenarios. The aim is to increase the compensation in total value terms as far as possible, even perhaps over-compensating for the damage resulting from quarrying activities.

Table 4 here

3.2.2 EFFECTIVENESS ANALYSIS: EXTRACTION CHARGES, ENVIRONMENTAL PLANNING AND MARKETS

The two cornerstones of policy on aggregates in Italy are: (a) planning/regulation of quarrying activities, and (b) extraction charges. The latter do not have the explicit aim of either reducing the quantities extracted or increasing the amounts of aggregates and C&D waste that is recycled. Extraction charges are mainly intended to ‘compensate’ for external land use costs arising from quarrying activities. In addition to extraction charges other costs may arise as a result of the agreements between site owners and municipalities, which could be up to double the amount of the basic extraction charge. A relatively small extraction charge thus renders these additional costs more economically sustainable.

It can be claimed that the Italian approach is based on a mix between keeping a stable level of ‘natural capital’ and compensating the local community for any disturbance or loss of amenities by investing in the area surrounding of quarrying activities. Also, the legal obligation of rehabilitating the areas around closed down quarries is coherent with the principle of maintaining an ‘almost’ constant natural capital (‘weak sustainability’ rule). Unlike other countries, Italy does not see the quantities of materials extracted as themselves being the source of environmental damage. In addition, quarrying policy does not reflect the principles of optimal consumption of scarce non-renewable resources, in which pricing plays a key role by

preventing inter-temporal negative externalities. Externalities are seen mainly in terms of changes to the local environment and landscape, and the economic instrument is mainly compensatory in nature.

In general, the planning of quarrying activities seems to be based on the same principles as land conservation and minimisation of natural capital losses. Extraction is allowed to keep pace with demand, and the scarcity of aggregates is not prioritised; however, resource exploitation should fulfil sustainability rules⁸. Planning has generally addresses the preventive side to these sustainability objectives, but the approach is changing. During the last few years, the approach of planners has shifted from allowing small and shallow extraction for short period over large areas of land, to allowing a few deeper sites involving less surface areas. In short, a few deeper, better managed mines are considered preferable to several shallower, less well exploited mines. This confirm the idea that the ‘surface externalities’ related to quarrying sites, including the transportation networks, are considered to be more important than those associated with intensive exploitation⁹.

Planning does have an influence on quarrying activity (quantities) that is: (a) linked to the development of demand but is lagging behind it due to the slowness of the planning process; (b) based on caps on total quantities extracted that are related to the sustainability of local land resources and conservation; and (c) the imposition of higher rehabilitation costs.

The specific role of aggregates extraction planning is complemented by a very complex set of legislation/regulation on (a) land use and (b) waste.

The first area of legislation (land use and planning) contributes to limiting the quantitative development of quarrying activity and to increasing its explicit and implicit costs. However, the very ‘local’ nature of the activity gives Municipalities a significant and arbitrary role in the actual development of aggregates quarrying, including the nature of the ‘compensatory’ investments required of quarry owners, the actual earmarking of the revenue from the extraction charges, and the land rehabilitation operations when the quarry is abandoned.

The second area (waste) acts instead in a more complex way. On the one hand, it works as an indirect support for quarrying activity by limiting the development of recycling for mining/quarrying and C&D waste. Although the application of some provisions (e.g ‘green public procurements’) could lead to significant developments, current recycling developments are very poor. On the other hand, the increasing limitations on waste landfills, including the enormous amount of C&D waste, and the application of a

⁸ This view is consistent with Kellett (1995) who stresses that potential resources are massive and prices are low compared to other minerals. The real issue is not scarcity per se, but the environmental costs linked with extraction, within a wide geographical perspective that takes account of interregional and inter country spillovers through the trading of aggregates: “it is not resource depletion which is the key issue but the environmental impact of resource exploitation” (Kellett, 1995, p. 575).

⁹ In ER, authorisations for extractions usually apply to a period of 5 years. 4 of these are to be devoted to mining and the fifth to rehabilitation of the site (i.e. creation of grassland, wetland, tree planting). In practice, some rehabilitation (i.e. tree planting) begins in parallel with excavation activity (i.e. tree planting).

landfill tax since the mid-1990s, could drive the development of recycling to produce substitute for virgin aggregates. Even in this case, however, the evidence suggests that these effects would be very limited in the short term.

In other words, planning in terms of quantities, seems clearly to be more important than extraction charges for shaping the development of aggregates supplies in Italy. From the information available and the interviews with stakeholders it is clear that material extraction is inelastic to prices, and taxes/charges, and that extraction charges are low relative to the total value of the materials extracted: 1 cubic metre has a market value of 8-9€, compared to a charge of 0,31 €/m³. Even if the other payments to municipalities are included the cost rises only to a maximum of 0,6 €/m³. On the other hand, demand for aggregates seems to be inelastic to price and also to extraction charges when translated into the market price of aggregates.

In one of the regions we examined (Emilia-Romagna), when the charge was established in 1991 its level was relatively high, probably the highest in Italy at the time. The idea was to implement a real fiscal environmental tool aimed at making an impact on materials extraction through prices. Policy makers later recognised that price instruments were less effective than planning mechanisms, which are now at the heart of policy relating to the aggregates sector. In Emilia Romagna, the new charge, to be introduced in 2006/2007, is just an update of the old one, taking account of inflation over the past decade. It is worth noting that higher taxes and stronger policies may bring about detrimental side effects they might even lead to more illegal extractions, and/or more imports from neighbouring regions or abroad (where regulations is less stringent) thus exporting environmental effects that may be higher or lower in value depending on specific circumstances (see above). This matters if sustainability is conceived as a regional / European issue, not merely national. Tables 5 and 6 summarise the main findings of the case studies that offer scope for generalisation. Table 5 highlights the complementary role of charges and regional planning, with a focus on the intended and unintended effects.

Tables 5,6 here

4. MAIN OUTCOMES FROM THE AGGREGATE EXTRACTION CHARGE ANALYSIS

The empirical analysis through case studies and interviews to main stakeholders shows some main outcomes. Extraction charges to aggregates in Italy are not primarily aimed at reducing the quantity extracted nor at promoting the recycling of extractive/mining and C&D waste. It is instead aimed at contributing to reducing the external costs of quarrying activities by financing local land conservation investments by municipalities and other institutions that receive a share of the charge revenues, the bulk of which goes to the municipalities.

Therefore, the effect of the charge on quantities extracted, or conservation of the resource in the ground, *cannot be used as a direct dimension for evaluating this policy*. However, extraction charges could affect the

aggregates market, and this effect could be an important dimension of policy evaluation, which, however, is about an *'unintended effect' on reducing extraction and developing recycling*. The key 'effectiveness question' refers to the actual use of the revenue for compensation of landscape alterations, destruction of amenities, and other local impacts of quarrying activity.

In terms of the role of charges in the aggregate market, we conclude that the effects are very limited. Despite the variety of situations caused by the very decentralised management of the charge across provinces/municipalities, the level of charges is generally too low to be expected to have an effect on demand (through aggregate prices) and supply of aggregates. Also the stability of nominal charges over time contributes to their limited efficacy in the production costs of the aggregates quarrying industry.

Markets mechanisms, and in particular construction investments, are actually the main drivers of demand for extraction/production. On the supply side, production is mainly controlled by provincial level planning of quarrying and extraction. Quantity extraction planning tends to be in line with forecast demand, and defines supply ceilings accordingly. In addition, the true objectives of current planning are generally sustainable management of landscapes and multi value public goods.

The result is that the elasticity of aggregate supply to demand can be limited at the local level, in particular in times of favourable business cycles for constructions. This general rigidity, however, is compensated for by flexibility in procurements inside the economically feasible area (about 30-50 km), by flexibility in the timing of extractions within the total capacity of single quarries (extraction anticipations and delays within allowed limits), by some limited import flow from nearby countries, and by price increases (even if elasticity of demand to prices is low which means that the quantities demanded are hardly affected).

The still poor working of the recycling loop for C&D waste in Italy despite recent favourable developments, and the preference for virgin materials by the construction industry, combine to make aggregates recycling marginal and not a true alternative to virgin aggregates. Also, the relatively low extraction charges, do not work in favour of recycling. Specially designed policies and taxes on landfill would do more to promote recycling. It is worth noting that a drawback of 'environmental policy decentralisation is the increasing gap (divide) between regions. The 'flexibility' and coherence with local preferences (Oates theorem) of regional implementation of public good provision can exacerbate performance gaps. Both 'mean' and 'variance' of environmental performances are relevant to assess a country's experience. As example, the Italian huge divide in recycling performance – that favours the North - is correlated with the adoption of 'new waste policies' – more intense in the North as well (Mazzanti et al., 2012).

5. CONCLUSIONS

We present conceptual and empirical insights on the issue of resource taxation, an intrinsic regional environmental policy. The political economy approach to resource taxation is defined by the necessity to cope with various issues (externality of extraction, resource efficiency, recycling, damage compensation,

site requalification) in a way that is related to both efficiency (without optimality)¹⁰ and effectiveness objectives. What mainly distinguishes Resource from other environmental taxes is in the end the two key interrelated issues of (i) rent management (ii) regional environmental planning actions. The two spill over the typical aims of environmental policy instruments and define a political economy framework where various elements of efficiency, effectiveness and distribution (of rents) matter for the achievement of economic and environmental targets. The complementarity between economic instruments and planning is of special interest and importance.

The paper specifically deals with the implementation of environmental taxes and environmental planning at regional level, as tools aimed at achieving weak sustainability for non renewable resources like aggregates, extracted for a diverse set of economic aims. We frame the discussion in the spirit of refreshing the need of ecological and resource tax reforms at national and regional level-. We do note and discuss the intrinsic peculiarities of resource taxes with respect to emission taxes, namely the integration with regional planning, the use of revenue for weak sustainability objectives, the different role by played technology and efficiency. Factors that are to be taken into account in any specific implementation. One important point that emerges from the analyses is that more than with externality problems and real scarcity, we cope with weak sustainability objectives, namely the necessity of setting up (bargaining over) social compensations paid by the 'exploiter of the resource' (e.g. the owner of the quarry excavation right) through various means (abating labour taxes, providing local public goods, generating in situ environmental compensations). Indirect effects of policies are relevant as well in this 'institutionally minded' political economy approach.

At a conceptual level, we may affirm that there are some structural differences that deserve attention when we move the reasoning on concepts and implementation of ETR from emission taxes to resource based taxes. First, in some (most?) cases we face a striking difference between pollution externality and resource-based externality and scarcity. Given that scarcity is often not the priority issue (materials and resources are abundant), key issues are the sustainable management of extraction and the possibility that large differences in environmental taxation between not very distant regions/countries could drive trade. This is in itself not detrimental, but could generate hot spots and extraction to happen in less regulated environments, wherein compensatory mechanisms are not institutionalised. Global environmental effects of extraction may increase as a consequence. Second, price elasticity might be low. This means that you could be forced to massively increase prices if you wanted to 'reduce' extraction. This action would privately cost very much with probably low public gains in sustainability. Third, then, sustainability is a consequence driven more by 'compensation' effects (in a weak fashion of that sustainable development

¹⁰ We observe that the 'efficiency without optimality' concept, associated to the implementation of economic instruments is a reasonable assumption that also derives from the seminal contribution by Baumol and Oates (1988). The charges and standards approach says that setting a sufficient variety of environmental policies can contribute to the efficiency of a program for controlling externalities, and this is more relevant the higher the social costs are. A satisfying procedure that does not search for the global optimum can approach the least cost solution related to a specific target of interest. It thus can be designed as to approximate the Pigouvian outcome." (Baumol and Oates, 1986, p. 165).

(SD)) than by 'pollution reduction'. Extraction and its ancillary negative social effects should be at least compensated for, and further they could be over compensated (through private and public goods provision to local communities and society as large). This is exactly what SD is about: giving new generations more capital stocks than the present one, in quality and quantity terms. Weak sustainability seems the ideal framework for reasoning around resource tax implementation at least when dealing with materials (though even other resources, such as water, are not strictly characterised by absolute scarcity and risk of depletion).

The aggregate analyses has demonstrated that the case is here different from a policy approach aimed at discouraging extraction through price-based mechanisms (tax). Extraction is based on demand growth but under conditions that minimise the impact on land resources. This constraint, in theory, could produce severe limitations on extraction activities depending on the choices made by local planners. The key incentives consist of the internalisation of local external costs in the cost structures of extraction activities. This approach seems to encompass a 'weak sustainability' rule, according to which reduction in natural capital due to quarrying is compensated for by investments in natural capital in the surrounding areas, and investment is internalised in production costs through the charges levied (we refer to the EEA, 2008 report 'Effectiveness of environmental taxes and charges for managing sand, gravel and rock extraction in selected EU countries, report n.2, Copenhagen: European Environmental Agency, and the 2007 draft country report 'aggregate taxes in Italy')¹¹. Tax implementation, institutional improvements, and planning. When dealing with resources, environmental planning plays a key role. This is mostly true in cases such as aggregate taxes and similar situations. The resource tax may have indirectly and positively affect the policy and market environment through institutional improvements: valuable resources before given away for free emerge. Economic values drive better management and planning, including monitoring of activities due to the tax imposition and tax collections. A key factor is the monitoring and quantification of flows that followed the introduction of the tax before which there was only qualitative evaluation of quarries. Thus, we would argue that a resource tax may contribute to better environmental performance through complementarity effects with other policy/economic factors, such as planning and ex post compensation schemes¹². More specifically, we would suggest that the dynamic interplay between

¹¹ "A balance needs to be struck between the theoretical rhetoric of sustainable development and the commercial realities faced by the minerals industry" (Kellett, 1995, p. 572). Kellett is in favour of a "loose" definition of sustainability, that allows a movement towards a more sustainable basis for policy through a combination of recycling of aggregates and reductions in the amount of primary aggregates extracted each year.

¹² "the lack of recognition that high quality restoration is a positive element of a sustainable policy and as such should be distinguished from, day to day issues such as control over noise, dust and vibration plays down a genuinely credible sustainable aspect of the latest policy advice", and "local plan policies on aggregates need to be written specifically with sustainability issues in mind. Thus the central issue should be the balance between environmental quality before working commences and after restoration is complete. Issues of demand management and the localization of supply may be relevant to the realization of policies. Control over working to protect local populations from nuisance will remain a central theme in mineral plans but it is not directly related to sustainability. Finally resource depletion issues and the questions related to the economics of recycling of aggregates are best left to the market" (Kellett, 1995, pp. 576-577).

taxes and planning can be described as follows. If taxes reduce extraction levels through direct and indirect effects at time T , then future planning rounds at times $T+1, 2, \dots$. May take this into account and reduce authorized extracted material per value added (more efficiency overall should be the aim of future planning). Taxes are important, but their effects need to be integrated within a complementarity framework, with other instruments. The generated revenue, which is likely to be substantial, may then be recycled and earmarked to compensatory environmental or public good based projects and/or to society for other aims (labour tax cuts as well as in core ETR). The matter is in the end probably more one of capturing and managing the rents society owns from a collective natural resource, and reinvesting such rents (in a Hartwick's rule kind of fashion and in accordance to Genuine saving accounting, which poses the basis for economic-environmental sustainability) rather than using prices to internalise externality in a common fashion. Managing properly rents exploitation is a key economic-environmental issue along such line of reasoning. Rents finance investments in various (new) forms of capital: compensate or create new natural capital, substitute human and technological capital for natural capital.

We show in the analysis that unintended effects are crucial for effectiveness assessments. In addition to making the institutional system more robust, by strengthening monitoring, data collection, in sectors like construction RTR can reduce tax evasion overall. A more transparent data collection, driven by the necessity to apply charges, can produce evident side benefits in a sector that is quite affected by illegal/black market elements. RTR might increase re use of materials (though the resource is not always scarce we avoid new sites by closing loops). Overall, the environmental land use planning itself can benefit from resource tax implementation due to their complementarity and the overall functioning of the policy system as well.

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Table 1. Extraction charges in Lombardy

Category	Tariff/fee per cubic metre of extracted material*	
	2001-2002	2004-2005
I Sand and gravel	0,387 €	0,41 €
II Clay	0,439 €	0,47 €
III Peat	1,34 €	1,42 €
IV Ornamental stone	3,10 €	3,28 €
V Limestone and dolomite used to make lime and cement	0,387 €	0,41 €
VI Crushed stone (including residual material)	0,387 €	0,41 €

* The tariff applies to the volume of extracted material except for ornamental stone, where it applies to tradable materials.

Sources: Decree of the Regional Council VII/320 of 23rd October 2001, as modified by in 2002 and Decree of the Regional Council VII/1090 of 27th October 2004.

Table 2. Extraction charges in Emilia-Romagna (1991-2007)

Group I: extracting materials for constructions	€/m3
Sands and gravels from alluvial deposits	0,57
Extracting materials from the mountains	0,465
Other materials extracted from alluvial deposits	0,465
Extracting materials from “ <i>marnoso-arenacea</i> ” formations	0,258
Group II: extracting materials for industrial use	€/m3
limestones and marls	0,52
sands for industrial use	0,57
clays for bricks	0,465
Clays for ceramics	0,52
Gypsum	0,57
Group III: Ornamental stone	€/m3
Ornamental stone	0,258
Group IV: peats	€/m3
Peats	1,03

Table 3. Examples of extraction charges in Italy (€/m3)

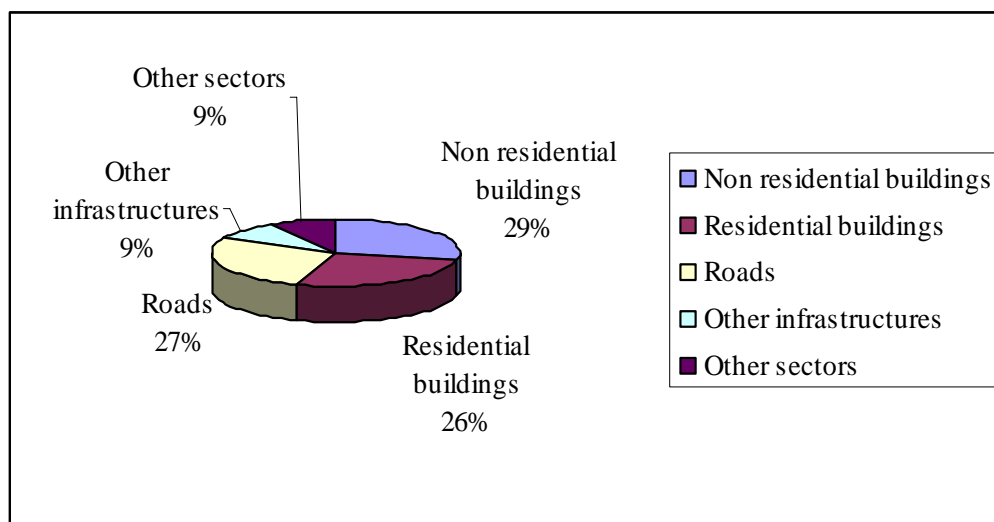
Materials	Piedmont since 2006	Lombardia since 2004	Veneto since 1995	Tuscany since 2000	Marche since 2004	Umbria since 2000	<i>ER (forecast revisions to charges)</i>
Sands and gravel (alluvial deposits)	0,75	0,41	0,62	0,46	0,59	0,25	<i>0,85</i>
Clay	0,50	0,47	0,52	0,21	0,35	0,25	<i>0,78</i>
Materials from mountains	0,50	0,41	0,36	0,46	0,70	0,35	<i>0,78</i>
Gypsum	0,50	Not available	0,36	0,39	0,29	Not available	<i>0,85</i>
	Not available	Not available	0,26	0,28	0,35	0,30	<i>0,39</i>

Table 4- Province of Bologna: Site restorations categories

Typology of quarry site restoration/ex post use of the site	1990	1995	2000	2005
Partial site covering with agricultural use	15%	14%	15%	15%
Total site covering with agricultural use	33%	33%	30%	33%
Lake creation for recreation use	1%	1%	0%	1%
Lake creation for multiple uses	5%	5%	9%	5%
Restoration with agricultural use and vegetation setting	23%	20%	12%	23%
Forestry	22%	25%	27%	22%
Total site covering with forestry	0%	1%	2%	0%
Total site covering with functional restoration	0%	0%	2%	0%
River water basin expansion	0%	0%	0%	0%
Wetland creation	2%	2%	4%	2%
Total number of site restoration in the Province	131	117	124	117

Source: Province of Bologna.

Figure 1. Main sectors of aggregates demand in Italy



Source: ANEPLA

Table 5. Assessment of the causality hypotheses on the charge instrument and planning

<i>Instrument</i>	<i>Intended effects</i>	<i>Evidence</i>	<i>Unintended effects</i>	<i>Evidence</i>
Charge ⇒	Revenue for investments compensating for 'external costs'	Limited, mixed about earmarking of revenues and quality of investments	Dispersion of financial resources out of the land resource sectors	Limited
Charge ⇒			- ΔExtraction	Strong: No effects
Charge ⇒			+ Δ Recycling	Strong: No effects
Charge ⇒			+ Δ Substitutes	Strong: No effects
Charge ⇒			+ Δ Import	Strong: Limited effects
Planning ⇒	Limitation of extracted quantities	Strong: Significant effects	Arbitrariness of local-level decisions	Limited
Planning ⇒	Limitation of quarrying areas	Strong: Significant effects	Arbitrariness of local-level decisions	Limited
Planning ⇒	Minimum impact on land resources	Limited, depending on local administrations (see charge)		
Planning ⇒	Remediation/restoration after closure	Limited, mixed about quality of remediation works		

Table 6 - Main findings

<p>1. The activities of the construction industry are the main driver of demand. Since the late 1990s, Italy has experienced a significant expansion in construction investments. The domestic supply of aggregates has expanded correspondingly and average prices have increased during the last few years.</p>	<p>2. Extraction charges are not primarily aimed at reducing the quantity extracted or at promoting recycling of extraction/mining and C&D waste. Rather, their purpose is to contribute to compensate for the external costs associated with quarrying activities through financing land conservation investments implemented by municipalities</p>
<p>3. the effects of extraction charges on aggregate market development in Italy are very limited. The level of charges is generally too low to have any effect on demand or supply of aggregates. Moreover, the stability in these nominal charges over time has contributed to their limited effect on quarrying costs.</p>	<p>4. The use of recycled aggregates is low level due to the still poor working of the recycling loop for C&D waste in Italy and the preference of the construction industry for virgin materials. In addition, the low level of extraction charges does not encourage recycling. Reformed Landfill taxes and policies related to C&D and quarrying waste could be significant in promoting recycling.</p>
<p>5. indirect effects should be taken into consideration when evaluating the overall effects of the introduction of aggregate taxes. The most important effect of charges on extraction activities is linked to monitoring, because following their introduction, new issues have emerged:</p>	<p>6. there has been a small reduction in the amounts of aggregate extracted, but in other respects there have been real improvements in the sector, both on the side of the public authorities and the market including a reduction in the number of operating quarries, major improvements in the use of materials, higher aggregate prices and better use being made of it</p>
<p>7. As a consequence of the legal rules being enforced and the public authorities operating more efficiently, aggregate taxes, combined with good planning procedures, good project evaluation and serious monitoring, there has been a positive evolution in the field of aggregate extraction. Overall, the combination of direct and indirect effects linked to planning, monitoring and agent behaviour described above have generated multiple improvements in the way the system works in terms of efficiency, environmental performance, and quality</p>	

