Cap & Trade and Tax Reform for Global Climate Policy Architecture

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Abstract
The core of climate change policy proposals boils down to "setting the right – energy and CO_2-eq. emissions – prices" (Stern, 2006). Mainstream thinking searches for applying "the" global uniform carbon price by means of either global cap and trade systems (Kyoto flexible mechanisms; flagship of EU climate policy), or the harmonized global carbon tax (Cooper, Nordhaus).
First is shown that the belief in the superiority of global uniform instruments is partly rooted in the characteristics of the climate change process itself, partly in the neoclassical economics paradigm of cost-effectiveness. Second, some pitfalls of the uniformity rule are documented for the two uniform instruments. Third is argued why ecological tax/budget reform is a valid and necessary component of workable and comprehensive climate policy architecture. The bottom-up and diverse character of ecological tax reforms by sovereign nations make this approach the fundamental driver of the required change.

Keywords: ecological tax/budget reform, emissions trading, harmonized carbon tax, diversity

Introduction
At a conference on tax reform in London (PETRE) David Gee (2009) observed a "decline of free market ideology" as an opportunity for radical Ecological Tax Reform" (slide 10) and criticized as "past inequitable policies" the "free ETS permits and windfall profits" (slide 28); Anselm Görres (German Budget Reform) complained about the weak support for tax reform while he argued fervently in favor of co-habitation with the EU Emissions Trading Scheme (ETS). The messages show that the relationship between Ecological Tax

/ Budget Reform (ETR/EBR) and the ETS is controversial and undefined. Yet this relationship is of high importance for future climate policy designs.
While favorable towards emissions trading as a policy instrument, I argue that the EU ETS is a wrong approach because of structural reasons: it tries to apply a uniform straitjacket on a tremendously diverse reality. This wrong matching is the root cause of the many practical problems with the ETS. ETR/EBR avoids the uniformity pitfall, and is the keystone of a workable global climate regime.

In section 1 two explanations are provided for the widely spread preference for uniform climate policy approaches. First, the global character of greenhouse gas concentrations in the earth's atmosphere. Secondly, neoclassical economics belief – based on mathematical optimization – in unlimited markets delivering unlimited efficiency. Section 2 is devoted to a brief discussion of the EU ETS and of the harmonized global carbon tax; although many more questions remain, it is argued that both are dysfunctional because they want to impose a straightjacket on very diverse realities. Section 3 provides some headlines of a bottom-up climate policy architecture with a crucial role for ecological tax/budget reforms by sovereign nations. There seems no other instrument available for real progress in setting the carbon prices and curbing the emissions of greenhouse gases.

1. The Preference for Uniformity

Most climate change policy studies agree on the crucial role of "setting the right – energy and CO_2-eq. emissions – prices" (Stern 2006). Mainstream thinking searches for applying "the" global uniform carbon price by means of market-based instruments (Aldy et al 2003). The literature deals with two major such mechanisms: first, global cap and trade systems (Kyoto flexible mechanisms; flagship of EU climate policy); second the harmonized global carbon tax (Cooper 1998, Nordhaus 2007). The search for this global uniformity conflicts with factual evidence of a tremendously diverse and complex world (PEW 2005).Yet, in climate policy the belief that the unicorn carbon price will bring relief is widely spread and deep-rooted. This phenomenon itself is worth separate study. Here are discussed two lanes that drive minds into the uniformity funnel: first, spill-over of global CO_2 concentrations; second, neoclassical economics efficiency.

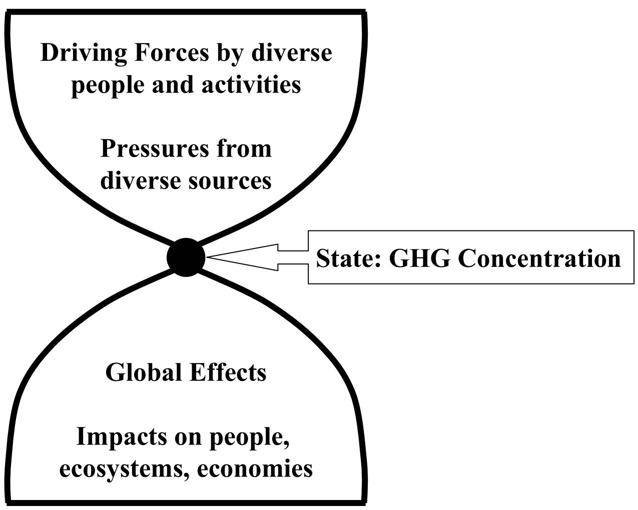
1.1 Spill-over of Global CO_2 Concentrations

The environmental problem of climate change reflects a remarkable "sandglass" embedment in the DPSI@R[1] template (figure 1).
Driving forces (D-stage) of climate change are incomprehensibly diverse covering all human activities on earth. "Global climate governance is marked by a mosaic of actors, including governments, civil society, science, business, and public non-state actors such as cities." (Pattberg & Stripple 2008: 368). Of similar spread are the greenhouse gas emissions sources, but they are chemically identified and their total quantities are enumerable (Pressure P-stage). All greenhouse gas emissions add to the single CO_2-

[1] DPSI@R stands for Driving forces – Pressures – State – Impacts – Responses. It is a conceptual framework for studying environmental issues. OECD (1997) initiated the PSR stages. Other authors and institutes (e.g. EEA, 2003) extended the framework to DPSI@R. I add "Values" in front of the Driving forces, the latter consisting of institutional, macroeconomic and economic sector drivers.

equivalent concentration of long-living greenhouse gases in the atmosphere, causing global radiative forcing and pushing upward global average temperatures (State S-stage). This is the narrow, unitary bottleneck of the sandglass. Then, effects (ambient temperature rise, droughts, storms, floods) fan out widely, unevenly affecting all ecosystems on earth, all societies on all continents, with consequences for nature, human health and well-being, economic property (Impact I-stage). Responses (@R stage) address Driving forces and Pressures (mitigation) and Effects and Impacts (adaptation) in worlds of "tremendous diversity" (PEW 2005: 9).

Figure 1: Sandglass structure of Climate change DPSI



A uniform approach cannot tailor the right incentives for the intricate problems at hand, encompassing versatile mitigation and adaptation wings. The logical flaw of imposing uniformity consists in transferring the uniqueness of the CO_2-eq. concentration on the other stages of the climate change nexus. The "Provide Flexibility" principle of the Pocantico Dialogue (PEW, 2005: 9) addresses this issue clearly: "The types of policies that can effectively address greenhouse emissions in a manner consistent with national interest will by necessity vary from country to country." Victor (2007: 150) is more outspoken that successful climate policy architecture has to be diverse, with his plea "for variable geometry of participation" and "for a variety of efforts that are tailored to each key member's capabilities and interests – rather than a single integrated system within which all members must adopt similar instruments."

1.2 Neoclassical Economics Efficiency

Economists are trained in neo-classical theory, centered on abstract consumption-utility and production-technology functions (Barker 2008: 6). Reducing tremendous diverse realities to *comparable and exchangeable components* in formal mathematical optimization models, leads to the *logical prescription* of equating marginal benefits and costs for all components (activities, sectors, countries) included in the models for deriving the *unique global price*. This seems a late application of Adam Smith's adagio that "the division of labor is limited to the extent of the market." In theory cost-effectiveness is maximized when all adopt the single cheapest solution (minimum diversity). Indeed all people in the world only drinking plain water, is the cheapest way of quenching global thirst. In practice, diverse people want diverse drinks, showcasing a wide range of prices for a cc of liquid. The case is evident: not all liquids are equal, and automatically (weakly) separated market segments or markets are formed for the diverse types.

Because the emission of one CO_2-equivalent of greenhouse gases adds equally to the concentration in the atmosphere (section 1.1), economists consider all emission sources as manageable in a single market. The evident corollary of the assumed exchangeability of all the components is that the least mitigation costs are obtained the wider the melting pot of mitigation efforts is made. This principle is the keystone of the alleged superiority of Kyoto's flexible mechanisms including the global trade in offsets. Numerous are the journal articles and consultant studies that "proof" huge expected gains from the single carbon market. One of the latest model studies on environmental effectiveness and economic consequences, Hof et al. (2009) "conclude that stabilizing greenhouse gas concentrations at low levels is more costly with a fragmented regime than with a universal regime, because reduction targets must be achieved by a smaller number of countries or because fragmented treaties may prevent reducing greenhouse gases where it is cheapest to do so."

The intractable diversity and complexity of countries, economies, sectors, activities, may be reducible to uniform treatment in abstract models. It is not possible, not necessary and not desirable to press the living world through the bottleneck of the neoclassical sandglass.

2. The Pitfalls of Uniformity

The uniform straitjackets of the "harmonized" global carbon tax or the "perfect" global carbon emissions market are not suited for tackling climate change. Both are mirages. The taxing and permit market instruments are precious, and their application is possible, necessary and desirable, but in a versatile and flexible way, each application tailored to the case addressed (Victor 2007: 150). In this section, practical problems that arise from amalgamated carbon trading and from harmonized carbon taxing are briefly documented.

2.1 Amalgamated Carbon Trading

"Emissions trading has accumulated some clear, impressive successes and because of those successes probably has irreversibly carved out a niche for itself in modern pollution control policy. The story also, however, uncovers many weaknesses of emissions trading, particularly in specific contexts, and this approach still faces many challenges that are as yet unresolved" (Tietenberg 2006). The question is whether global carbon trading is a suitable application. In this lecture is argued that carbon trading is workable when applied to quite homogenous sectors, but causes many biases when forced onto amalgamations of diverse activities.

First, the main reference of a successful emissions trading market is the USA sulfur dioxide emissions permits tradable system. The characteristics of this system are:

- It is governed by a single experienced national authority, the Environmental Protection Agency (EPA) of the USA
- Before vesting the tradable system EPA had been assigning emissions permits to the participants during some decades. The initial allocation of the trading system was established
- Participants are the coal fired electric power plants of the USA, i.e. similar sources within a single industrial sector, making use of similar technologies.
- The main success was cost-effectiveness based on substituting low for high sulfur coal; limited FGD applications were favored above innovation in alternative technologies, such as advanced dry FGD and sorbent injection systems (Taylor et al., quoted by Tietenberg 2006: 69).
- The system was not free of some price volatility but overall was stable. Satisfaction of the participants is high because of more flexibility, less administrative muddling and lower expenditures.

Extrapolating the one-country, one-sector, permit established case to a multi-country, multi-sector, out of the blue case is a bullish undertaking. “Initial allocation [of the permits] matters a great deal, not only in terms of its impact on fairness of the program but also on its cost-effectiveness. The initial allocation process also turns out in many systems to be the most controversial aspect of the implementations process.” (Tietenberg 2006: 127). There are several procedures for the initial allocation. The EU ETS in its first round and second round has adopted the “grandfathering” rule, mainly because of “practical feasibility” (read acceptance by the large emitters of CO_2). Because all industries got sufficient permits for free, the opposition by the participants to the introduction of the ETS was weak. In principle, the permits will be auctioned for the third round (period 2013-2020), but the consensus about what industrial activities will be submitted is still very distant. In principle the energy sector would be submitted to immediate full auctions, but the refinery sector already could escape from the obligation. For the electricity sector, the effect will be that full auction of fossil thermal power will give a boost to nuclear power, who’s “renaissance” is organized by the nuclear lobby; however what are the gains of substituting atomic risks for climate change ones? For the other sectors, they will lobby their governments intensively to get free permits for their CO_2 emissions and to get free from higher electricity prices, footing the burden to the non-ETS sectors. There is no strong argument why the parties refusing a carbon tax on their emissions would willingly accept a similar bill via auctions. On the contrary, auctions add pre-financing costs and risk premiums to the standard tax bill.
A main cause of disagreement will grow about the financial transfers across sectors: some sectors may gain profits, however paid by other sectors. This is very difficult to avoid because of the heterogeneity of technologies and economic conditions. The most evident solution is to organize eventual emissions trading systems globally within rather homogenous sector activities (section 3.2). This would mean the end of the amalgamated EU ETS.

2.2 Harmonized Global Carbon Taxing

A globally harmonized carbon tax is a theoretical attractive instrument (Cooper 1988, 2001, 2005; Dresner et al 2006; Nordhaus 2005, 2007). Nordhaus (2007: 35) can assume the problems of spatial and temporal efficiency solved "because carbon prices would be equalized" and "conceptually, the carbon tax is a dynamically efficient Pigovian tax that balances the discounted social marginal costs and marginal benefits of additional emissions".

Building on Weitzmann (1974), Pizer (1998) argues that the structure of climate change damage and abatement cost curves argue in favor of price-driven policy approaches. Nordhaus (2007: 36-40) argues why price approaches are preferable above quantity approaches and Kyoto mechanisms in climate policy. He characterizes "quantity limits are particularly troublesome where targets must adapt to growing economies, differential economic growth, uncertain technological change, and evolving science". He adds arguments related to uncertainty, volatility of permit prices, public finance, rents, corruption.

But as theoretical attractive, the quest for a harmonized global carbon tax is politically not pragmatic. First there is a problem of metrics: in what prices is the harmonized tax expressed? How accounting for different purchasing power parities, divergent inflation rates, and other diverse and divergent aspects of living economies? "Equalized carbon tax rates will have significantly different cost implications for different economies, depending on their per capita incomes and energy intensity." (Kolstad and Toman 2001: 49). This explains partly the weak support for uniform top-down carbon taxing proposals as the EU carbon/energy tax initiative could experience during the 1980-90s.

3. Budget Reform: Core of Workable Climate Policy

The quest for the perfect uniform instrument that allows universal omniscient governors to steer the climate problem looks a search for the unicorn. Yet, climate is the ultimate global commons and climate policy requires universal comprehensiveness. But the solution is not to force the diverse world through the sandglass bottleneck by uniform instruments. This section first highlights the components of the CO_2 emissions problem, followed by a proposal to address them in a bottom-up way.

3.1 Components of CO_2 Emissions / Emissions Reductions

A workable approach consists of a global framework that provides flexibility to the diverse participants in meeting emissions reduction targets. "The larger and more diverse the coalition is, the greater the need for structure, rules, and formal elements-i.e., institutionalization." (Lejano 2006: 197). Verbruggen (2009) developed a climate policy master plan based on transparent metrics, starting from the Ehrlich and Holdren (1971) identity writing yearly impact on the environment as a product of the number of people, affluence per person and technology. This identity was emulated by others, e.g. Yamaji et al. (1991), IPCC (2007), and Hummel (2007). A starting decomposition of global CO_2 emissions is:

$$CO_2 \text{ emissions} = \text{\# of People} \times \frac{\text{\$ GDP}}{\text{People}} \times \frac{\text{kWh energy}}{\text{\$ GDP}} \times \frac{CO_2 \text{ emissions}}{\text{kWh energy}} \qquad (1)$$

Global yearly emissions are the aggregate of the emissions by various countries, and one can write equation (1) for all countries separately, revealing the high divergence in the roles played by all four right-hand factors in determining the total emissions by country. The formula highlights that emissions are partly determined by population size and by the level of wealth of a country. Both factors are linked to the sovereignty of nations, and efforts by third parties to change them are contentious, even when UN institutions are involved. This makes negotiating significant emission reduction targets (keystones in quota based approaches) tedious among industrial nations and almost unfeasible for industrializing nations (Bodansky, 2007: 61). In addition, GDP can be volatile, especially in many developing countries. This erodes the predictability and stability of emission reduction quota, particularly over the longer run[2].

A one-step reduced form of equation (1) for either a global or national scale provides emissions per person:

$$\frac{CO_2 \text{ emissions}}{\text{Person}} = \frac{\$ \text{ GDP}}{\text{Person}} \times \frac{\text{kWh energy}}{\$ \text{ GDP}} \times \frac{CO_2 \text{ emissions}}{\text{kWh energy}} \qquad (2)$$

All variables now are relative magnitudes (ratios). The left hand side, yearly emissions per person, can be connected to ceiling greenhouse gas or CO_2 concentration values, but this implies also control on population growth. It would be useful to develop indicative target values to be agreed upon in an international agreement, framed by an "aspirational long-term goal" of convergence towards "viewed as fair" bands of emissions/person. This echoes the ethically inspired "Contraction and Convergence" proposal widely advocated by the Global Commons Institute since the 1990s (Bodansky et al. 2004: 25; Philibert, 2005: 17). Such contraction and convergence provide enough guarantees for controlling total emissions when population growth is checked during coming decades. Contraction and convergence, although not towards one single number, is a worthwhile path, and one should find suitable approaches to control the associated drivers.

A multiplication equals zero when one of its factors is zero; it becomes small when one of the factors is very small (assuming the others do not increase in a commensurate pace). One way to achieve this is the widespread adoption of low- and zero-carbon energy technologies, with renewable energy as the sustainable option. Renewable energy technologies will not simply appear across the globe. To make and keep the full transition to renewable energy affordable, significantly decreasing energy intensities of economies are a prerequisite. This will require economic reforms, such as taxes and subsidies to increase costs for CO_2-intensive activities and reward low-CO_2 activities. ETR/EBR are the crucial instruments to drive this reform.

A country's engagement starts with long-term intentional goals of contraction and convergence, and a nearby commitment to bring the country's emissions per person within the stabilization funnel.

The approach is bottom-up, considers national circumstances and provides maximum flexibility. As such it can be labeled as an "action driven" (Baumert and Goldberg, 2006) and "harmonized pledge and review" (Baumert and Winkler, 2005: 17) type. However, other than intentional pledges and soft reviews (Victor, 2007; Pizer, 2007), a *common regime applicable to all participants is designed with yearly reviews of progress on set numerical indicators*. Countries' obligations differ with levels of GDP per person, reflecting their ability to pay and with the rolling baselines they start from, taking into

[2] Also in industrial countries the impact is significant, e.g. the economic crisis starting summer 2008 may contribute significantly in meeting the Kyoto goals over the period 2008-2012.

account diverse national circumstances. Countries' implementations are fully left over to their own discretion.

Table 1: Yearly measured indicators by country, reviewed by UNFCCC

Definition	Type	Policy content	Task by country
B(y): Budget CO_2 emissions/person	Goal	Intentional, indicative; monitored are 5 year moving averages	Converge to low-end bands (contract for rich countries; control growth for poor countries)
C(y): Carbon intensity of commercial energy use	Driver 3	Monitored yearly progress in C(y) decline compared to rolling country baseline	Bring to almost zero by transition to renewable energy economy
E(y): Commercial energy intensity of GDP	Driver 2	Monitored yearly progress in E(y) reduction compared to rolling country baseline	Optimize with priority for energy efficiency and renewable sources
W(y): Wealth as GDP/person	Driver 1	Monitored yearly share of net climate tax revenues in national GDPs	Steadily increase shares; Restructure GDP to more sustainable activities

The unifying structure is built with the four basic variables of the CO_2 emission problem. A participating country engages to outline a scenario of future CO_2 budgets per citizen (idea of convergence; Global Commons Institute). The scenario is indicative and progress is monitored by five year moving average values. For realizing its CO_2 emission budget per person scenario, every country must learn to control commercial energy intensities and carbon intensities of energy use, bringing the latter close to zero in the long run, mainly by developing and implementing renewable energy opportunities (the technological aspect). In parallel it must restructure its GDP through a national policy of raising commercial energy and carbon emission prices (the pricing aspect organized as national ETR/EBR programs). The variables C(y) and E(y), shown in table 1 need no further elaboration here; the "share of climate taxes in national GDP" is discussed next;

3.2 Proved Instruments, Functional in Diverse Conditions

N. Stern (2006) and W. Nordhaus (2007) are not best friends in appraising their mutual benefit-cost analyses (Barker, 2008), but they both agree that "pricing carbon" is an urgent necessity. The question unsolved is "Pricing How?" Because of their lack of efficacy, efficiency, fairness and of unrealistic practical feasibility, the global uniform instruments such as the global harmonized carbon tax and international emissions trading schemes must be sidelined. The actual diversity of emission sources is too wide and deep for one-fits-all straitjackets (De Cendra De Larragán, 2008). The uniform treatment of diverse cases (type II discrimination) is as discriminatory as diverse treatment of similar cases (type I discrimination), but in many cases not perceived as such. On the contrary the adagio "uniform" is confused with "equal", and installs an impression of being fair, also when applied on very different cases.

The invisible hand of Adam Smith has been at work addicting the world to low-priced fossil fuels and grid electricity. That same hand is needed to do the reverse. But the hand is not a fist: finely-tuned incentives must match numerous decision-making processes for redirecting the activities currently causing emissions.
Applying the right dose by source requires a division of the many diverse emission sources in more or less homogenous groups. A first useful division is the split between emission sources in two main groups: categories of globally registered, i.e. enumerated or enumerable large sources and all other, i.e. numerous not individually identifiable sources. The registered categories encompass activities such as steel making, aluminum fabrication, cement manufacturing, particular basic chemical processes, commercial power generation, ocean-borne shipping, commercial aviation (with capacity thresholds to withhold the main sources and to keep the registers manageable). A common approach by homogenous group is recommended to avoid type I discrimination.

Redirecting activities of the "all other" sources localized in a particular country is the result of a steadily advancing tax reform in the participating countries. By definition such reform is a country-wise (and within large countries also state-wise) task of ETR/EBR. Measuring yearly advancement is possible by earmarking particular activities as climate unfriendly, all others then been considered as neutral or friendly[3]. Government receipts collected by taxing climate unfriendly activities diminished by subsidies given to such activities are summed, and added to the revenues obtained from pricing emissions of registered sources. Identifying climate unfriendly subsidies and measuring the quantitative flows could lead to problems of information, transparency, and accuracy in carbon tax accounting. This is the case already for existing tax and subsidy regimes in the various countries, and problems may increase with the central role of the indicator in performance measurement and transfer obligations. IMF, World Bank, WTO, OECD, will have an important task to structure and certify this indicator.

Redirecting activities of sources enumerated in registers should result from redesigning pricing and billing conditions in a way compatible with policies applied on the "all other sources" group. This excludes systems of grandfathering and other free-lunch options. First, global registers are differentiated by the type of installations. Within the named registers activities and technologies are similar, and of sufficient size. In some registers members are exposed to significant mutual international competition, in others to modest or no competition. Climate policy for the competition exposed registers is best organized on a global scale by register. While binding all its members to the choice, a register may choose between two instruments: either a harmonized carbon tax applied on all members' emissions globally, or a register specific emission trading system. The implementation of both instruments adopts energy and carbon tax rates at the height of the averages applied on all other sources[4]. When a register prefers the tax mechanism, tax rates may be

[3] Two additional points: first, one could extend the scope from climate unfriendly to all non-sustainable activities (e.g. including nuclear power activities); second, one could qualify the activities on a multi-point scale rather than use the binary one.
[4] The average tax rate is the ratio of the sum of net climate tax revenues divided by the summed tons of CO_2 emissions, both sums calculated over all tons of all participants during the given year. Starting up the regime will face some difficulties in observing and agreeing on the height of the global average tax rates

diversified by participating country around the average rate for adjusting for uneven development and for Purchasing Power Parity issues. When a register prefers an emissions permit market, all permits are auctioned yearly in sealed-bids[5], steered by set prices equivalent to the global average tax rate.
Most of the detailed regulations can be administered by an international register committee that coordinates separate registers committees, the latter representing the members by register. The annual revenues of taxes and auctions are assigned to the countries pro rata the payments by installations registered in the various countries. Subsidies given to the installations are subtracted from those revenues. The organization by register is helpful in identifying subsidy mechanisms that a particular country would apply, because members of a register are competitive colleagues. Referencing to a global carbon price meets concerns on efficiency (pushing global uniform instruments) and equity (avoiding unbalanced charges on some activities). The crucial difference with uniform instruments is that *average price* signals are dosed by activity group and that within the groups significant price diversity can occur. The variance of prices is expected to be smaller when activities are more alike as is the case in the registers of large-scale sources. But also there considerations on state of development and on purchasing power disparity can result in different prices by groups of countries.

Net tax revenues of re-pricing all climate unfriendly activities (registered and others) are summed by country and expressed as a share of its GDP. This share is a valid indicator of real effort organized in a country to redesign the activities in a low-carbon direction.
Tax reform is a bottom-up country-wise approach, with allowance for respecting specific values and conditions (Heyward, 2007: 527). Contrary to a harmonized global tax rate it may be composed of a high variety of climate taxes when stamped as such by IMF controllers. The indicator of relevance is not a particular price but the total net revenues in climate taxes. An additional advantage of using and comparing tax revenue shares in GDP is sidelining international currency exchange issues. Also, the least developed countries lack capabilities and resources for governing complex policy instruments. The instruments they master most are indirect tax settings and raising revenues from it.

In principle, every country could pledge on a country specific net climate tax revenues share. It is recommended that similar countries agree on similar shares or trajectories towards similar shares, ironing out unfair competitive conditions. By applying the global average prices on the registered activities, unfair competition and leakage are minimized

Conclusion

The mainstream economists' position is that the best climate policy is submitting all CO_2 emission sources to a unique carbon price. This position is explained by the structure of the climate change problem and by neoclassical economics emphasis on cost-

(facing issues of international currency exchange rates, and perhaps no direct availability of all data files). This teething problem can be solved within a few years.

[5] Sealed-bid auctions reveal well the true marginal mitigation cost functions of bidders (without gaming when more than a handful installations compete; Montero, 2007). Price-steered auctions are necessary to equilibrate the assignment across diverse registers in an efficient and fair way. Negotiating efficient and fair quota assignments across incommensurable activities and installations is a mission impossible.

effectiveness. Imposing the unique carbon price is thought to be organized best by a globally uniform instrument, either cap-and-trade or a harmonized global tax rate. Both instruments are mirages in a tremendously diverse and complex world. Workable and comprehensive climate policy architecture is build bottom-up, with large responsibility and authority to sovereign nations. Ecological tax/budget reform is the crucial driver for charging carbon emissions more and more in the future. Internationally progress is easy to measure and monitor as a percentage ecological tax revenues in total GDP of the participants.

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