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**D7.09 Report on the design, delivery and impact of carbon markets within
the context of broader policy strategies**

Part B: Political economy perspectives of carbon markets

Political economy perspectives of carbon markets

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Abstract

This paper considers certain political economy aspects relating to the development of carbon markets. It touches on the conflicting narratives of their being too few carbon markets versus their being too many carbon markets. According to one narrative drawing on public choice theory there has been too slow an uptake of economic instruments and their design has been ineffective. According to a political economy perspective that focuses on the role of neoliberalism, there has been an impressive spread of carbon markets that may undermine real action on climate change. The paper begins with a brief overview of what economic theory has to say regarding the choice of an emissions trading system over a carbon tax along with the rationale for other regulatory measures. It then presents alternative political economy approaches to environmental policy and climate policy providing two historical accounts of climate policy and instrument choice in the US and why carbon markets has tended to be the default policy instrument of choice relative to carbon taxes.

Keywords: climate change policy, public choice and environmental policies, interest groups, tradable permits, green taxes, multiple instruments, political economy, carbon markets

Journal of Economic Literature classification: D23, D62, D72, D73, H23, Q57, Q58

1. Introduction

A carbon economy, made up of several, increasingly inter-connected carbon markets takes different forms in different parts of the world. It includes systems of emissions trading and the buying and selling of offsets through “compliance” markets like the Clean Development Mechanism (CDM) as well as “voluntary” markets. The global financial crisis has raised questions about the effectiveness of carbon markets with permit prices falling so low that they defeat the purpose of incentivising low carbon energy or technological development. Their legitimacy has been questioned “amid claims of climate fraud, “toxic carbon”, and acts of (neo)colonial dispossession” (Newell et al 2012). Despite these crises, faith in carbon markets as a central component of a global policy to mitigate CO₂ emissions remains strong though the idea of carbon taxes or a hybrid system of cap and trade with price floors or ceilings are also being increasingly discussed.

Initially, the international response in the years up to 1992 looked to follow the route of numerous previous regimes (multilateral environmental agreements) that involved a prescriptive process of global targets being enforced nationally. Unlike the case of ozone that was amenable to substitution of damaging chemicals by a few large multinational enterprises, effective climate change policy required regulation of the worlds’ energy supply and use intimately linked to economic growth prospects. In view of the difficulty of the challenge, carbon markets appeared to offer the most politically attractive among the potential measures due to their ability to reduce costs of achieving targets and their flexibility in mitigation across time and space. They aligned nicely with prevailing neoliberal ideologies regarding regulation and the primacy of “efficiency” and they were the preferred option of powerful interests in leading economies when compared to taxes or prescriptive policy. The USA made their incorporation a condition of their continued involvement even though despite their adoption they eventually walked away from the Kyoto deal (Newell et al 2012). For domestic industries concerned that capital would move overseas as a result of mitigation efforts it was clearly better to pay others to reduce

where it is cheapest. Developing countries' governments were also supportive given the prospect of transfers from the North to South through the trading of offsets. This confluence of interests brought about emission trading and the CDM. While there are many precedents in markets to address resource overconsumption (fisheries, conservation, other forms of pollution), the scale and range of powerful actors make the carbon economy "an historically unparalleled experiment in marketised environmental governance" (Newell et al 2012, p. 3).

While carbon markets have been the most prominent of instruments discussed and associated especially with broad based regional and global action for climate change they have also been criticised for being ineffective in mitigation or in promoting a technology transition. Moreover, there is considerable diversity in the form of national action that usually involves sectoral approaches to climate change mitigation or delegated action to sub-national levels. There are only a few cases of economy wide carbon price efforts at the national level. Much activity takes place at sub national levels, especially urban areas, without much coordination from the national level. Local institutional and political context appears to explain much of the diversity of approaches (IPCC 2014a).

A study by Lachapelle and Paterson (2013) found that among the 19 highest emitting countries six have some form of carbon price while 14 have used regulation and other incentives for greenhouse gas mitigation. A number of explanations have been commonly used to explain this variation including the novelty of emissions trading, the legitimacy problems faced by emissions trading (Paterson 2010), political contestation over increased taxation (see for instance Laurent (2010) for the French case and Jotzo (2012) for Australia), and the lobbying by fossil-fuel or energy intensive industry lobbies (Bailey et al 2012; Sarasini 2013).

An original and long standing question for the public choice of environmental policy was why economic instruments were not used by policy makers. This question, to paraphrase Hahn (1989) was "Why the patient does not follow the doctor's orders?" since for environmental economists the use of some economic instrument, primarily a tax on



emissions or a relevant proxy of these, or the use of tradable permits was seen as clearly superior in theory. Most environmental economists would probably still hold to this view. Though there has been a substantial improvement in the patient's willingness to at least listen to the doctor, in practice economic instruments are used far less and in far less effective forms than that envisaged by economists. Even in the case of climate change where there has been substantial innovation and experimentation in the use of economic instruments, economists lament the fact that policy makers largely ignore economics 101 by failing to put a price on carbon. There is less naiveté about the reasons why this is the case but the sense that the right prescription is being ignored remains. Though there are heated and lively debates on the best form of economic instrument, when it comes to the broader issue of what policy makers should be doing there tends to be a broad consensus that some economic instrument (tax or permit) should be used to bring about a carbon price that has some hope of internalising the damage caused by climate change. In short, the patient still isn't following the doctor's prescription.

When taking the perspective of political theorists or political economists of the more classical tradition of that term, the question is turned on its head. What can account for the breathtaking spread of markets for emissions and commodification of 'nature'? For them, what is noteworthy is that markets have been almost taken for granted as the policy of choice. To heighten the contrast we could phrase their question as why has the patient been overenthusiastic in following the doctor's orders? For some within this perspective, however, the form of economic instrument has more relevance. The more important question might be, Why have permits been generally preferred over taxes for climate change policy? In this framework, which is often but not always critical of the role of markets, the answer lies in the ascendancy of neoliberalism since the late 1960s.

In both contrasting positions the questions and answers have become substantially more nuanced, partly to accommodate developments that don't quite fit in either of them. Many policy approaches or forms that are seen by some economists as departures from theoretically appropriate policies are increasingly viewed in a positive light; as if, as it

were, the doctor has reconsidered some of his prescriptions. The use for instance of strong support for renewables in conjunction with an emissions permit system for GHGs has been viewed by some as self defeating or mutually destructive, while others are increasingly recognizing the potential complementarity of such measures. The first stance relies on a public choice perspective to explain how policy is captured and thus mislead in its design of policy, while the latter finds 'new' theoretical underpinnings of some of the policy patterns, either allowing for some wisdom on the part of the policy makers or indicating that there is space for good policy outcomes within public choice constraints. Similarly, for the political economy approach, the presence or proliferation of some forms of non-market policy responses to climate change like support for R&D in renewables and energy efficiency, or direct support for the development and deployment of renewables and greater prescriptive regulation of utilities emitting GHGs has been either seen as a departure from neoliberal approaches or as an accomodation within a more nuanced understanding of the political economy state relations that may provide room for some conflicting policy logics within a broader neoliberal onslaught.

Besides understanding the reasons why policy takes the form it does an important reason to better understand the policy forming process or the political economy underpinnings of instrument choice and climate policy more broadly there remains the pressing reality that what is being done is too little and too late. Since the Stern (2007) report there was a sense that while the scientific community has largely come to a consensus about the need for immediate and strong action it was the turn for economists to achieve a similar consensus to help advance the policy debate. Though there is dissension among economists on the appropriate policy there is substantial agreement that much more needs to be done so that a key focus remains why policy is lagging and what can be done about it. More and more the focus is turning to the realm of the political economy of policy formation for an understanding of why climate policy has been adequate and why it has taken on specific forms. Issues of political feasibility of policy and political economy analyses of policy are seen as critical in providing answers that may help bridge the gap

between what is prescribed and what is done. The Fifth Assessment Report of the IPCC (2014) has a much more extensive discussion of the importance of institutions and governance in the economics of climate change mitigation. It recognises, inter alia, that institutions also shape the political context for decision making by affecting the relative power of different interest groups (Steinmo et al 1992; Hall 1993)ⁱ. The need to understand the broader institutional and political underpinnings of climate policy action and form is particularly sharp given the increasing gap between calls for action by the scientific and economic community and the general failure in policy response.

This paper aims to look at certain political economy aspects relating to the development of carbon markets. It touches on the conflicting narratives of their being too few or too many carbon markets. It begins with a brief overview of what economic theory has to say regarding the choice of an emissions trading system over a carbon tax along with the rationale for other regulatory measures. It then presents alternative political economy approaches to environmental and climate policy providing two historical accounts of climate policy and instrument choice in the US and why carbon markets have tended to be the default policy instrument of choice relative to carbon taxes.

2. Economic theory and instrument choice

2.1. Unprecedented market failure

The causes and consequences of climate change are global. Greenhouse gases (GHGs) emitted from any location and any activity contribute to climate change. Though different countries and sectors of the economy may emit different amounts of GHGs, the impact of an incremental tonne of GHG is the same irrespective of its origin. In fact, the impact is global and not restricted to the emitting country. Almost every human activity and sector of the economy contributes directly or indirectly to GHG emissions, making climate change unprecedented in the breadth of activities implicated. Similarly, the impacts of climate change are so extensive that no part of our economies and societies remain untouched.

Economic analysis of relatively small or marginal projects, impacts and market failures, has a long history and has become quite sophisticated, but for large, non-marginal

impacts affecting substantial portions of an economy or region, and with corrective responses required from almost every economic activity, these methodologies confront serious strains. This extraordinary scope of causes and consequences of climate change, with so many complex interdependencies and dynamics, pushes the limits of any economic analysis. “The analysis must cover a very broad range, including the economics of: growth and development; industry; innovation and technological change; institutions; the international economy; demography and migration; public finance; information and uncertainty; and the economics of risk and equity; and environmental and public economics throughout” (Stern and Treasury of Great Britain 2007). All these special features make climate change by far the biggest and most complex institutional failure of all time. It also means that despite a growing wealth of economic analysis of climate change, climate economics often remain in unchartered lands, requiring innovative theoretical and empirical work.

The standard guide to policy in economic analysis is to identify and correct market failures. Two major sets of market failures relate to the negative externalities of GHG emitting activities and the public good nature of renewables and energy efficiency or projects that sequester GHGs that lead to underinvestment in these activities. Innovation and diffusion are characterised by externalities and other market failures.ⁱⁱ There are also market failures associated with the adoption of energy-efficient technologies, infrastructure projects, urban development, and modes of transportation to mention a few. Market failures are so ubiquitous that it makes little sense of even considering first best policy. According the Lipsey and Lancaster (1956) the simple existence of one other market failure renders any context independent first best policy inadequate. While early economic analysis of climate change tended to focus on a single market corrective like the use of carbon taxes or tradable permits there is much more recognition of the need for multiple and complementary instruments. The next section will provide an overview on the differences and relative advantages of tradable permits versus carbon taxes followed by a discussion of the need for regulatory approaches.

2.2. Permits versus taxes

There is little action on climate change at the Congressional level in the US. The Executive Branch is engaged in climate policy through the Environmental Protection Agency under the auspices of the Clean Air Act and several States are pursuing various initiatives. The only large jurisdictions with significant and fairly general carbon taxes (at least 10/tCO₂) are the Scandinavian countries, the Netherlands, the UK, and the Canadian province of British Columbia. Among these only a few Northern European countries have sizeable general taxes. Sweden's carbon tax is USD165/tCO₂ which makes it much higher than the EU ETS permit price, though it includes exemptions for large energy users who participate in the EU ETS (IPCC 2014a). Emission trading has evolved from a textbook idea (Dales 1968) to a major instrument in pollution control. Earlier schemes include the California RECLAIM Program and the US Acid Rain Program. Following the EU carbon trading system a number of other countries and sub-national jurisdictions have proposed or put in place trading schemes to mitigate GHG emissions, e.g., Australia, New Zealand, California, northeastern United States, Quebec, South Korea, Tokyo, and five cities and seven provinces in China. All of these are very recent so there is little room for empirical evaluation. Three GHG cap-and-trade programs were in operation by 2012, with California, Quebec and Australia starting in 2013. See World Bank (2014) for the present state and trends of carbon markets.

Climate policies take a number of regulatory forms ranging from emissions pricing, performance standards, to technological mandates. A key theoretical attraction of economic instruments versus prescriptive policies (such as mandated technology or performance standards) is their capacity to achieve emission reductions at lower cost. Economists are generally in favour of the use of emissions pricing as a key component of climate policy though there is much debate about the particular form, e.g., a carbon tax or a cap and trade system. The often heated nature of the debate can potentially hamper efforts to introduce some form of emissions pricing and distracts from the fact that most

economists would agree that some form of carbon price is needed even if it's not their preferred variant. The differences in academic economists' views over alternative instruments, or carbon markets versus taxes, seem to be based on specific economic advantages emphasised rather than a political economy worldview. The "Pigou Club" formed by Greg Mankiw and Metcalf (2009) prefer carbon taxes, while Kehonane (2009) and Stavins (2007) prefer cap and trade.

Though cap and trade has generally dominated attention in US policy circles as well as in Europe since Kyoto, there has been a recent rise in interest in the use of carbon tax in the US, partly as a result of the discouraging inability of passing cap-and-trade legislation, but also by the potential to raise revenues with a carbon tax as part of a broader tax reform that will also reduce budget deficits (Goulder and Schein 2013).

Since the broader policy and political debate often juxtaposes cap and trade and carbon taxes as a debate about the extent of market versus state involvement or intervention over vital environmental services, or whether cap and trade represents a commodification of nature and extension of markets in contrast to some form of emissions tax, it is important to consider the differences as identified by economists. Goulder and Shcein (2013) provides a nice overview of some of the relative advantages and disadvantages of carbon taxes versus cap and trade systems including hybrid systems that combine design elements of both 'pure' forms of these. A key message from comparing the differences is that along many of the dimensions that have usually been the focus of supporters of one over the other policy, the policies are actually nearly the same if appropriately designed. Alternatively, the way the instruments are designed largely determine the extent of differences that remain which also suggest that the design of the instrument may be more important than the choice. Differences that have often been highlighted include the view that carbon tax is better able to (a) achieve a fair distribution of the policy burden between polluters (firms) and consumers, (b) to preserve international competitiveness, and (c) to avoid problems related to the verification of "emissions offsets". Goulder and Shcein

(2013) and Weisbach (2009) show how with appropriate design emission taxes and cap and trade have equivalent potential along each of these dimensions.

Given the multitude of dimensions of interest to policy makers and the potentially different impacts that different policies and designs can have it is certainly difficult if not meaningless to reach a general conclusion about the preferred instrument. It must ultimately depend on the weighting of the several dimensions but some general findings emerge (Goulder and Schein 2013). Policies that specify emissions prices exogenously like a carbon tax or a hybrid system (a cap and trade policy with a ceiling and/or floor price) have several advantages relative to policies that do not. Exogenous emission price advantages include the prevention of price volatility, the likelihood that they will minimise expected policy errors in the face of uncertainties about benefits and costs, less problematic interaction with other climate policies, and avoidance of large wealth transfers to oil exporting countries. Given some of the additional attractions of exogenous emissions pricing and since a hybrid system combines the advantages of a pure cap and trade system with these additional advantages it is easier to make the case that a hybrid system is superior to a pure cap and trade system (Goulder and Schein 2013).

It is commonly believed that carbon taxes are superior to cap and trade with freely allocated allowances because the latter does not provide an incentive for emission reduction but theory makes it clear that this is not the case. Even if an allowance is free it has an opportunity cost, if it is used there is loss of revenue from not selling it or an increase of permits that will have to be bought for compliance. A presumed advantage of cap and trade is that the distributional impacts can be controlled separately from the efficiency outcome whereas emission taxes are seen to have uneven distribution costs across producing sectors or between producers and consumers.ⁱⁱⁱ Any distributional outcome under cap and trade can be replicated with an appropriate design of a carbon tax, for instance, if emissions are allocated for free, a carbon tax can grant partial or full exemptions to reproduce the same distribution of costs. The general view that carbon taxes are more burdensome to firms most likely derives from the fact that tax exemptions

are generally not associated with carbon tax policy, but there is no reason why they shouldn't be.

There are some dimensions along which even comparably designed carbon taxes and cap and trade lead to different outcomes. Cap and trade is likely to have higher administrative costs in that besides the need to monitor emissions which is common to both, it requires the establishment of a registry for allowances and the need to keep track of change in ownership through allowance trades^{iv}. Cap and trade has been criticised for price volatility and this is not a problem for an emissions tax. This can be potentially addressed by allowing intertemporal banking and borrowing of allowances or incorporating an allowance price floor, an allowance price ceiling or both (hybrid). Uncertainty is another area where the policies differ. A cap and trade program stipulates the aggregate emissions but leaves price uncertainty while a carbon tax stipulates the price leaving uncertainty over aggregate emissions. This is one area that has drawn some environmental groups to cap and trade to the extent that they consider it crucial that emissions are kept within a certain limit. Also, to the extent that emissions and environmental damage is highly nonlinear there are significant risks if certain thresholds are passed. On the other hand, uncertainty over price allowances is one of the weaknesses of cap and trade for business groups as it increases the riskiness of investing in new technologies or changing the input mix. In the presence of uncertainty about costs and benefits of mitigation, theory has suggested that the choice of permit or tax should depend on the relative slopes of the marginal costs and benefits (Weitzman 1974; Newell and Pizer 2003). As GHGs are a stock pollutant the benefits curve is fairly flat so that according to theory a carbon tax would be more effective. The recent economic crisis of 2008 can intuitively illustrate the rationale. In the presence of a negative shock the cost of abatement falls as idle resources mean lower opportunity costs for mitigation investments so more abatement should be done. A fixed carbon price would ensure this additional abatement but not a cap which would lead to a fall in the price of emission allowances as happened in the EU ETS.



Over the very long run there may be greater uncertainty regarding marginal abatement costs in which case a quantity target may be preferred. This can mean short run losses in efficiency (as those just noted above). One option would be to allow for greater short run flexibility in caps (while maintaining the long run target) but this runs up against the problem of increasing investors' regulatory uncertainty which is itself costly. A way to solve this 'dilemma' is to introduce price floors and ceilings thus making caps a hybrid price-quantity tool. This would reduce price volatility while strengthening long run environmental integrity. Intertemporal flexibility can also be increased with banking and borrowing of permits, availability of credit reserves and offsets (IPCC 2014).

In the presence of supplementary policies, like a sub national policy intended to increase the mitigation effort, a carbon tax is preferable to a cap and trade policy that can render other policies redundant (Goulder and Stavins 2011). Cap and trade can lead to wealth transfers to oil exporting countries when an energy exporting country responds strategically by limiting supply and allowing the price of oil to rise and effectively extracting any rents associated with emission permits (Strand 2013; Wirl 2012). Strategic supply side behaviour can also render a carbon tax less effective when oil producers react to a carbon tax that rises over time by dumping larger quantities of oil on the market earlier (Sinn 2012)^v. The green paradox literature on the issue of intertemporal and spatial leakage appears to give preference to cap and trade over taxes. However, "the green paradox mainly exists in oversimplified models and poorly designed tax schemes" (2014). Appropriately designed taxes (and permit systems) can address green paradox concerns. For instance, it might be preferable to set taxes high with a slow growth rate versus low with a fast rise, or somewhat restrict flexibility in permit systems, especially in borrowing. Another area where the relative advantages of cap and trade have often been touted has to do with the potential for linkages across jurisdictions, yet here too there are some considerations that favor a carbon tax, like the fact that it avoids the potentially large revenue flows across nations, leaving the overall result ambiguous.

Stavins (2007) has suggested that political dynamics favour a more effective cap and trade system than a tax system. Drawing on historical experience he points to the fact that various industries will seek and win exclusions from the tax making it less effective. In contrast, stakeholders confronted by a cap and trade system exert pressure to get free allocations rather than outright exemption of coverage, thus favoring a broader coverage of sectors relative to a carbon tax. Gains in broader coverage can be offset by losses in the ability to lower the marginal tax that revenues from a carbon tax would allow. Furthermore, a carbon tax system could rely on tradable tax exemptions thus in principle overcoming its political disadvantage relative to free allocation of allowances.

Goulder (2013) points out that perceptions and political feasibility can also factor into selection criteria of carbon tax over cap and trade. In the US cap and trade had completely dominated any legislative efforts at the federal level partly because it seemed to avoid any association with a tax which was a politically tainted term. As politicians have increasingly recognized that a cap and trade system does not differ that much from a tax system, especially with auctioned allowances, the political support has eroded. At the same time there is an increasing appeal of a carbon tax and the use of its revenues to finance a broader tax reform. Accordingly, the initial political advantage of cap and trade in the states is no longer clear.

Table 1 summarizes the dimensions across which the carbon tax and cap and trade systems differ and the relative advantage of each.

2.3. Regulatory approaches

Though much discussed, economy-wide carbon pricing is more the exception than the rule when it comes to implementation of climate policies. The regulatory approach is more often used with sector-specific policies alongside other policies, e.g., in the energy sector Renewable Portfolio Standards (RPS), energy efficiency standards and fuel subsidy reductions may be in force concurrently. Many regulatory approaches include elements of

economic instruments as is the case with RPS (that allow purchases of renewable energy credits from other producers), feed-in tariffs (that involve both regulations and subsidies) and low-carbon fuel standards (that often allow trading between suppliers). Interestingly there has been much less criticism of these forms of market mechanisms among those critical of the spread of carbon markets.

Regulatory approaches have faced criticism from economists primarily on the grounds of not being cost effective or even environmentally effective. The informational demands for more precise regulation are too great and detailed regulation may be less transparent and more prone to capture or distortionary interest group influences (Helm 2010; Sunstein 2005).

Numerous studies on energy efficiency standards for appliances have found substantial savings (Meyers et al 2003; Gillingham et al 2006). Similarly positive results have been found in the building sector in the US (Sanstad et al 2012; Jacobsen and Kotchen 2013) and with fuel economy standards (Anderson et al 2011). The environmental effectiveness of energy efficiency policies must also account for potential rebound effects. Direct rebound effects refer to the increased demand for energy resulting from the fall in the cost of energy services within the regulated sector. Indirect rebound effects refer to the increased energy demand resulting from higher economic growth as energy services become relatively cheaper. Total rebound effects are not likely to exceed 60% according to a recent review (Gillingham et al 2013).

The presence of rebound effects suggest carbon pricing may be a needed complement (if not substitute) to prescriptive policies to improve their environmental effectiveness. Similarly, carbon pricing on its own may be too costly a way of achieving the necessary behavioural adjustments.

Emission standards have been criticised for being less flexible than economic instruments and can even lead to perverse incentives as when new units are treated more stringently than old ones (Burtraw et al 2010). When incorporating institutional features of various policies in the United States, like the capacity to adjust the stringency of a regulation,

emission standards may be more effective than cap and trade in reducing overall emissions (Burtraw and Woerman 2013). This once again illustrates in part that a crisp distinction between prescriptive and incentive instruments apparent in the theoretical models may often be misleading in the more nuanced world of rich institutional variation. Allcott (2011) found that 40% of US car buyers did not consider fuel costs in their purchasing decisions.

Market failures or barriers to adoption of energy-efficient technologies often warrant regulatory policies. Literature focusing on certain sectors like transportation, building and industry have shown that regulations have been implemented at negative costs (IPCC 2014). Economic theory has shown that the negative costs can result from regulation in certain circumstances like when buyers have less information about the efficiency and cost of a device than sellers. In such instances, where low-efficiency devices can drive out of the more expensive high efficiency models, efficiency standards can improve welfare by reducing the informational asymmetry (Goulder and Parry 2008; Leland 1979; Akerlof 1970). Tenants may choose to buy low quality (inefficient) equipment given a short time horizon to recoup capital expenses even though both tenants and landlords could mutually benefit from more efficient equipment with higher up front costs. Cognitive costs (of calculating minimum cost actions) may prevent consumers from taking into account operating (energy) costs when making purchases.

In the development of renewable energy sources government provision and planning of infrastructure (e.g., electricity transmission and distribution, interconnectors, storage facilities) play a critical complementary role. Public planning and provision is required for a modal shift in transportation. Urban planning can have a major impact on emissions. Cities have local pollution and congestion co-benefits to consider in addition to climate change benefits from mitigation. Public planning for buildings and associated very long-lasting energy supply infrastructure can avoid lock-in while encouraging low-carbon technologies. Planning at city or municipal level needs to account for transport pricing

relative to land prices, building, parking and zoning regulations, city-wide district heating and cooling systems (IPCC 2014; Baeumler et al 2012).

A carbon or fuel tax may be more effective if done in conjunction with planning and infrastructure provision by augmenting the substitution towards low carbon lifestyles. It may also help generate sufficient demand for public transit systems that could be lacking if private transit costs do not include their social costs. In contrast a tradable permit system may work against (substitute) emission reduction through public provision. Local actions would reduce the costs of meeting an overall cap but they would not affect the overall emissions if these have been set at a national level potentially de-motivating local governments from taking action.

Market failures associated with research, technology development and technology diffusion are distinct and interact with market failures associated with damage associated with anthropogenic climate change. The dominance of the carbon-based system leads to path dependence as incentives are created to improve carbon technology rather than non-carbon. Both private (Aghion 2012) and public institutions (Unruh 2000) have been observed to be subject to this kind of 'lock-in'. Lock-in can be overcome through public policy coordination (Kretschmer 2008; Rodrik 2008) and can be facilitated by policy that addresses technology push, demand pull and framework conditions in a complementary fashion (Nemet and Shogren 2013).

Beyond the need for public funding of R&D to address market failures related to innovation it can also help compensate for barriers to private investment arising from long lifetimes of incumbent technologies leading to long transition times to a new system or technology (Fouquet 2010), uncertainty about discount rates or future levelized costs of capital (Nemet and Shogren 2013), or the fact that there is no guarantee of success of an investment (Nemet and Shogren 2013; Mazzucato 2014).

The effectiveness of any technology policy is closely related to the overall system or 'enabling environment'; that is the regulatory and institutional environment (including political, legal, and social norm characteristics) (Grubb 2004; Edenhofer et al 2013).

Technology transition literature highlight the importance of integrated policies that understand the complementary nature of incentive instruments, authority and norms (Parson and Kravitz 2013).

3. Political economy approaches to environmental policy and carbon markets

Though economic theory clearly and strongly supports the use of either carbon taxes or tradable permits or (more likely) some hybrid of the two as a central or key component of climate policy it does not appear to be overwhelmingly supportive of one over the other policy. In this regard while many economists have strong views in favour of taxes or permits they are likely to agree that what is most important is that an effective carbon price is established whatever the instrument. It is also clear from the discussion that there is much room for design differences and that the design of the instrument may be more important than whether it's deemed a tax or permit system. In this regard one of the early and ongoing question for economists was why economic instruments were not taken up by policy makers. Public choice theory, being closely associated with welfare economics, was the first to attempt to address this and related questions. The next section provides an overview of public choice theory approaches to environmental policy and considers the development of climate policy in the US in the light of this theory. The next section presents some alternative and potentially broader political economy perspectives of carbon markets and considers some specific political economy interpretations of neoliberalism and US climate policy and the more general discussion of the recent spread of carbon markets.

3.1. Public choice and environmental policy

Microeconomics and welfare economics have a long tradition of examining market failure. Externalities were seen as a central cause of market failure and environmental issues were a prime example, so a large tool kit was developed on ways that the authorities should correct markets that included pollution taxes, marketable permits, liability rules, etc. Yet this advice from the economic profession did not seem to feed into policy. Public



choice theory that was closely related to welfare economics provided an explanation of why microeconomic recommendations were often ignored.

Public choice did not develop an axiomatic account of ideal government decisions and an associated understanding of government failure as a departure from the ideal that would parallel the welfare economics approach (Schroeder 2010)^{vi}. Instead it appeared to extend assumptions about individual behavior to public decision makers and predicted that such decisions would tend to exploit government positions for their own gain. Rather than looking for a system (like the 'invisible hand') that could produce normatively attractive decisions it provides an account of government failure as decisions were dominated by narrow interests capable of exploiting the self-interest of government decision makers. In short they provided a theory (or perhaps prediction) of government failure without a model of ideal government.

Public choice theorists found microeconomists' disappointment that their advice was not heeded by governments as inconsistent if not naive given that they assumed that public actors would be motivated by pursuing the broader public interest. Behavior was seen as mysteriously changing once individuals moved from the market setting to the public arena. Welfare economists in the tradition of Pigou treated the government as a benevolent manager unaffected by special interests, while public choice treated government officials as self interested (Yandle 1999).

Empirical work attempted to verify the behavioral postulates assumed about public officials and the concomitant government failure. Olson (1965) applied the rational actor assumptions to interest groups, a basic building block of politics. Groups would be difficult to organize when they produced benefits that were spread out thinly among beneficiaries as each individual would see their contribution as minimally affecting the formation of the group. Smaller groups with high or concentrated benefits could overcome the transaction costs of collective action. This insight allowed Stigler (1971) to argue that regulation would be dominated by the industry being regulated as it enjoyed concentrated benefits with low organizational costs relative to the consumers whose benefits would be spread out but

would face high costs of organizing. While Stigler's rudimentary model of interest groups and regulation has been significantly developed it still embodies the distinctiveness of the public choice approach. These models are systematically "pessimistic" about the ability of government action to improve overall social welfare.

Early models treated government as monolithic rather than being structurally complex. Also they focused almost entirely on the demand side (usually from concentrated interests) without considering the political process that led to regulation (supply side) (Keohane et al 1998).

There is a growing literature that considers how diffuse groups succeed in organizing despite the disadvantages (Lubell et al 2006; Lubell 2002; Everett and Peirce 1991; Chong 1991). Ostrom (1990) has shown conditions that can help groups manage common pool resources or environmental problems to avoid the 'tragedy' of multi-person prisoners' dilemma type situations. Theoretical and empirical work has shown that individuals can overcome collective action problems present in promoting environmental objectives by forming large broad-based environmental groups. These can have an important influence in the political and regulatory arena mostly through voting since they usually can not compete with industry lobbies in terms of providing financial benefits.

The ability of diffuse groups to bring votes may outweigh the influence of financial resources that cannot always be translated into votes. Denzau and Munger (1986) construct a model with three rational, self-interested maximizing actors: legislators that supply public policy and seek to maximize reelection votes, organized interest groups that can supply campaign resources but not votes, and individuals who offer votes. With this model if voters are informed about the relationship between their preferences and policy proposals, interest groups cannot influence policy. Aidt (1998) show that under fairly demanding conditions, interest group competition over environmental policy can lead to public policy that maximizes social welfare. This 'invisible hand' type argument of optimal public policy deriving from narrow self-interest maximizing public agents counters the earlier pessimistic view of government involvement.

Empirical evidence also strengthens the case of effective broad based environmental advocacy (Oates and Portney 2003). It is hard to explain the growth of environmental regulations enacted in the last decades without taking account of the influence of the preferences of environmentally concerned citizens.

Maloney (1982) identify conditions under which imposing environmental standards on firms can bring about an increase in profits. This happens when the standards are imposed in a way that restricts entry allowing cartel type supra-normal profits to persist. They draw on one instance where OSHA's cotton dust standards seem to increase the profits of some affected firms to argue that "many of the existing laws and institutions can be explained as devices for distributing rents created by regulation" (Maloney and McCormick 1982, p. 121). This generalization, however, is unwarranted without broader empirical backing and "demonstrating that some firms gain ex post does not show that those firms demanded regulation ex ante" (Schroeder 2010). Indeed, even in the case of cotton dust standards evidence suggests that industry consistently opposed OSHA's restrictions.

Overall evidence fails to find that preferences and lobbying efforts of regulated industries succeeds as a positive theory of environmental policy (Oates and Portney 2003; Moe 1997). Matters differ however when we move from the realm of explaining the enactment of stringent environmental laws to the choice of regulatory instruments and procedures envisioned for the enforcement of these laws.

Attempts to explain large group collective action often consider an expanded set of preferences that include in addition to narrow material self-interest, the pursuit of solidarity benefits and purposive and expressive benefits derived from participating in large groups (Cigler and Loomis 2007). Also notions of trust in groups. Though we are far from a fuller understanding on how these other preferences as well as other factors like trust influence or increase the potential for effective large group collective action a number of studies find evidence of the influence of such mobilization on environmental decisions (see Hamilton and Viscusi {%Hamilton and Viscusi 1999}).

Kalt and Zupan (1984) examined voting patterns of Senators relating to the Surface Mining Control and Reclamation act during 1977-78 and found that the Senator's "ideology" significantly increased the model's ability to predict how a Senator will vote.

Models of legislative behavior are better able to predict outcomes when they acknowledge "a constellation of factors made possible by being a legislator: making public policy, doing good things for the country or for the district, satisfying ideological beliefs, having prestige and prerequisites of the office and so on" (Keohane et al 1998). Similarly, studies show that bureaucrats are also influenced by a broader set of factors.

The earliest public choice explanation of the preference for direct regulation over taxes was offered by Buchanan (1984). They argued that direct regulation of emissions can function like a barrier to entry, especially when new sources faced tighter regulation, allowing increased profits from cartelization. Direct regulation is also less costly since regulated firms only pay for the abatement technology and are not taxed on the remaining uncontrolled emissions.

Firm-dominance models can also be criticized for treating public agents as simply accommodating these preferences. They do have a greater initial plausibility with respect to instrument choice as they are more consistent with our observations. Emission taxes are relatively rare (especially at levels needed to act as an incentive), tradable permits are more common and rely on grandfathering, whereas direct regulation remains the dominant form.

Extensive use of certain instruments may not just signal firm dominance in influencing public choice since environmental organization often side with industry on instrument choice for different reasons. They often prefer direct regulation for philosophical or ethical reasons, viewing the use of market incentives as a kind of 'license to pollute', or are concerned that toxic hot spots may result from incentive-based instruments. Legislators have their own reasons to prefer certain instruments. Taxes are politically difficult and the costs of incentive based regulation is more visible to the taxpayer than direct regulation. Elected officials find direct regulation easier to understand and may find that they offer



greater opportunities to influence implementation decisions. Agencies intent on expanding their budget and staff will also prefer direct regulation (Schroeder 2010).

Keohane et al (1998) look at the potential preferences of different interest groups for particular policy instruments of environmental regulation. Firms would be expected to prefer those instruments that would impose the lowest costs to the industry of achieving a regulatory goal. Though this might be expected to predispose them in favour of incentive instruments over prescriptive policy this would depend on the particular way that the costs of policy are distributed between industry and society. To the extent that pollution taxes have been associated with payment for residual emissions and not just to for compliance, private industry is traditionally strongly opposed to these. Firms would be expected to prefer grandfathered permits to pollution taxes and emission standards would be preferred to auctioned permits or emission taxes.

Another dimension of preference for different instruments that needs to be accounted for is the extent to which regulations can generate rents by erecting barriers to entry. An environmental standard may reduce the total production and thus lead to an increase in price and rents which may last if entrance is prohibited. In this case firms may actually prefer standards to no regulation. These theoretical considerations could explain why firms and their trade associations may have favoured prescriptive policy and especially in a more stringent form for new pollution sources, and thus their prevalence in U.S. environmental law. They would also explain why grandfathered tradable permits have been the predominant form of incentive instruments when these have been used, though they do not explain why these have not been more successful relative to prescriptive policy. There is however very little empirical work validating these theoretical propositions (Keohane et al 1998).

Differential costs of compliance could provide another explanation of what instruments firms support. If some firms have lower compliance costs than others in the industry they may be more willing to have these imposed on the industry in the hope of gaining some competitive advantage. Differences in firms' expansion plans may also lead to different

policy preferences. Those with more ambitious expansion plans would benefit from weaker barriers and may try to structure them to their advantage relative to newcomers. Such was the structure of the “bubble” program of the Clean Air Act. Different firm interests will also arise as to the means of allocating or grandfathering emissions allowances. If allowances are allocated according to past emissions firms that have already undertaken reductions will lose relatively to those that haven't. Smaller firms may prefer grandfathering out of concern that larger firms may dominate auctions.

In the case of environmental organisations a public choice perspective might consider how alternative policies might affect the overall environmental quality, the image of the organization, but also its capacity for fund raising. Some measures may be more likely to attract members and persuade donors to contribute, or increase the visibility and prestige of the organization. The identification of the organization with a specific instrument may help on all these fronts. For instance, the Environmental Defense Fund's (EDF) strong support of the SO₂ allowance trading program can be seen as an instance of identifying with a specific instrument that was likely to succeed politically and strengthened its reputation of a pragmatic environmental organization open to novel strategies. More generally, environmental advocacy groups have been relatively hostile to market-based instruments preferring prescriptive policy. On philosophical or ethical grounds they have seen taxes and permits (especially the latter) as “license to pollute”. To the extent that incentive instruments rely on weighing costs of compliance against benefits of reduced damages they also tend to have strong reaction against the idea that health and ecological values can be adequately measured or monetised. There may also be strategic grounds for opposing incentive instruments like a concern that once implemented permit levels or tax rates may be more difficult to change than prescriptive measures. Pollution taxes may be viewed as politically difficult to increase over time.

Trade unions generally focus on protecting jobs so their preferences over policy instruments would be expected to vary according to projected impacts on jobs.



Prescriptive measures are often tailored to protect ageing plants so this may weigh against more measures that would allow greater flexibility on where pollution takes place. Consumer groups may be expected to prefer those instruments that would have the lowest impact on consumer prices and thus those that are most cost effective. In practice these groups have not expressed strong demand for environmental policies and the detail of instrument choice has generally lied outside their interests.

From the perspective of politicians, legislators and bureaucrats or what Keohane et al. (1998) call the supply side of environmental policy, they make the following points regarding their preferences. First, legislators may be predisposed by training to prescriptive measures and are unfamiliar with market-based approaches. Second, Republicans may be predisposed toward market-based instruments (especially tradable emissions systems) on the ground that they reduce the role of the government, while Democrats would take the opposite stand. Third, they would prefer policies with more visible benefits and less visible costs. Given the high visibility of the cost impact of incentive instruments as directly linked to consumer prices politicians would be expected to prefer prescriptive policies where the costs are less visible (even if greater). For the same reason, grandfathering would be preferable to auctioning or emissions taxes. Fourth, prescriptive policies are more amenable to exemptions and may be liable symbolic politics with strict compliance standards but lax enforcement. Fifth, politicians will not like market instruments to the extent that they may allow some firms to close and reallocate elsewhere giving rise to localised unemployment. Sixth, prescriptive policies allow politicians to better target one group over another which may be an important element in generating their preferred coalition or better identifying the beneficiaries. Seventh, bureaucrats or administrative decision makers (versus legislators) are likely to oppose incentive instruments because of familiarity with prescriptive instruments, new instruments may require new expertise, and they imply a scaled down role for the agency while reducing their effective control over private firms and potential benefits that arise from that relationship.

Empirical studies of instrument choice and different groups preferences over these are sparse. The general rule seems to be that while a generic analysis may suggest that certain groups prefer one type of instrument over another, it is the details of the design of the instrument that ultimately determines a constituency's support or opposition (Schroeder 2010).

Turning specifically to climate change policy some general public choice or political economy observations concerning interest group differences have been observed. When it comes to the stringency of emission reduction targets financiers, sunrise industries and ENGOs favour more stringent targets. Higher and steadily rising carbon prices create more trading opportunities for financiers both in spot markets and derivative markets as regulated firms seek to hedge against risk of increasing prices. Regulated firms, on the other hand have opposing interests regarding stringency. Within an emissions trading system they prefer grandfathering of permits versus auctions. The potential of grandfathering is another reason why regulated firms were less resistant to carbon markets over prescriptive measures and taxes. Institutional investors' interests are more ambiguous as they balance viability of regulated firms' market performance in the short run over the long-term exposure to carbon intensive industries (Paterson 2012a).

With regard to the offset markets for reasons of environmental integrity ENGOs prefer the exclusion of certain types of projects seen as problematic (forestry), more stringent rules on additionality, and stronger limits on the access to offset markets. Much of the skepticism from the environmental community regarding carbon markets is focused especially on these aspects of the offset markets. The interest of sunrise industries for reasons of profitability align here as well with ENGOs. In this case, financiers as well as regulated firms tend to prefer easy access to offset markets which increase money making opportunities and strongly support the 'streamlining' of the approval process in the CDM for reasons of reducing costs. To the extent that easy access to offsets may lead to reductions in carbon prices financiers may be less supportive.

Linkages between carbon markets, or the extent of forming a globalised carbon market, involves another set of policy design choices with potentially differing alignment of interests. Some ENGOs are concerned that a globalised market will reduce incentives of economies in the West to promote a transformation of the energy system. There have also been nationalistic blocs antagonistic to a globalised market like the rejection of all three of the Kyoto flexibility mechanisms by the Stephen Harper government in Canada on grounds that it would lead to transfers of resources from Canada to other countries. One would expect that already regulated firms would clearly prefer globalised markets both because of the potential for reductions in costs of mitigation as well as allaying concerns of loss of competition from unilateral regional or even national policies. On the other hand, if they see the globalizing of emissions markets as part of a strengthening of overall climate policy and its stringency they may have reasons for concern. In this regard, they should not be assumed to provide support for multilateral efforts. To the extent that globalising and/or linking of emissions trading reflects a strengthening and spreading of climate policy then sunrise firms, financiers and institutional investors should all be supportive (Paterson 2012a).

3.1.1. A public choice perspective of US climate policy

Brewer (2014) provides a public choice analysis of responses to climate change in the USA by looking at “the distinctive patterns in the interests, ideologies, institutions, and influence in the US political system”. Climate change became an explicit national campaign issue for the first time in the 1992 presidential elections with public opinion showing a substantial concern for the global warming. The elected Clinton administration proposed a tax on carbon emissions in 1993 on the basis of the heat content of fossil emissions. The proposal passed the House of Representatives with a narrow majority but it was abandoned in the Senate given the strong opposition from organised business lobbies. The same year that the Clinton administration signed the Kyoto protocol in 1997 the Senate passed the Byrd-Hagel amendment to a resolution that the US should not be a

signatory to an international agreement regarding the UNFCCC limiting US GHGs unless it also limited emissions from developing countries.

Al Gore made climate change an issue again in the 2000 presidential election with an even stronger sense of concern over global warming registering in public polls. In 2001 the George W. Bush administration announce that it opposed US participation in the Kyoto Protocol. The state of California adopted a number of energy efficiency and renewable energy policies and programs in the early 2000s and in 2006 adopted the Global Warming Solutions Act setting a 2020 target to reduce GHG emissions to the 1990 level. This included a cap and trade system to start operating in 2012. The Regional Greenhouse Gas Initiative (RGGI) also set up a cap and trade system for CO₂ emissions of electric plants in nine Northeastern states beginning in 2009. Numerous other states and cities developed their own climate change policies around this time.

In 2003 Senators McCain and Lieberman proposed a mandatory national cap and trade system that was defeated by vote of 43 to 55 in the Senate. Again in 2008 the Senate considered cap and trade legislation known as the Climate Security Act co-sponsored by Senator John Warner and Lieberman. It was unable to get enough votes to be debated. A positive federal outcome came in 2007 when the Supreme Court decided by 5-4 to allow the EPA to regulate greenhouse gases through the Clean Air Act. This marked a turning point in providing a legal basis for the executive branch to develop climate change regulations.

The American Clean Energy Security Act was introduced to Congress in 2009 by Representatives Waxley and Markey to establish an extensive cap and trade system and expanded energy efficiency and renewable energy programs. The bill passed the Congress but was unable to get the 60 vote super majority in the Senate needed for cloture. The coal industry, the oil and gas industry, the chemical industry and umbrella organisations like the Chamber of Commerce and the National Association of Manufacturers along with other organized groups were against the cap and trade legislation. There was support for

it from important segments of the electric power industry, energy efficiency and renewable energy firms.

Hope for some federal action on climate change came in 2013 when President Obama noted in a speech a series of measures the administration could take without congressional actions, like new standards for carbon dioxide or emissions standards for existing and new electric power plants.

The distribution of costs and benefits associated with climate change, along with the efforts to change them or their perception, can be used to explain the domestic political economy of US policy responses. The patterns of economic interests like the relative importance of oil and gas, coal, and automotive, and electric power industries in the regional and national economy provide insights on the kinds of influences on policy makers. Ideological viewpoints on the role of government intervention that can vary over time can also influence policy making. The federal political system in the US means that influence is decentralised in a national government marked by the overlapping authority of the Congress, the executive, and the courts. This pluralistic tendency imposes obstacles to effective climate action but may also facilitates action by one set of institutions when others are inactive Brewer (2014).

Figure 1 provides a summary view of Brewer's political economy (public choice) analysis framework.

There has been consistent opposition to government climate change regulation measures and cap and trade by the major politically active and influential umbrella organisations representing business interests in the US. Opposition has also come from industry-specific associations representing coal, oil and other fossil fuels intensive industries. More recently there has been active support for climate change legislation from new coalitions representing a wide range of service and manufacturing industries.

Opinion polls and surveys have shown a persistent public consensus in the US that climate change is happening and that the government should take some form of action. More regulation of business's emissions and products as well as government subsidies for energy efficiency and renewable energy have been favoured by the public. The public consensus in support of a wide range of government policies has largely been bipartisan. Publics in Northeastern and West Coast states have generally been more favourable toward measures at the national level than those in Southern, Midwestern, and Mountain states. Though majorities have consistently shown concern for global warming the percentages have varied over time. Self-identified liberals and Democrats are more likely to believe that climate change is happening than conservatives or Republicans (Brewer 2014).

Scruggs and Benegal (2012) refer to widespread evidence from national public opinion surveys in the United States that show a dramatic decline in the public's concern for climate change following the 2008-9 recession. This is reflected in beliefs about the existence, immediacy and seriousness of climate change. Using over 30 years of public opinion data (aggregate opinion trends from the Pew, Gallup and Stanford/Ohio State polls) they estimate the percentage of population saying that there has been global warming as a function of three variables: weather, media bias, and the condition of the economy. While there has been speculation about a 'crisis in confidence' in climate science and a number of explanations have been offered for this change of heart, they argue that poor economic conditions and more specifically, the recent economic downturn, provides the best explanation. Declining concern is not unique to the United States. More generally, they find that labor market conditions "appear to be more important in affecting concern than does news coverage of "anti-warming" claims, the "climategate" scandal, or changes in short-term weather conditions" (Scruggs and Benegal 2012).

The US response to climate change is occurring in large parts through the various and distinctive state policies. The most active state governments are those on the West Coast and the Northeast. These parts of the country have had traditionally strong environmental



protection and heavy manufacturing industries have been generally absent. The Midwest and South have shown less concern for the environment and auto, coal, oil, and petrochemical industries are important.

Members of Congress that come from coal, oil, and auto states have generally been able to gain significant industry-specific concessions in the House and prevent legislation passing in the Senate. Several attempts to pass a national cap and trade system have been effectively countered by the traditional fossil-fuel-dependent industries and greenhouse gas emissions intensive states in the Midwest and the South and their representatives in Congress. Structural and procedural features on the Senate have meant that carbon intensive states are over represented and low carbon states under represented. Voting rules in the Senate are skewed against the least GHG intensive states because of the cloture rule (60 Senators needed to close a debate and have a vote on legislation) in combination with a built-in over representation of the least populous states and under representation of the most populous states. Many of the states with high greenhouse gas emissions are sparsely populated while low greenhouse gas states tend to be densely populated. Given that each state regardless of population has two senators this favours representation of the less populated high GHG emission states. To give a sense of the bias the ten states with the lowest per capita emissions represent 27.9 percent of the population while the ten states with the highest per capita emissions represent 8.1% of the population. Overall, GHG intensive states have about one and half times higher a share of the vote than they would have had under a proportional system. In conjunction with the cloture system states representing 25.7 per cent of population can prevent passage of legislation favoured by three fourths of the population (Brewer 2014).

With the impasse in Congress and the structural impediments to progress in the Senate the Environmental Protection Agency has been taking up the slack with more extensive regulations. The Securities and Exchange Commission has also developed guidelines to clarify how climate change may impact firms' reporting requirements.

Climate policy addressing the negative externality is dealt with primarily through the Environmental Protection Agency and other regulatory agencies, while policies relating to technology issues are addressed within the energy, agriculture, and transportation departments. Also the ideological issues relating to these different market failures are different. The main ideological discourse relating to federal regulation of GHG emissions is framed in terms of prescriptive versus incentive policies, the rules in a cap and trade system and additional issues about the role of markets and offsets. In the case of technology policy the focus is on the magnitudes and rolls of government subsidies or the advantages of subsidies relative to taxes as means of encouraging innovation and diffusion (Brewer 2014).

3.2. Politics of carbon markets

Public choice theory being intimately linked to welfare economics was first to develop perspectives on political economy reasons of why certain policy instruments were favoured or not by policy makers. Since incentive instruments failed to be taken up by policy makers despite the strong support by economic theory it was natural the public choice would focus on this issue given its affinity to economics. Political science more broadly, however, only started looking at incentive mechanisms for environmental and climate policy after they became an important focus of policy makers. As climate change rose to prominence among environmental issues and as a political priority, and carbon markets became the instrument of choice in Kyoto, the politics of carbon markets came into being.

Three broad categories of literature on the politics of carbon markets are identified by Stephan (2015). The first strand of literature that encompasses economics, law and technopolitics, focuses on the mechanisms of markets or how different elements of the market affect its performance. This 'optimal design' concern may involve analyses of how design characteristics affect the achievement of specific goals like the minimisation of transaction costs or the attainment of a certain carbon price level. In many respects this

parallels standard economic analysis of the design of incentive mechanisms for carbon control with the difference being that the design variables being studied are political institutions. Political science engagements in this line of analysis include such works as that of Green (2008) and Lund (2010) who look at how the delegation of authority to private actors influences the effectiveness of the CDM. According to Lane (2012) they take for granted that emissions trading and offsetting are the 'naturally' optimal tool while not considering other non-market forms of governance. An alternative political science perspective within this optimal design approach draws on the Actor Network Theory and Science Technology studies that consider such issues as how the material, technological and technical infrastructure of the markets have been assembled in order to undertake their economic function. In this regard Calon (2009) points to the use of carbon markets as 'in vivo' experiments in the creation of new environmental commodities. See also Mackenzie (2009a; 2009b) as representative of this strand.

The second strand, predominantly from political scientists, investigates the process of policy, the actors' role and the development and diffusion of policy that brought about the current network of carbon markets. By focusing on the efforts and confrontations in the forming and shaping of carbon markets it appears to be dealing more squarely with the politics of carbon markets. This literature has looked at the way the idea of emissions trading spread and was adopted in different regions. Selin and VanDeveer (2011) examines the case of the regional GHG trading system in the US, while Hood (2010) and Bullock (2012) look at the cap-and-trade system in New Zealand. Few contributions compare developments across countries (Paterson 2012a; Betsill and Hoffmann 2011). Being the first and largest mandatory emissions trading system the EU ETS has drawn the most attention. Christiansen and Wettestad (2003), Damro and Mendez (2003), and Voß (2007) look at enabling role of policy transfer and learning mechanisms in the adoption of emission trading. Skjærseth and Wettestad (2008; 2009) consider the role the EU's multilevel structure and the intergovernmental bargaining between EU member states. On the role of different actors Braun (2009) discusses large policy networks, Skjærseth and

Wettestad (2010b) look at policy entrepreneurs, while business actors and their motivations are examined by Meckling (2011b; 2011a), Kolk and Pinkse (2007; 2007). This strand of literature could be seen as having the closest affinity to the public choice perspective in the broad sense of identifying interests, influences and coalitions shaping policy development.

The third strand of literature refers to a heterogeneous critique of carbon that look into the legitimacy and justice implications of carbon markets and usually advocate their abandonment. Postructuralists look at how carbon markets are used by governments to render carbon politically manageable (governmentality studies) (Bäckstrand and Lövbrand 2006; Methmann 2013; Wolf 2013). Others look at how carbon markets have come into existence, or what governing effects these markets have on the state and the individual level (Boyd 2010; Stephan 2013; Lövbrand and Stripple 2011; Paterson and Stripple 2010). A political ecology perspective (originating from geography) investigate how the materialities and political structures have interacted with and have been transformed by carbon offset markets. Legitimacy issues is another focus of critique of carbon markets linked to matters of justice and environmental effectiveness. Skjærseth and Wettestad (2010a) considers the impact of EU ETS pre third phase reforms on its legitimacy. Critiques of carbon markets have also drawn on moral philosophical and ethical considerations (Caney 2010; Aldred 2012; Page 2013).

A Marxist political economy literature views carbon markets and their development within the broader context of a capitalist or neoliberal global socio-economic system. Three different approaches are identifies within this group (Stephan and Lane 2015). One draws on an account of capitalism that is “not intrinsically linked to any specific mode of production or material and energetic means of value creation” and often indicate problems with carbon markets on the environmental, justice and legitimacy front, but allow for the possibility that these may play a role in contemporary capitalisms road to decarbonization (Newell and Paterson 2010). In contrast, a second Marxist view sees (capitalist) neoliberal forms of environmental governance as inherently incapable of

achieving the emissions reductions beyond the status quo (Lohmann 2011; Lohmann 2006; Smith 2007). A third approach follows an older eco-colonial debate and views carbon markets as means of enabling carbon intensive lifestyles in richer nations to be pushed onto the poor (Bachram 2004).

Despite these many political accounts of carbon markets Stephan and Lane (2015) argue that they inadequately focus on the politics of carbon markets because there is not enough attention given to the actual political actors responsible for bringing the carbon markets into being,^{vii} e.g., why carbon taxes were passed over for carbon markets, and when political actors are brought into the picture they are “reified and monolithic conceptions of macro-social actors or structures” (large corporations driven by inherent logic of capital or a necessary extension of neoliberalism) (Stephan and Lane 2015).

One broad critique of carbon trading comes from theorists working in the tradition of ecological Marxism according to which this form of marketized climate policy is a means to “socialize” or “re-embed” capital within social and ecological life (Böhm et al 2012; Storm 2009; Foster et al 2009; Lohmann 2010). Capitalism is driven to continuously expand, and the search for cheaper labor, raw materials and new markets puts it at odds with sustainable human consumption. Crises result as the social and ecological elements necessary to sustain accumulation are undermined by capitalist production. Carbon trading, among other measures, provide technological and spatial fixes by temporarily suspending or displacing the crisis in time and space. These technological fixes through carbon markets essentially de-politicizes the climate challenge by turning it into a technical matter while at the same time reinforcing consumer culture (Pearse 2014).

Mirowski (2013) views carbon markets as part of a general strategy of neoliberalism when confronted with a crisis. In the case of the climate crisis there is a short term response in the form of global warming denialism, followed by the medium term response of instituting trading schemes for carbon emission permits and offsets and eventually a long term science fiction response of geoengineering. The shorter term response is just a way of buying time for the “thought collective” to put in place its favoured approach of new



fringed market structures which in the case of climate change are bound to fail being too little too late and ultimately avoiding the necessary reductions in emissions. He also argues that each of these “ideas” were innovated in neoliberal think tanks.

“A postfoundational understanding of the political allows us to theorize the politics in the creation, maintenance and contestation of carbon markets in terms of depoliticising and repoliticising narratives, institutions, techniques and technologies” (Stephan and Lane 2015, p. 11). Carbon markets can be seen as part of a depoliticisation of climate change. Turning the political issues into matters of technocratic management. Indeed, in view of the potentially apocalyptic impacts of climate change politicians themselves argue that the responses go beyond politics. What should be political debates about the fossil fuel dependence of our social-production is displaced by technocratic discussions about design features of carbon markets that have already been accepted as the most economically and environmentally effective (Lohmann 2011; Mitchell 2011). Despite the tendency to depoliticising there is always the possibility that ‘dislocative’ events might lead to certain repoliticising. For instance, the financial crisis created some scepticism regarding markets and financial institutions though this was short lived.

From this critical wing of political economy comes a different assessment. “Carbon markets are in the middle of a fundamental crisis - a crisis marked by collapsing prices, fleeing actors, and even increasing greenhouse gas levels. Yet carbon trading remains at the heart of global attempts to respond to climate change. Not only this, but markets continue to proliferate” (Stephan and Lane 2015, p. 2). According to Stephan and Lane (2015) for the critical wing of political economy the apt metaphor for the development of carbon markets is “the zombie”. The connection is made with the general proliferation of the use of the term following the 2007 financial meltdown whether the target is capitalism (Harman 2010), economics (Mirowski 2013), or neoliberalism (Peck 2010). “This notion of zombie neoliberalism: empirically defunct yet still dangerously powerful; without a lively legitimacy yet proliferating and voracious, is an apposite metaphor to describe the ongoing development of the carbon markets” (Stephan and Lane 2015, p. 2). More specifically the

authors argue that while the term is used to express the 'unkillable nature of apparently defunct neoliberal governance and economic theory' it also expresses the fact that what is taking place occurs without agency.

3.2.1. Neoliberalism and US climate policy history

Neoliberalism is viewed as the predominant force structuring climate change policy by a broad literature. Accordingly the neoliberal^{viii} context has shaped the form of climate policy explaining its increased reliance on market mechanisms or departure from prescriptive policies. One body of literature argues that neoliberalism produces responses to environmental changes through privatisation of existing resource management regimes (Mansfield 2009) and commodification of 'nature' (Castree 2003). The fetishising of markets as forms of social organisation draws on the ideological logic of neoliberalism and this combines with a political project of global economic elites to undo mid-twentieth century redistributive reforms. In terms of the privatisation of existing resource management regimes the debate can be couched along the traditional argument of Pigouvian taxes versus Coasean property right assignment where the first implies a neutral state able to internalise externalities through taxation while the latter assumes that the state need not have such a meddlesome role. The neoliberal skepticism towards the idea of a neutral state that instead envisage environmental taxation as subject to rent-seeking from state bureaucrats and vested economic interests means that the privatisation will be the preferred choice (Hay 2007). Coasian privatisation is seen both as a means to avoid over-use of resources but also as a means of an elite-led struggle to regain dominance (Harvey 2005).

The commodification of 'nature' is understood both in terms of the belief in markets as the most efficient institutional form as well as its potential to open up new opportunities for investment and accumulation. A considerable literature has extended this analyses to show how dominant actors (especially financiers) have relied on the neoliberal ideology to promote the progressive commodification of the atmosphere through emissions trading or offset markets (Brunnengraber 2009; Bumpus and Liverman 2008; Newell and Paterson

2010). Others see the commodification of climate as a process of appropriation of the atmosphere's carbon sink services by northern political and economic elites (Bachram 2004; Lohmann 2006; Smith 2007; Gilbertson 2009). With a somewhat different emphasis another strand of literature using the notion of ecological modernisation (Hajer 2010; Mol 1996; Buttel 2000; Mol and Spaargaren 2002) considers how economies undergo substantial transformations in their relation to nature and thus produce or address various forms of environmental degradation. It is generally more optimistic about how the economy can benefit from moves towards environmentalism. It also argues that social democratic welfare states can more easily pursue ecological modernisation strategies than neoliberal ones (Mol and Spaargaren 2002; Dryzek et al 2003).^{ix} This literature provides an explanation of why cooperative and corporatist political-economic systems that are characterised by a culture of cooperation among business, government, and environmental groups excel at ecological modernisation relative to the market fundamentalist and neoliberal states like the US (Dryzek 2013).

MacNeil and Paterson (2012) argue that these analyses over-represent the place of commodification and privatisation logics in neoliberal policy by relying too heavily on market fundamentalists' conception of state practice. Instead, neoliberal climate policy is more nuanced so that while market instruments are salient aspects they have not crowded out other competing logics in the policy process and especially the structural role of the state to create conditions of stable growth and accumulation. Rather than viewing the state as homogeneous entity they view it as a form of social relation and arena of struggle between economic and political forces enlisting its power for their own purposes. There is no singular logic of neoliberal policy form but several different outcomes depending on the specific conditions and political relations in different states.

This framework is used to explain the particular forms that US climate policy has taken. In particular, while the neoliberal logic of financialisation has not been strong enough to establish a federal cap-and-trade system given the opposition of the powerful fossil fuel interests, a secondary logic has become the guiding policy in the form of the government's

tradition since the late 1970s of directly fostering and facilitating the growth of domestic high-tech sectors (MacNeil and Paterson 2012). Rather than focusing on the missing property failure associated with climate change this logic relies on the problem of inappropriate technologies^x and the need to develop new energy technologies. American congressional voting patterns over the past three decades have been characterised by a neoliberal anti state hostility that have blocked formal intervention at the federal level but have engendered uses of certain historically viable alternative policy means. Of these Mcneil and Paterson (2012) focus on three: the growth of environmental industrial policy, the rise of sub-national regulation, and the use of unilateral executive authority.

Since the Climate Action Plan established under the Clinton administration to promote the development of alternative and renewable energy technologies, there has been a continuing though modest use of state-led developmental policies as a response to climate change that fits in with the broader and highly interventionist stance of the federal government's role in fostering technological innovation and market development. Ironically, this developmental network state (DNS) with the federal government playing a central role in fostering and coordinating technological development occurred during the very ascendancy of neoliberal dogma. It was largely a response to the decline in the country's relative technological and competitive edge in the late 1960s relative to Western European and East Asian economies^{xi}. In spite of its aversion to climate change action the Bush administration oversaw the creation of the National Climate Change Technology Initiative and Climate Change Program, both dedicated to fostering the creation and deployment of novel climate and energy technology. Federal investment in R&D increased dramatically with the pro climate action Obama administration though this also coincided with the financial crisis and a new Keynesian perspective on green stimulus. Climate policy has found one avenue with less resistance due to the broader developmental stance that has survived the neoliberal ideology in part because of the concern for competitiveness and energy security.

With the increased deregulation at the federal level associated with neoliberalism primacy of environmental governance returned to the states. Furthermore, the consistent failure of climate policies to make headway at the federal level made the states the de facto site of intervention. According to Rabe (2010) close to one-third of US states established regulatory programs focusing among other things on electricity generation, end-use regulation, transportation, building codes, development and agricultural policy. Renewable Portfolio Standards were one of the prominent market instruments used. These require the state utilities to generate a given percentage of their electricity from renewable sources. Certified renewable energy generators earn certificates for the electricity they produce and they can sell these along with the electricity to supply companies that are able to use the certificates to meet their mandate. Neoliberal commodification also spread at the sub-national level through numerous state and regional cap-and-trade policies.

The use of executive authority to unilaterally impose environmental policies is one other way that some forms of climate policy in the US have been able to overcome the near standstill at the federal level. One of the more prominent uses of unilateral presidential authority was when the Obama administration saw its rule making obligations on CO₂ in the Clean Air Act as another means of pursuing climate policy. This led to the announcement by the EPA that it would enforce new industry-specific carbon standards starting in late 2011. The New Source Performance Standards (NSPS) laws develop strategies for limiting and regulating emissions of existing facilities and establishing limits on GHGs new facilities may emit (MacNeil and Paterson 2012).

Macneil and Paterson (2012) view these competing logics apparent in the different forms of climate policy in the US as having been designed to work around reactionary legislative conditions but within pre-existing patterns of state practice in the US. They do not represent a fundamental shift in the political-economic context or state form. The R&D programmes and vested interests created by RPS systems could gradually undermine the entrenched power in Congress of coal interests thus allowing more progressive legislation. If it

happens that the pro climate action coalitions manage to create constituencies over time for new renewable energy technologies they might undermine the present veto power in the hands of the coal states. In terms of potential implications for effective intervention of social movements, the alternative policy approaches provide another avenue for social movements to focus on which technologies should be favoured rather than just on stringency of targets or the sorts of offsets present allowed within market instruments. It is less clear that some of these policy logics can be extended to the international arena through the international agreements since the developmental policies (support of new green technologies) are driven in large part by the US economic competitiveness strategy that only works to the extent that it can reproduce US economic dominance.

3.2.2. Why have carbon markets spread?

While for many economists the long standing question was why carbon markets or economic instruments had failed to materialized at the rate and in the form needed, for political scientists the more pressing question was to explain the rapid spread of carbon markets despite their doubtful legitimacy among broad swathes of society. It is important to distinguish between a normative analysis on why emission trading may be an effective means of carbon abatement and an empirical analysis that investigates why ET has become an integral part of climate policy (Paterson 2012a). Existing literature generally rely on one of three three types of explanations for the success of carbon markets. The first sees them as the result of a concession at Kyoto with other states conceding to the US demand for carbon markets in the hope of getting it to ratify the treaty (Grubb et al 1999; Depledge 2000). The second relates to the flexibility of carbon markets allowing a decrease in the costs of achieving targets by allowing advanced economies to reduce emissions by investing in cheaper emission reductions abroad. The third is related to the second but puts a greater focus on efficiency or the desire by states to find the least cost means of overall abatement or the equalisation of marginal abatement costs across all sources of emissions (Aldy and Stavins 2007).



Paterson (2012a) suggests that these explanations do not adequately address the reasons for the adoption of carbon markets that require a focus on the politics and political economy of carbon markets. Indeed, efficient institutions are often supported on theoretical grounds but rarely seen in practice so that having some of these properties does not provide an explanation of why they were adopted. Instead, the two interlinked reasons for their popularity is that they have enabled the formation of a 'winning' coalition favouring mitigation of GHGs and they have enabled businesses to imagine means of profiting through the process of decarbonization. From the perspective of policy makers, a key tension is the need to generate cycles of growth for particular sectors while ensuring the environmental integrity and thus sustain the needed support or political coalition favouring its policy.

In this view, emission trading allowed a new loose political coalition to develop and enabled policy makers to legitimise climate policy. The explosion of enthusiasm for carbon markets between 1997 and 2001 can be identified as an important turning point. A key shift is illustrated by the collapse of the Global Climate Coalition (GCC) bloc that had been vehemently opposed to action prior to Kyoto with numerous of its former members taking a pro-action position. Another key component of this new coalition was the finance sector. Institutional investors were already alighted to the concerns of insurance due to climate risk exposure and the potential business risk associated with the carbon intensity of firms, but the development of carbon markets provided a new impetus to financiers. According to Paterson (2012a) financiers would not necessarily be in the pro-climate coalition without carbon markets as the policy response. IETA (International Emissions Trading Association) established in 1999 and CMIA (Carbon Markets and Investors Association) are two competing lobby groups representing firms that have a vested interest in the pursuit of aggressive mitigation targets. The greater the emissions reductions needed the greater the need for finance servicing companies to hedge against carbon price volatility and to access offset mechanisms. Lastly, numerous environmental NGOs were supportive of

carbon markets and in many cases strong links were formed between these and various carbon market firms often operating through revolving doors.

The key to understanding the shift between forces (groups) pitted against climate action towards the new balance of forces (coalition) towards accommodation with climate change responses is in the way that the specific policy instrument of carbon markets alters the incentives of the finance sector. The political economy explanation is linked to the way that capitalist society creates an imperative for economic growth and how the state has evolved in part to manage capitalism's inherent instability and to provide the conditions for smooth growth. As most of the early economy-climate models found that climate policy would entail some reduction in economic growth, this has resulted in recurrent crises of political legitimacy of mitigation proposals. Legitimation is further undercut by the classical collective action problem of broad and diffuse benefits of GHG cuts and concentrated costs (Olson 1965). In this sense, the success of carbon markets is that they provide benefits to a particular sector that also happens to be one of the most influential sectors in the latest phase of capitalist development.

The successive deregulation of finance since the 1970s engendered an enormous expansion of financial markets. Financial actors have become structurally powerful both with respect to states given their capacity to move vast amounts of money in very short times and even trigger crises in countries, as well as with respect to manufacturing as seen in the shift towards short-term share price movements over 'shareholder value'. In this sense, Paterson (2012a) finds that it is no coincidence that carbon markets have become the policy tool of choice to the point of being taken for granted. Looking at the UK which has been one of the strongest proponents of climate action and carbon markets he observes that the initial UK policy network did not have any links with firms that would end up carbon trading so that the influence of the finance sector draws from its structural power rather than any 'behavioural' power. He also points to one of the motivations of the UK to pursue emission trading aggressively was linked to the desire to enable the City of London to achieve a structural advantage in the emerging carbon markets. Canada is also

presented as a counterfactual to the importance of finance in promoting carbon markets. Because the carbon market is based on an intensity-target and because of the low price cap that is created by the technology fund system, no regular trading has taken place and there is minimal interest of financiers. “The failure to design a system that interests financiers is part of the reason for the failure of carbon market policy to take off in Canada” (Paterson 2012b, p. 90).

With the creation of exchange platforms for new commodities like the EU Allowance Unit (EAU) and the CER^{xii} or similar units that will arise with emerging trading systems, financiers are able to make money through commission on purchases and sales of emission permits or credits, through arbitrage, or through the creation of derivate products that allow for hedging in the risk of price volatility. Project developers make money by finding emission reduction projects through the CDM thus linking carbon markets to investment strategies. A number of other actors that have a stake in the carbon markets include consultants that prepare Project Design Documents (PDD) required for approval of a project by the CDM Executive Board, brokers that try to bring together project developers and purchasers of CERs, firms that validate project plans and verify emission reductions when projects are running, and lawyers drawing up the contracts. All these actors have a keen interest in sustaining the growth of carbon markets.

4. Some concluding remarks

The variety of political economy approaches to environmental policy, climate policy and carbon markets give various and sometimes conflicting interpretations of the form and merits of present climate policy. Almost all agree that climate action and policies implemented have been generally inadequate. Public choice theories focus on the constellation of interests of different groups and constituencies in conjunction with the motives of legislative and administrative bodies as well as the form of political institutions to explain both the extent of policy intervention as well as the predominance of emission trading systems with grandfathering among carbon pricing mechanisms. Some political

economy analyses tend to focus more on system wide imperatives of capitalism and ideational factors like the rise of neoliberalism to explain the preference for carbon markets over carbon taxes but also the inadequacy of mitigation policy. Some take a very critical view of carbon markets preferring carbon taxes or other regulatory measures or questioning the very possibility of capitalism addressing the climate crisis. At one extreme, carbon markets are presented as the living dead marching apace but ultimately deceiving us that something is being done while fuelling capitalism's thirst for growth and consumerism. Others see the extension of carbon markets as perhaps the only way to bring about a coalition of interests capable of forming a full fledged climate capitalism that can live up to the challenge of a transition to a low carbon economy.

The contrasting narratives presented in the introduction of the patient not following the doctor's prescription or there being too little use of economic instruments versus the picture of the surprising spread of carbon markets can be better interpreted in light of the political economy approaches. From the perspective of mainstream economists, the predominant view is that despite the increased prominence of market instruments in the political debate they still remain the exception in terms of implemented policy relative to prescriptive measures. Importantly, even where implemented they have been designed in ways that tend to undermine their effectiveness. Public choice theory has provided a useful explanation of why the patient has been very selective about the doctor's advice. Cap and trade systems have provided policy makers with the appearance of doing something while targeted industry has managed to influence the design of the instrument predominantly by ensuring that allowances are distributed freely. While a carbon tax system could also replicate free emission allowances and offsets, the political symbolism of a 'tax' has provided an easier political sell for emissions trading systems. In essence the patient continues largely to ignore the important parts of the doctor's advice. Carbon markets or carbon taxes have not been implemented as required by theory to bring about the expected results. At the same time there is far greater recognition that non-price, prescriptive or other forms of regulation have a much more critical and often

complementary role to play alongside a carbon price policy. A deeper understanding of the way alternative policies interact, whether synergistically or counterproductively, has become a key focus of recent climate policy research. It is an inevitable aspect of the scale and complexity of the institutional failure associated with climate change.

From the perspective of some political economy approaches much more emphasis has been placed on ideational analysis, or the fact that carbon markets align well with the growth of neoliberalism. To some this rapid commodification of the environment is a serious cause for concern and an inevitable aspect of capitalism's growth imperative. It is also a ploy to depoliticise climate policy in the hope of making it largely redundant. In this later respect (the ineffectiveness of policy), though the wording and explanations differ, there is common ground with the public choice approach. Where differences continue relate to the questioning of the inherent logic of emissions trading as a system. Economists are critical of specific design elements but acknowledge a close affinity with a tax system. Indeed, contrary to some political economy views that assume carbon markets as involving a more neutral state if anything there seem to be higher administrative demands in setting up carbon and offset markets than in extending existing apparatus to taxing emissions. Overall, economic theory would suggest a prominent role of the state at several levels of jurisdiction for both emissions trading systems and carbon taxes or a mix of these. One could go as far as suggesting that the metaphor of extending the market into nature could just as easily be turned on its head as that of extending the state into areas of resource management it had avoided, but this is now the accepted Polanyian interpretation of embedded markets. While the debate among economists regarding taxes or permits or some hybrid design remains heated it is not couched in terms of the extent of market versus regulation but effectiveness of design. Similarly, from the perspective of some political economic analyses neoliberalism does not necessarily involve a single focus or logic of extending markets but recognizes an active role of the state and multiple and conflicting logics coexisting.

This paper has focused more on political economy explanations of climate policy developments and instrument choice rather than considering potential implications of such an understanding. The latter of course is the more critical if there is to be hope of some way of overcoming the serious policy failure of too little or poorly designed climate policy. As pointed out earlier, the public choice literature has not developed a similar ideal model of government functioning or policy formation as has been the case with welfare economics. Had such a model been developed we might envisage numerous government correcting measures in the spirit of market correcting measures in the presence of market failures. These guides to 'good' government could then perhaps correct the biases in interest group influences on policy formation. It's not clear that this would be the way forward nor of course would it resolve the issue of the agency of change in government functioning. These are issues that are central to public choice, social choice theory and political science more generally but I am not aware of work in this realm that lead to specific 'correctives' for policy failure in the realm of climate change policy. Some broad based ideas like greater reliance on market mechanisms or non-complexity of policy have been suggested to reduce the likelihood of capture or pork barrel (Helm 2010). Alternatively, the general idea of including political feasibility as a criterion among the alternative standard economic criteria like effectiveness, efficiency, and equity appears as perhaps the most common broad implication of a public choice perspective (Gawel et al 2014; Jenkins 2014). The idea is to consider the likelihood of a policy recommendation to be able to gain enough support in the relevant political process increasing the likelihood that it will be adopted and sustained (Brewer 2014).^{xiii}

One interesting specific policy recommendation that derives from a political economy analysis that accounts for political feasibility comes from Paterson's (2012a) discussion on the spread of carbon markets. To the extent that policy makers are structurally constrained to promote economic growth accounting for the potential ways to build coalitions in support of climate policies should be a more explicit focus of their concern, if it isn't already. Understanding the way that different design elements of carbon markets

relate to coalition building could be an important aspect of political success. This includes potential path dependencies that derive from political choices that strengthen those elements of supportive coalitions that will be able in return to provide enhanced support for future policy strengthening. This of course also depends on the time horizon of policy success that politicians aspire to. If it is just short term success for reasons of reelection there may be less interest in measures that have staying power and this would have implications for the kind of coalitions they may attempt to enable.

Based on these considerations Paterson (2012a) suggests two important policy design issues require careful attention by policy makers. First, while offset markets are anathema to many ENGOs they are important for gaining the support of a broad range of investors, consultants, lawyers, and others. By focusing on improved governance of such markets and resisting simple 'streamlining' of CDM procedures they can alleviate some of the criticism of the ENGOs while maintaining a broad coalition. Second, emissions trading systems and connected offset markets should be designed to generate futures and options contracts in order to get finance interested. The Alberta system (which is a template for the Canadian emissions system) is intensity based so there is no clear scarcity of credits and firms do not know at the beginning of the commitment period how many permits to hold at the end. This has been linked to failure of the Canadian futures market. A similar difficulty would have confronted the Kerry-Lieberman bill as it allowed only for regulated firms to engage in trading. This design would exclude important players and thus potential allies.

What is interesting in Paterson's (2012a) suggestion is not just the fact that some policy that may not be 'optimal' on purely economic grounds may be the wiser choice in the light of political realities, but that there is a dynamic element of building coalitions and new potential interest groups that once they gain greater influence and identify with climate policy may reinforce and strengthen policy change in possibly new directions. This has overtones of a political-economy equilibrium much like that discussed by Acemoglu (2013). Furthermore, this rationale could be extended as an additional argument in favour



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of non-fossil fuel or renewable energy support policies (that have sometimes been portrayed as antithetical to carbon markets) beyond those related to standard market failures. In the sense that new constituencies are formed that will be supportive of stronger climate action.

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Figures and Tables

Table 1: Relative advantages of economic instruments across a number of dimensions

Issue	Carbon Tax	Hybrid	(Pure) Cap and Trade
Minimize Administrative Costs	✓		
Avoid Price Volatility	✓	✓*	
Address Uncertainty			
Weitzman issue (price vs. emissions uncertainty)	✓	✓	
Murray-Newell-Pizer issue (flexibility to respond to new information)		✓	✓
Avoid Leakage from "Nested" Regulation	✓	✓*	
Avoid Large Wealth Transfers to Oil-Exporting Countries	✓	✓*	
Achieve Revenue-Neutrality, Promote Broader Tax Reform	✓		
Achieve Linkages across Jurisdictions	?	?	?
Achieve Benefits from Broad Sectoral Coverage	?	?	?
Achieve Greater Political Support	?	?	?
* applicable when the price ceiling or floor is engaged			

Source: Goulder (2013)

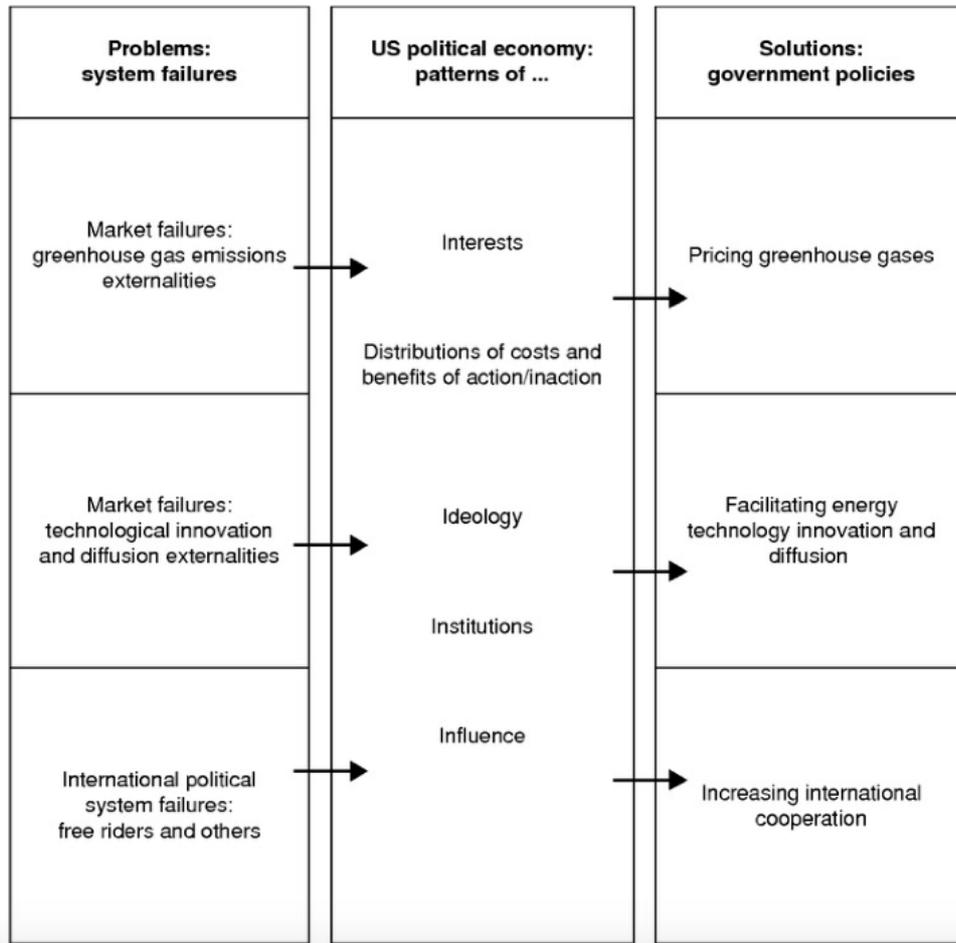


Figure 1: Summary diagram of Brewer's {Brewer 2014} analytical framework.
 Source: Brewer (2014)

Endnotes

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- ⁱ See also Harrison (2012) for an illustration of this in the case of an environmental tax reform in Canada.
- ⁱⁱ Jaffe and Stavins (Jaffe et al 2005) provide a breakdown of these various market failures.
- ⁱⁱⁱ The outcome of trading programmes on the average household will depend much more importantly on the use of the value associated with emissions allowances than with the stringency of the regulation (Burtraw et al 2009). Parry (2004) shows that emission trading can be regressive especially with grandfathering. Hassett et al (2007) find that when using a lifetime measure of income the degree of regressivity is substantially reduced. Blonz et al (2012) point out that social safety nets that adjust automatically to inflation can protect low-income groups in the US from any regressive distributional impacts of GHGs mitigation programmes.
- ^{iv} It is sometimes claimed that cap and trade is more expensive since control is required downstream with many more points of regulation than upstream, but there is no reason why a cap and trade cannot be applied upstream or a tax cannot be applied further downstream.
- ^v See (van der Ploeg and Withagen 2012) and (Cairns 2013) that question the realism or strength of such a supply side response.
- ^{vi} This section draws heavily on Schroeder (2010).
- ^{vii} For instance, the first strand of the literature on optimal design essentially reduce politics to neoclassical accounts of rational actors pursuing self-interest. The second strand holds too narrow a conception of politics and does not account for broader institutional forces and the context of neoliberal global political economy.
- ^{viii} This is not a conception of neoliberalism that sees the expansion of markets as a rollback of state power, but as a reorganisation of the role and practice of the state.
- ^{ix} A similar distinction in comparative political economy (Hall and Soskice 2003) is that between 'coordinated market economies' (CMEs) and 'liberal market economies' (LMEs).
- ^x There is of course a substantial economic literature on market failures specifically associated with technological innovation and separate from the open access problem of the atmosphere's climate stabilising services that provide a linked justification for supporting low carbon technologies that also confront, inter alia, knowledge spillovers.
- ^{xi} US government investments in scientific research through the military had already been immense in the post war period but the government was not immediately concerned with the transition of innovation to civilian markets.
- ^{xii} Units of account for the EU ETS and the CDM, respectively.
- ^{xiii} This discussion is taken up in Papandreou (2014).