Confronting the American Divide on Carbon Emissions Regulation

David Wheeler

Abstract

The failure of carbon regulation in the U.S. Congress has undermined international negotiations to reduce carbon emissions. The global stalemate has, in turn, increased the likelihood that vulnerable developing countries will be severely damaged by climate change. This paper asks why the tragic American impasse has occurred, while the EU has succeeded in implementing carbon regulation. Both cases have involved negotiations between relatively rich "Green" regions and relatively poor "Brown" (carbon-intensive) regions, with success contingent on two factors: the interregional disparity in carbon intensity, which proxies the extra mitigation cost burden for the Brown region, and the compensating incentives provided by the Green region. The European negotiation has succeeded because the interregional disparity in carbon intensity is relatively small, and the compensating incentive (EU membership for the Brown region) has been huge. In contrast, the U.S. negotiation has repeatedly failed because the interregional disparity in carbon intensity is huge, and the compensating incentives have been modest at best. The unsettling implication is that an EU-style arrangement is infeasible in the United States, so the Green states will have to find another path to serious carbon mitigation. One option is mitigation within their own boundaries, through clean technology subsidies or emissions regulation. The Green states have undertaken such measures, but potential free-riding by the Brown states and international competitors seems likely to limit this approach, and it would address only the modest Green-state portion of U.S. carbon emissions in any case. The second option is mobilization of the Green states' enormous market power through a carbon added tax (CAT). Rather than taxing carbon emissions at their points of production, a CAT taxes the carbon embodied in products at their points of consumption. For Green states, a CAT has four major advantages: It can be implemented unilaterally, state-by-state; it encourages clean production everywhere, by taxing carbon from all sources equally; it creates a market advantage for local producers, by taxing transport-related carbon emissions; and it offers fiscal flexibility, since it can either offset existing taxes or raise additional revenue.

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1. Introduction

Without a global agreement to control carbon emissions, climate change threatens to undermine poverty reduction in developing countries. Unfortunately, the stalemate at last year‟s Copenhagen Conference eliminated any realistic hope for a global agreement in the near future. Although many factors contributed to the Copenhagen impasse, the dominant cause was undoubtedly the recalcitrance of the world‟s two largest carbon emitters – the US and China. On the American side, the primary shortfall was the failure of the US Congress to regulate carbon emissions.

Since Copenhagen, the Congressional default has continued. Although the House of Representatives narrowly passed a cap-and-trade bill in mid-2009 (Broder, 2009), its prospects in the Senate plummeted after Copenhagen. By April, 2010, Intrade futures were trading at a 14% probability of Senate enactment, down from 55% in July, 2009 and around 40% just before Copenhagen (Figure 1). In July, 2010, cap-and-trade died in the Senate when the Democratic leadership withdrew it from consideration (Chaddock, 2010). The November election produced significant gains for conservatives who oppose carbon emissions regulation (Graham, 2010), thereby eliminating any prospect of Congressional action during the next two years.

To promote better understanding of this tragic impasse, this paper asks why the US has failed to enact carbon emissions regulation, while Europe has succeeded. My analysis employs a stylized model of interregional carbon mitigation negotiations whose outcome is determined by differences in anticipated mitigation costs and the strength of regions‟ incentives to join an agreement. The model seems to fit the American and European cases reasonably well, with significant implications for policy in the US.

2. Income, Emissions Intensity and Carbon-Regulation Negotiations

The US and EU experiences both involve negotiation over adoption of carbon emissions regulation by Green and Brown regions whose interests differ significantly. The Green regions come to the negotiating table with higher incomes, greater willingness to pay for mitigation, and economies dominated by tertiary and high-tech sectors that emit relatively

little carbon. The Brown regions are poorer and have higher *relative* mitigation costs because emissions-intensive primary and secondary sectors dominate their economies.

Negotiations are motivated by the realization of some or all parties that greenhouse emissions pose a dangerous climate risk, but even total mitigation by the Green regions will not ensure a safe level of emissions. Overall success therefore depends on significant emissions reductions by the Brown regions, whose willingness to cooperate depends on two critical factors: the relative size of their mitigation costs, and the size of the countervailing incentives -- carrots or sticks-- wielded by the Green regions.

2.1 Green and Brown Regions in the US

In the US, the identities of the Green and Brown regions can be inferred from three sets of evidence about the states" view of carbon emissions regulation: votes on the Waxman-Markey cap-and-trade bill passed by the House in 2009 (Figure 2); votes on the Warner-Lieberman cap-and-trade bill considered by the Senate in 2008 (Figure 3); and participation in one of American"s three regional cap-and-trade agreements (Figure 4). I assign Green status to states that meet the following conditions: membership in a regional cap-and-trade agreement; a majority of House representatives who voted for Waxman-Markey; and at least one Senator who voted for Warner-Lieberman.

Conversely, I assign Brown status to states that are not members of a regional cap-and-trade agreement, with 50% or more of House representatives voting against Waxman-Markey, and two Senators voting against Warner-Lieberman.[1] These criteria yield the regional pattern in Figure 5: 19 Green States, 15 Brown states, and 16 states that are intermediate. Basically, Green America comprises most of the New England and Mid-Atlantic regions, much of the north-central Midwest, and the Pacific Coast. Brown America is principally the South, along with some states in the Ohio Valley and Mountain West.

Table 1 provides information on the populations, incomes and emissions intensities of the three regions. Green America has significantly higher income per capita than Brown America ($42,260 vs. $34,484) and much lower carbon emissions intensity, expressed in tons of CO2 equivalent per $ million in output (369 vs. 870). Green America has 44% of the nation"s population, 49% of its income, and 32% of its CO2 emissions, while Brown America has 27% of the population, 24% of total income and 37% of total emissions.

[1] Numerous Senators abstained from participating in the key Warner-Lieberman vote in the summer of 2008. Four were national political candidates (Obama, Clinton, Biden and McCain) who would probably have voted for the measure otherwise. In three of those cases (Obama, Clinton, Biden), the result would have been two state Senatorial votes for Warner-Lieberman. To incorporate this ambiguity, I use a strong criterion (two Senatorial no votes) to assign Brown status and a weaker criterion (one Senatorial yes vote) to assign Green status.

2.1 Regional Disparities and Regulatory Outcomes in Europe and the US

In my assessment of regional disparities and their consequences, I treat EU nations and American states as comparable political units. Although European states retain greater sovereignty than their American counterparts, the two groups overlap considerably in population, economic scale, income per capita and carbon emissions intensity. For this comparison, I use carbon emissions intensity as a proxy for relative sensitivity to mitigation costs.

The first phase of the EU"s Emissions Trading System (ETS) was begun by the West-European Green states – the original EU15 -- in 2005.[2] As the box plots[3] in Figure 6 indicate, these states began the ETS after a long period in which high energy taxes and rigorous control of local polluters had reduced their carbon emissions intensities. Between 1980 and 2005, the median carbon emissions intensity for the EU15 states had declined from 500 tons/$US million to about 300, and interstate disparity had narrowed drastically as well.[4]

Figure 7 introduces the same information for American states since 1990, the earliest year for which comparable information is available. Although the US median carbon emissions intensity has declined substantially since 1990, it has remained far above the EU15 intensity. And – equally significant in this context – the dispersion of US states dwarfs the dispersion of the EU15. On both counts, these large disparities are sufficient to explain why mitigation negotiations in the US have been much more difficult than in the EU15. Further insight is provided by Figure 8, which compares the EU15 with the one US Green region that has actually enacted cap-and-trade: the Northeastern states in the Regional Greenhouse Gas Initiative (RGGI - displayed in Figure 4).[5] Here the similarities in median intensities and regional dispersions are as striking as the differences between the EU15 and all US states.

Further insight into the similarity of Green regions is provided by Table 2, which combines US and EU states in a composite top-25 ranking. The two highest-ranking states are in the EU15 -- Sweden (178 tons/$million) and France (213) -- while the next three are American: New York (246), Connecticut (256) and California (270). Among the 5 lowest-ranking states, 3 are European (Luxembourg (368), Greece (369), Belgium

[2] The EU15 states are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

[3] Box (or box-and-whisker) plots provide robust views of numerical distributions. In Figures 6-11, the white lines within boxes are medians; the box boundaries are quartile points, and the outer "whiskers" are the highest and lowest non-extreme values. A few extreme values have been excluded to preserve clarity in scaling.

[4] Data for Figures 6-11 have been obtained from the World Resources Institute.

[5] The RGGI states are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware and Maryland.

(370)) and 2 are American (Washington (357), Delaware (371)). Overall, 10 US Green States join the EU15 in the top-25 group.

To summarize, the EU-ETS was established by a group of 15 West-European Green states that had a low median emissions intensity and small interstate disparity. These conditions made successful negotiations *within the region* possible, just as they did for the US RGGI states. But the EU15 went further, by expanding the EU-ETS to include the 12 states (henceforth the EU12) that joined the EU after 2004.[6] In contrast, the US Green states were unable to induce Brown-state participation in carbon emissions regulation. For perspective, Figures 9-11 compare distributions of emissions intensities for the EU15 and EU12, the US RGGI and Brown States, and the EU12 and US Brown States.

Figure 9 displays emissions intensity distributions for the EU15 and the EU12, mostly former East Bloc states. In 1990, with the legacy of socialist industrialization still fresh, the EU12 had a median emissions intensity twice that of the EU15 and far greater disparity within the group. By 2005, privatization and increased regulatory pressure on pollution-intensive industries brought the EU12 distribution into rough alignment with the EU15 distribution in 1990. But continued progress by the EU15 maintained a large East-West gap, so the EU12 clearly presented the EU ETS with a large hurdle. The European states are justifiably proud of surmounting it, and EU cap-and-trade has endured, despite recurring difficulties as the Europeans have attempted to pursue overall emissions reduction without imposing excessive costs on EU12 states or undermining the global competitiveness of heavy manufacturers.

Why were the EU15 able to integrate the EU12 into the EU-ETS, while the American Green states have not enjoyed similar success with the Brown states? The evidence suggests important roles for both incentives and disparities in emissions intensities. First, and perhaps most critically, *the EU12 joined the EU-ETS because EU membership required them to do so, and this membership offered economic benefits so enormous that they more than compensated for any economic risks associated with emissions trading.* In the US, the Green states have simply had no comparable carrot (or stick).

To compound America‟s problem, its Green-Brown disparities in emissions intensity continue to dwarf their European counterparts. Figure 10 shows that the US RGGI and Brown states are much more disparate than the EU15 and EU12. To reinforce this point, Figure 11 shows that the median and dispersion of US Brown-state intensities are far greater than their EU12 counterparts.

[6] The EU12 countries are Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia

3. Policy Implications for the US

The unsettling implication of this analysis is that an EU-style arrangement is probably infeasible in the US. Congress may yet pass an energy bill that promotes clean energy while further subsidizing nuclear power, natural gas and "clean coal" experiments. But, given the existing intensity disparities and the absence of an EU-level carrot, the Brown states are unlikely to accept anything more than nominal regulation of carbon emissions.

In the present circumstances, it is difficult to avoid the conclusion that the Green states will have to propel carbon mitigation in the US, perhaps in concert with some of the Intermediate states. If this conclusion is correct, then the Green states have two basic options. The first is aggressive carbon mitigation within their own boundaries, through clean technology subsidies or emissions regulation. This option is eminently feasible, since it would only require strengthening existing programs. In the Clean Energy States Alliance (CESA), 12 Green states have already joined with 5 Intermediate states and 1 Brown state to establish state-level funds for subsidizing the development of clean energy.[7] Although CESA represents a progressive coalition of Green and Intermediate states, its current ambitions are modest. During the next ten years, CESA funds are only expected to invest about $3.5 billion (CESA, 2010).

The Green states have also promoted carbon emissions regulation through three regional cap-and-trade coalitions (Table 3, Figure 4). However, only the Northeastern RGGI states have begun emissions trading, and their current ambitions are again modest. In the RGGI auction on September 10, 2010, emissions permits were sufficiently plentiful to be priced at only $1.86/ton[8]. This is less than 10% of the current EU-ETS price, $19.29/ton[9], which is half of its pre-recession level. And the disparity is not surprising, since costly self-regulation by some states in the open US market would inevitably shift investment in carbon-intensive industries to unregulated states. The current status of cap-and-trade in the RGGI states suggests that they are well aware of this risk.

To summarize, the existing state-level initiatives are quite modest and, unfortunately, likely to remain so because of potential free-riding by unregulated states. In principle,

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[7] CESA members by group are:
Green: California, Connecticut, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, New Mexico, New York, Oregon, Vermont, Wisconsin;
Intermediate: Arizona, Colorado, Florida, Ohio, Pennsylvania;
Brown: Alaska.

[8] Details are available at http://www.rggi.org/co2-auctions/results

[9] Point Carbon at http://www.pointcarbon.com/, December 1, 2010.

the CESA states could subsidize clean technology adoption in the Brown states, but such initiatives may not be politically feasible. And even if the Green states adopted strict emissions regulation, Table 1 provides an important caveat: Collectively, the 19 US Green states account for only 32% of US carbon emissions, compared with 37% for the 15 Brown states and 31% for the 16 Intermediate states. Thus, even stringent carbon limits in the Green states would address only one-third of the American problem.

This leaves option 2, which is motivated by the contrast between columns (2)-(3) and column (4) in Table 1. Although the Green states account for only 32% of American carbon emissions, they have 44% of the nation"s population and 49% of its income. Option 2 mobilizes this market power by reversing the conventional approach and encouraging low-carbon consumption rather than directly regulating carbon emissions.

Option 2 draws on carbon lifecycle analysis, which accounts for the carbon emitted during the production and distribution of goods and services. For example, an automobile purchased in the US state of Maryland may have been assembled in Kentucky, from components produced in the UK, Poland and China. Carbon has been emitted, either directly or indirectly (e.g., from coal-fired power), during the production of each component, its transportation to Kentucky, assembly there, and transportation to final sale in Maryland. Carbon lifecycle analysis computes the total carbon embodied in the automobile at its point of sale in Maryland.

In principal, any independent polity can use carbon lifecycle analysis to calculate embodied carbon, assign a price to carbon and add a "carbon bill" to any product or service. At the national level, Krugman (2010) incorporates this principle in a proposed "carbon tariff" that would impose border charges to protect domestically-regulated industries from competitors in countries where carbon emissions are not regulated. Stern (2010) notes that future carbon tariffs in the EU may target imports from the US if it continues to reject carbon regulation. Stiglitz (2010) proposes a general implementation of the concept, through a global "carbon added tax" (CAT).[10]

From the perspective of the Green states, a CAT system has three important advantages. First, they have the political power to implement a CAT directly, without any need to negotiate or compromise with Brown states. The CAT is basically a sales tax that is quite similar to taxes on alcohol content that are already levied in some states (Marin Institute, 2010). Second, the market power of the Green states would enable them to use a CAT to encourage clean production in Brown states (as well as other countries). Faced with markups for carbon-intensive products in the large, lucrative Green-state market, all producers would face strong competitive pressure to reduce their carbon emissions.

[10] For further discussion, see Farmanfarmaian (2008) and Atkinson, et al. (2010).

Third, a CAT would attract support from local producers because its taxation of embodied transport emissions would give them a market advantage.

While these potential strengths of the CAT approach are undeniable, so are its potential problems. The first relates to tractability: To implement a full CAT, the Green states would have to finance and support a credible, constantly-updated set of carbon lifecycle accounts for every product marketed within their borders. As previously noted, this would even entail different CAT rates for otherwise-identical products (i.e., automobiles of the same make and model) from different production and transport chains. Perhaps such a CAT will be feasible in a future, universally-barcoded era, but we are presently far from it. For now, a feasible CAT would have to rely on more easily-computed statistics (e.g. average carbon-intensity of power production in China) that would reduce (but not eliminate) its ability to differentiate among products. Recent work by Atkinson, et al. (2010) has explored the global implications of a CAT-like system using multiregional input-output analysis.

The second problem relates to political feasibility, since a CAT is a tax. It is undeniably more appealing than direct carbon regulation for local producers, since it automatically levels the playing field by imposing equivalent charges on all carbon emitters. And a CAT can be fiscally neutralized by reducing other taxes proportionally. But it would still be a new tax, and that might be enough to undermine it in some Green states. On the other hand, fiscal stress in many of these states is generating pressure for tax increases. These could provide a vehicle for rapid adoption of CATs.

Despite its potential problems, the CAT retains powerful Green-state appeal because its potential national and international impacts are large, and it does not require Brown-state assent. In the current climate, a workable CAT would have to impose minimal economic and technical burdens on the public sector, while providing strong new incentives for low-carbon production.

4. Summary and Conclusions

In this paper, I have explored the reasons why Europe has succeeded in regulating carbon emissions and the US has failed. The contrasting outcomes reflect striking differences in regional emissions intensities and incentives to participate in a mitigation agreement. In Europe, the EU15 states only initiated cap-and-trade regulation after other forces had drastically reduced their interstate disparities in carbon emissions intensity. Then, by dangling the enormous carrot of EU membership, the EU15 integrated the poorer and more pollution-intensive East European states into the cap-and-trade system. In the US, cap-and-trade has already been implemented by 10 Northeastern states whose emissions intensity profile resembles that of the EU15. Through their Congressional

representatives, they have joined other Green states in an attempt to integrate poorer and more pollution-intensive Brown states into a national cap-and-trade system. But the US Green-Brown disparity in emissions intensities dwarfs the EU's, and the US Green states cannot offer an incentive that is remotely comparable to the carrot of EU membership. The result has been Congressional failure to enact cap-and-trade or any other carbon emission regulation.

The unsettling implication is that EU-style regulation is probably infeasible in the US, unless catastrophic climate change becomes evident. Congress may yet pass an energy bill that promotes clean energy while further subsidizing nuclear power, natural gas and "clean coal" experiments. But, given the existing carbon-intensity disparities and the absence of an EU-style carrot, the Brown states are unlikely to accept anything more than nominal regulation of carbon emissions.

It is therefore difficult to avoid concluding that the Green states will have to proceed on their own for now, perhaps in concert with some of the Intermediate states, in coalitions like the existing Clean Energy States Alliance. As they face this challenge, the Green states have two basic options. The first is pursuit of carbon mitigation within their own boundaries, through clean technology subsidies or emissions regulation. But potential free-riding by the Brown states and international competitors seems likely to limit the strength of this approach, and it would address only one-third of US carbon emissions in any case. The second option is mobilization of the Green states' enormous market power through adoption of carbon-added taxation in some form. This would level the playing field for Green-state producers, while providing a powerful incentive for producers in unregulated areas to reduce their carbon emissions. In a future paper, I will provide a more detailed assessment of this second option.

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Table 1: Characteristics of Green, Brown and Intermediate States

Group	(1) Number of States	(2) % of US Population	(3) % of US Income	(4) % of US CO2 Emissions	(5) Average Income Per Capita	(6) Carbon Emissions Intensity[a]
Green	19	44.4	48.7	32.3	42,260	369
Brown	15	26.5	23.7	36.6	34,484	870
Intermediate	16	29.1	27.6	31.2	36,607	649

[a] Tons CO2 equivalent per $ million

Data Source: US Census Bureau

Table 2: US Green States and EU15 States:

Comparative Emissions Intensities

State	**Rank**	**Emissions Intensity (tCO2e/ $Million)**
Sweden	**1**	**178**
France	**2**	**213**
New York	**3**	**246**
Connecticut	**4**	**256**
California	**5**	**270**

Denmark	**6**	**271**
Austria	**7**	**280**
United Kingdom	**8**	**281**
Ireland	**9**	**287**
Italy	**10**	**288**
Massachusetts	**11**	**293**
Spain	**12**	**307**
Portugal	**13**	**307**
Rhode Island	**14**	**316**
Germany	**15**	**319**
Netherlands	**16**	**324**
Vermont	**17**	**330**
Oregon	**18**	**336**
Finland	**19**	**346**
New Jersey	**20**	**356**
Washington	**21**	**357**
Luxembourg	**22**	**368**
Greece	**23**	**369**
Belgium	**24**	**370**
Delaware	**25**	**371**

Data Source: World Resources Institute

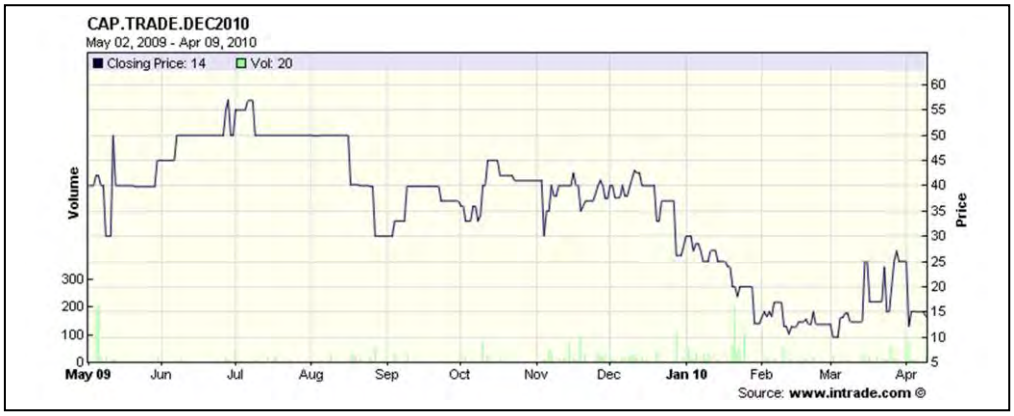
Table 3: Green, Brown and Intermediate States

State Group	Region	State	% of House Reps Voting for Waxman-Markey	Senators Voting for Warner-Lieberman	Member of Regional Cap-and-Trade Agreement (1 = Yes)
Green	Midwest	Illinois	58	1	1
	Midwest	Iowa	60	1	1
	Midwest	Michigan	53	2	1
	Midwest	Minnesota	63	1	1
	Midwest	Wisconsin	63	2	1
	Northeast	Connecticut	100	2	1
	Northeast	Delaware	100	1	1
	Northeast	Maine	100	2	1
	Northeast	Maryland	88	2	1
	Northeast	Massachusetts	100	1	1
	Northeast	New Hampshire	100	1	1
	Northeast	New Jersey	85	2	1
	Northeast	New York	86	1	1
	Northeast	Rhode Island	100	2	1
	Northeast	Vermont	100	2	1
	West	California	62	2	1
	West	New Mexico	100	1	1
	West	Oregon	60	2	1
	West	Washington	78	2	1
Brown	Midwest	North Dakota	0	0	0

	Midwest	Ohio	44	0	0
	Midwest	South Dakota	0	0	0
	Other	Alaska	0	0	0
	South	Alabama	0	0	0
	South	Georgia	31	0	0
	South	Kentucky	33	0	0
	South	Louisiana	0	0	0
	South	Mississippi	25	0	0
	South	Oklahoma	0	0	0
	South	South Carolina	33	0	0
	South	Tennessee	33	0	0
	South	Texas	28	0	0
	West	Idaho	0	0	0
	West	Wyoming	0	0	0
Intermediate	Midwest	Indiana	22	1	0
	Midwest	Kansas	25	0	1
	Midwest	Missouri	44	1	0
	Midwest	Nebraska	0	1	0
	Northeast	Pennsylvania	42	1	0
	Other	Hawaii	100	2	0
	South	Arkansas	25	2	0
	South	Florida	36	2	0
	South	North Carolina	46	1	0

	South	Virginia	45	2	0
	South	West Virginia	0	1	0
	West	Arizona	38	0	1
	West	Colorado	57	1	0
	West	Montana	0	2	1
	West	Nevada	67	1	0
	West	Utah	0	0	1

Figure 1: Intrade Prices: US Cap-and-Trade Enacted by December 2010



Source: Intrade.com
http://data.intrade.com/graphing/jsp/closingPricesForm.jsp?contractId=674142&tradeURL=https://www.intrade.com

Figure 2: Percent of Congressional Representatives Voting for Waxman-Markey

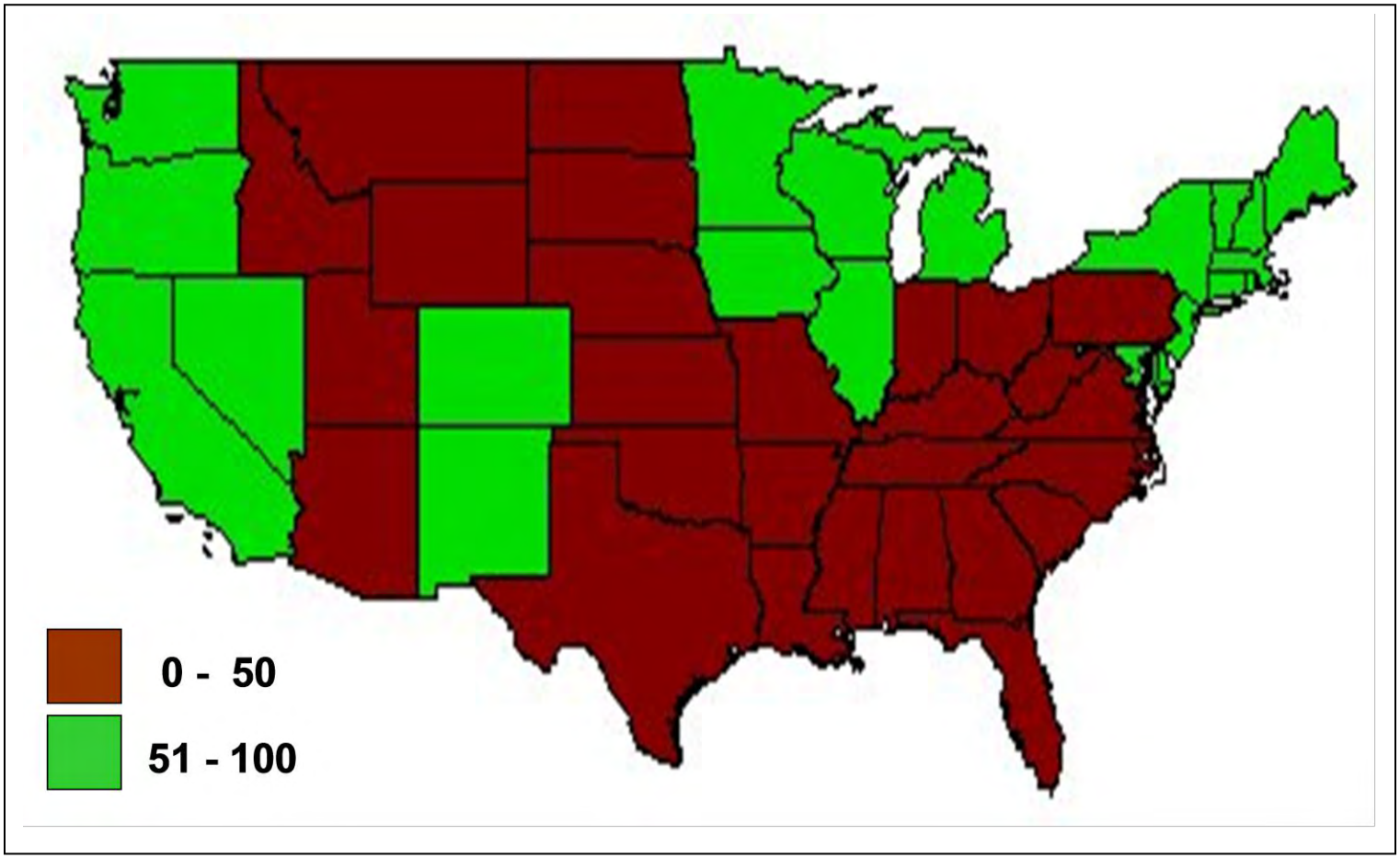


Figure 3: Number of Senators Voting for Warner-Lieberman

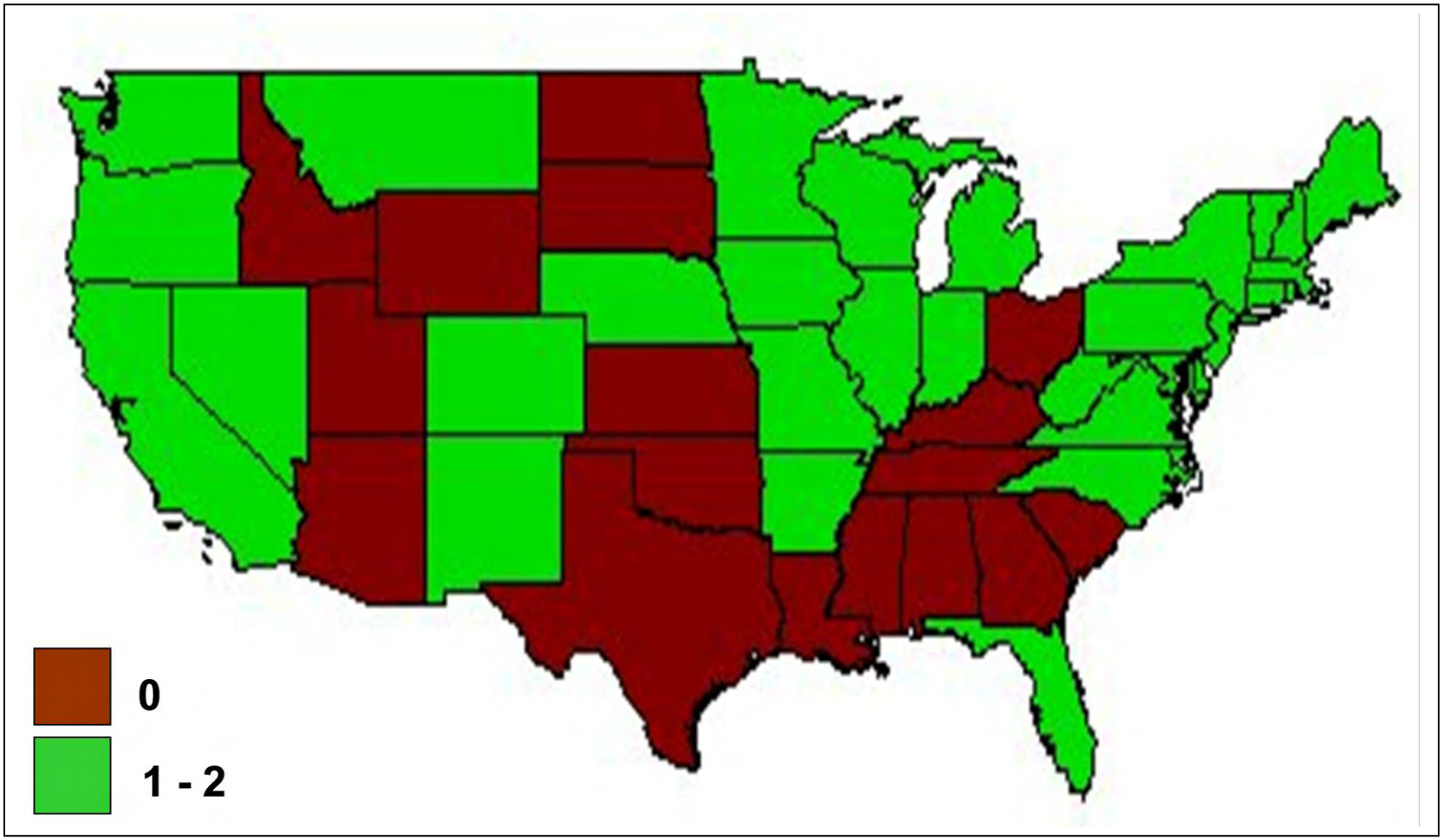


Figure 4: States Belonging to Regional Cap-and-Trade Agreements

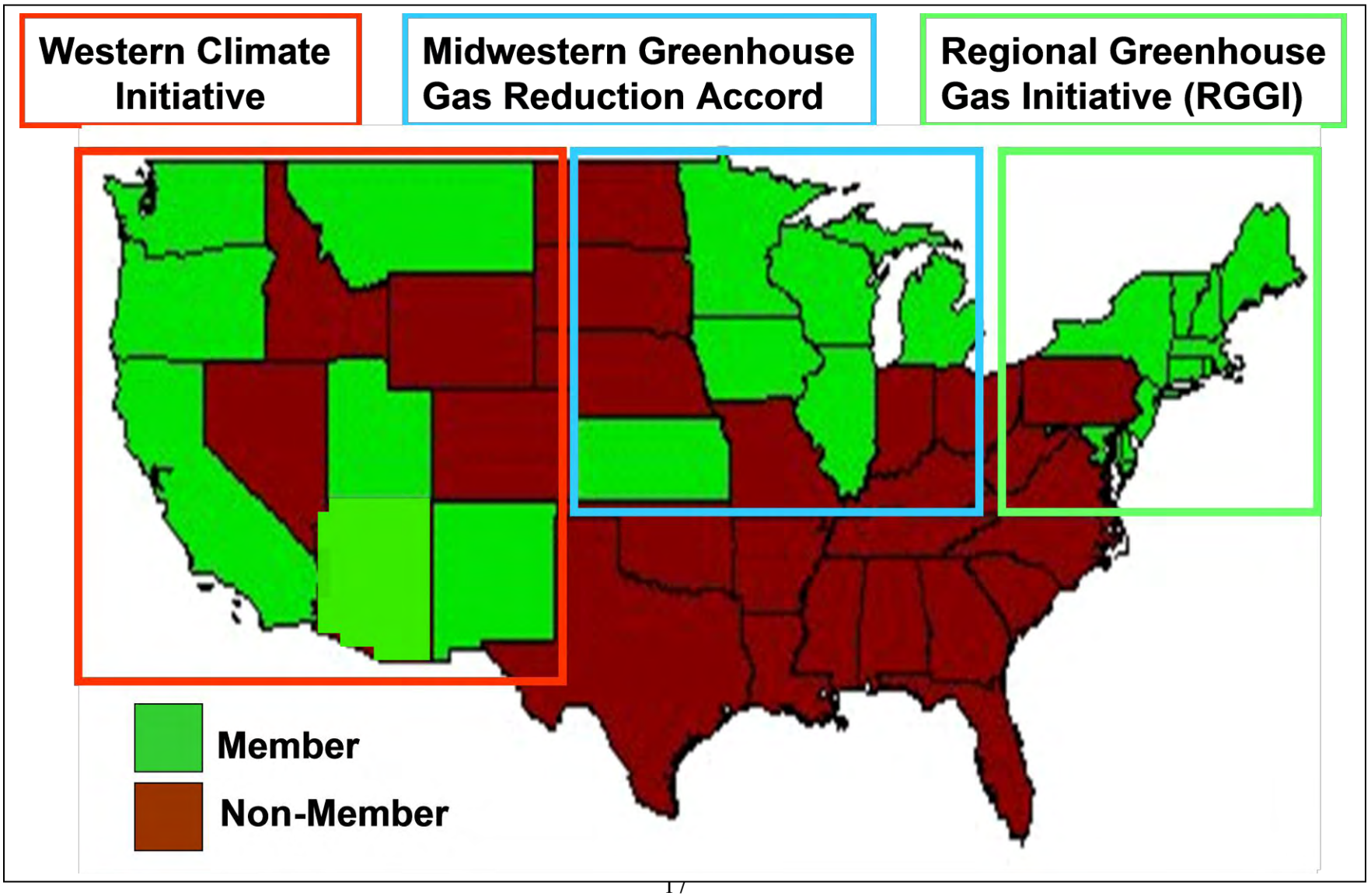


Figure 5: States' Positions on Carbon Emissions Regulation

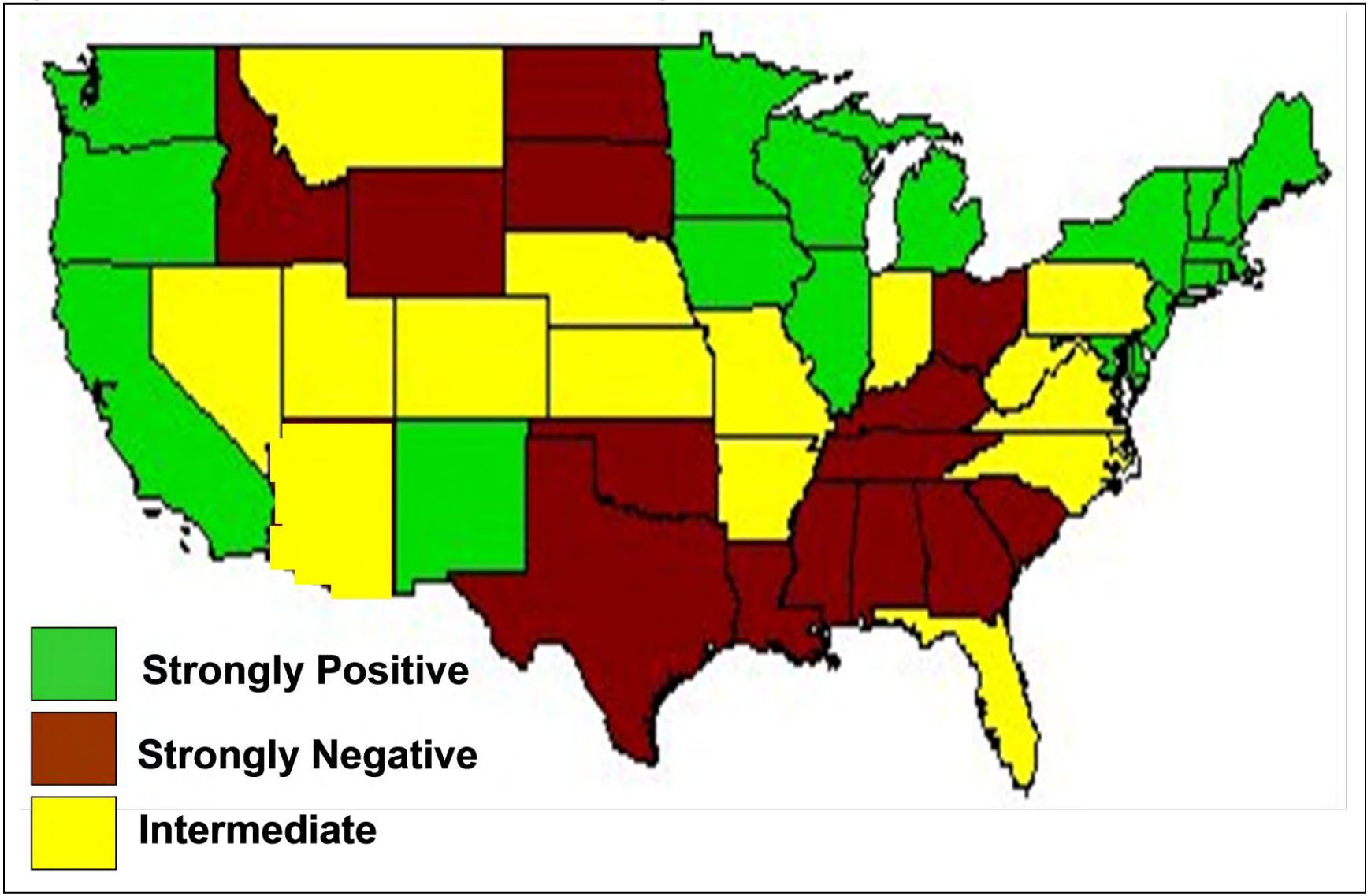


Figure 6: EU15 Carbon Emissions Intensities, 1980-2005

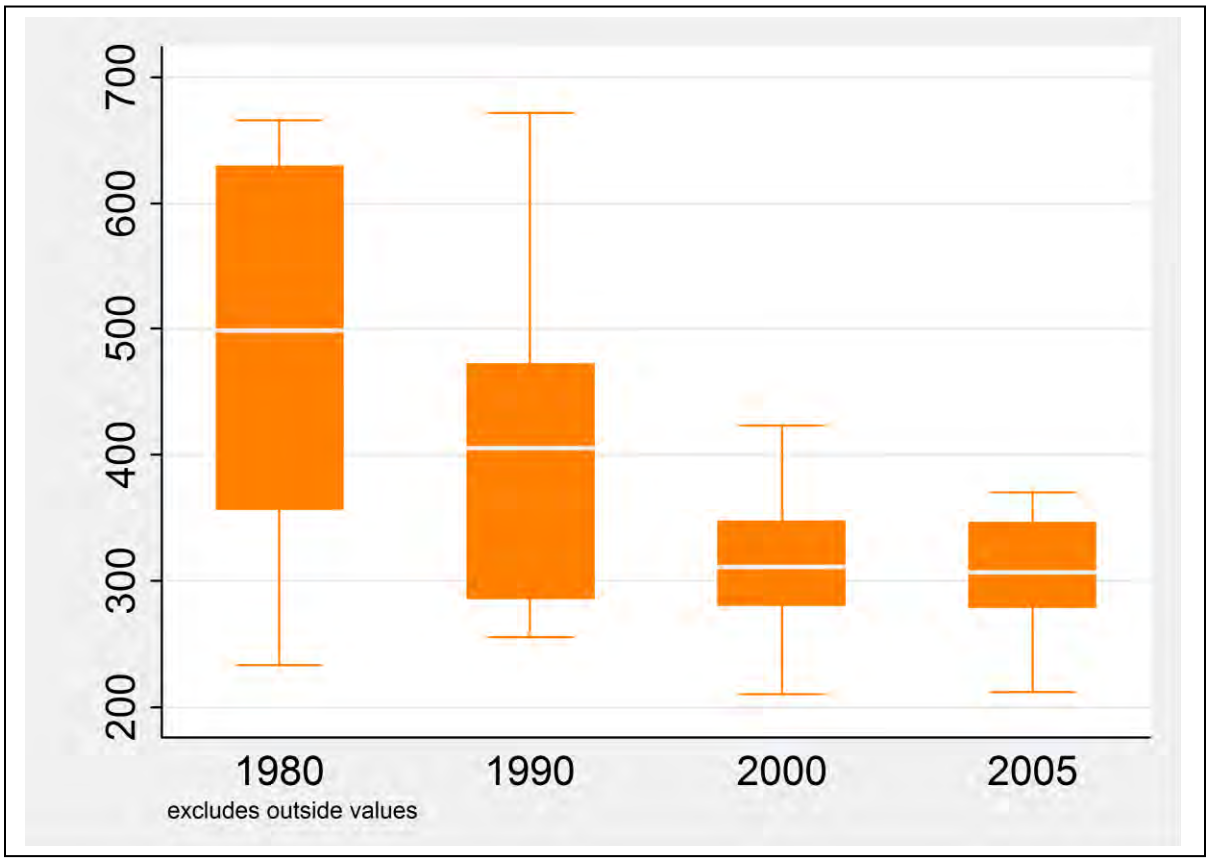


Figure 7: Carbon Emissions Intensities, 1990 – 2005: EU15 vs. US

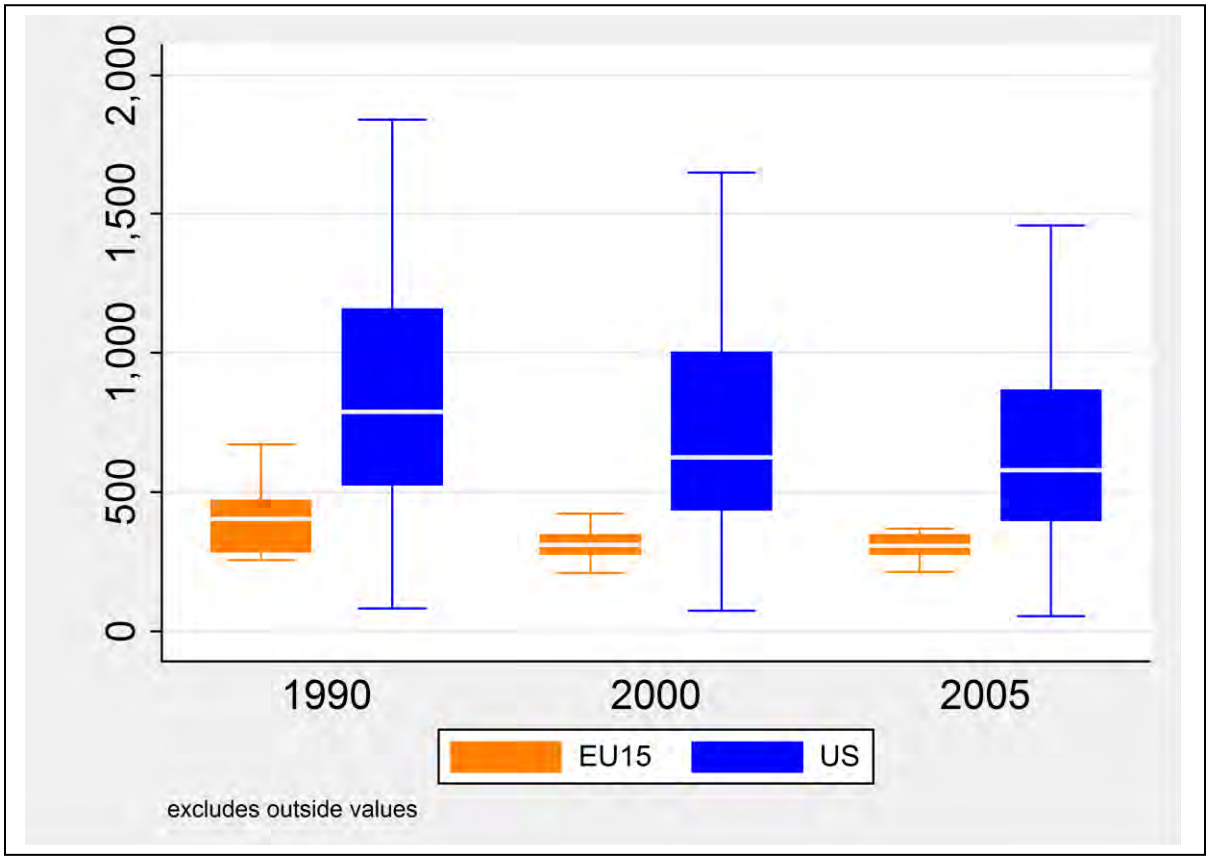


Figure 8: Carbon Emissions Intensities, 1990 – 2005: EU15 vs. US RGGI States

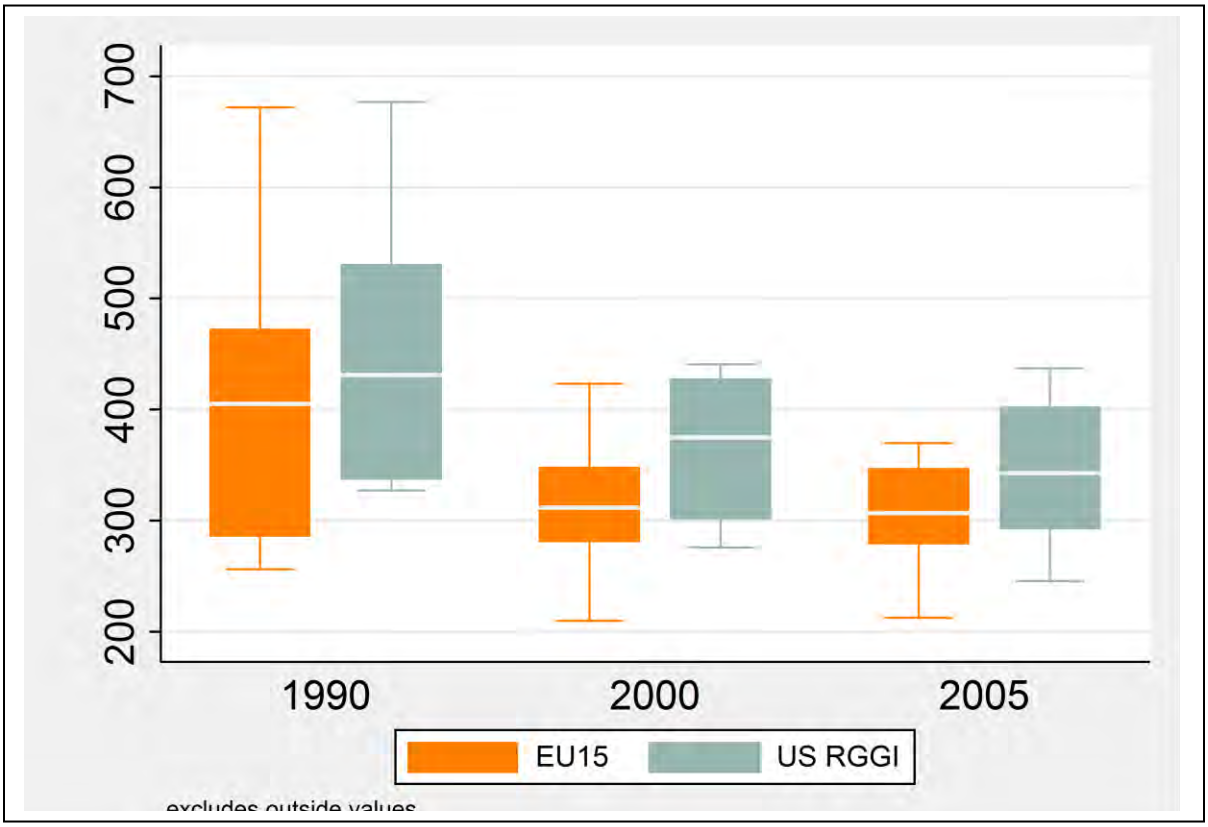


Figure 9: Carbon Emissions Intensities, 1990 – 2005: EU15 vs. EU12

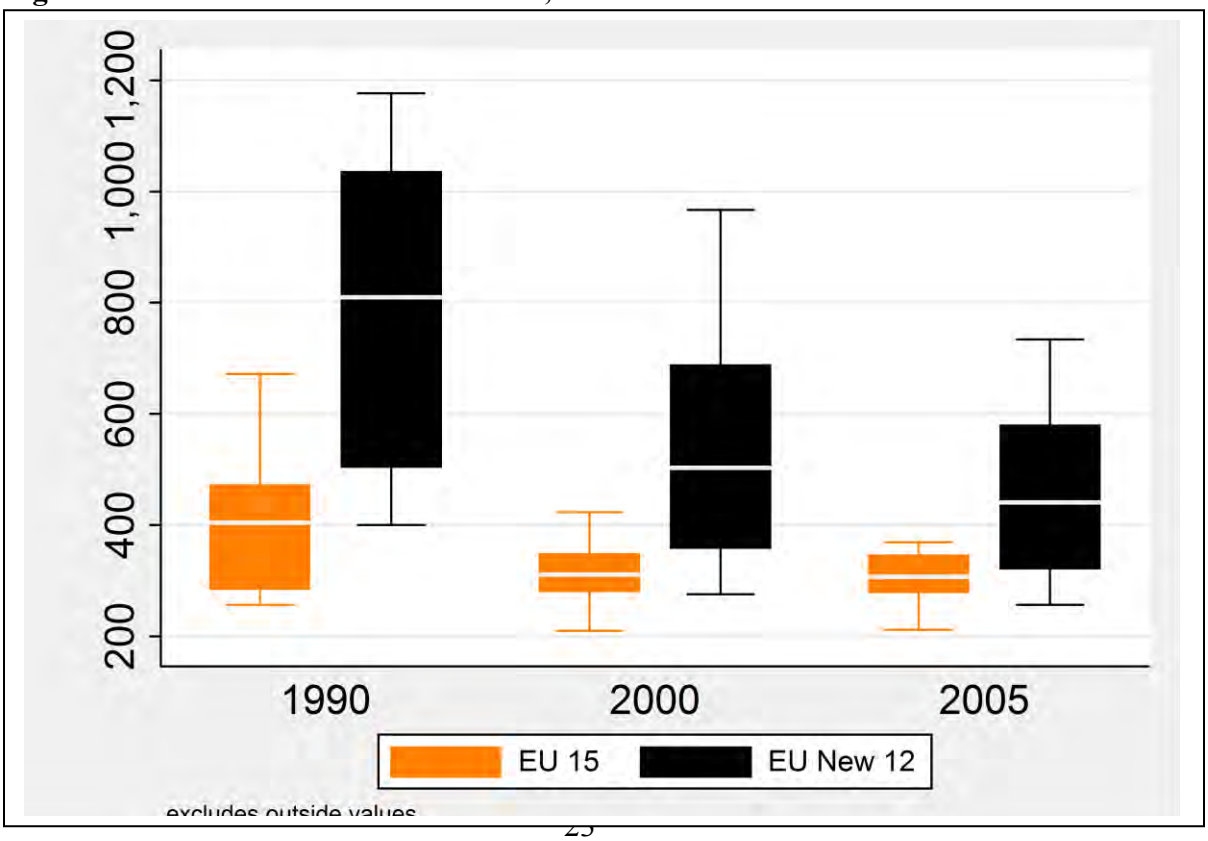


Figure 10: Carbon Emissions Intensities, 1990 – 2005: US RGGI vs. Brown States

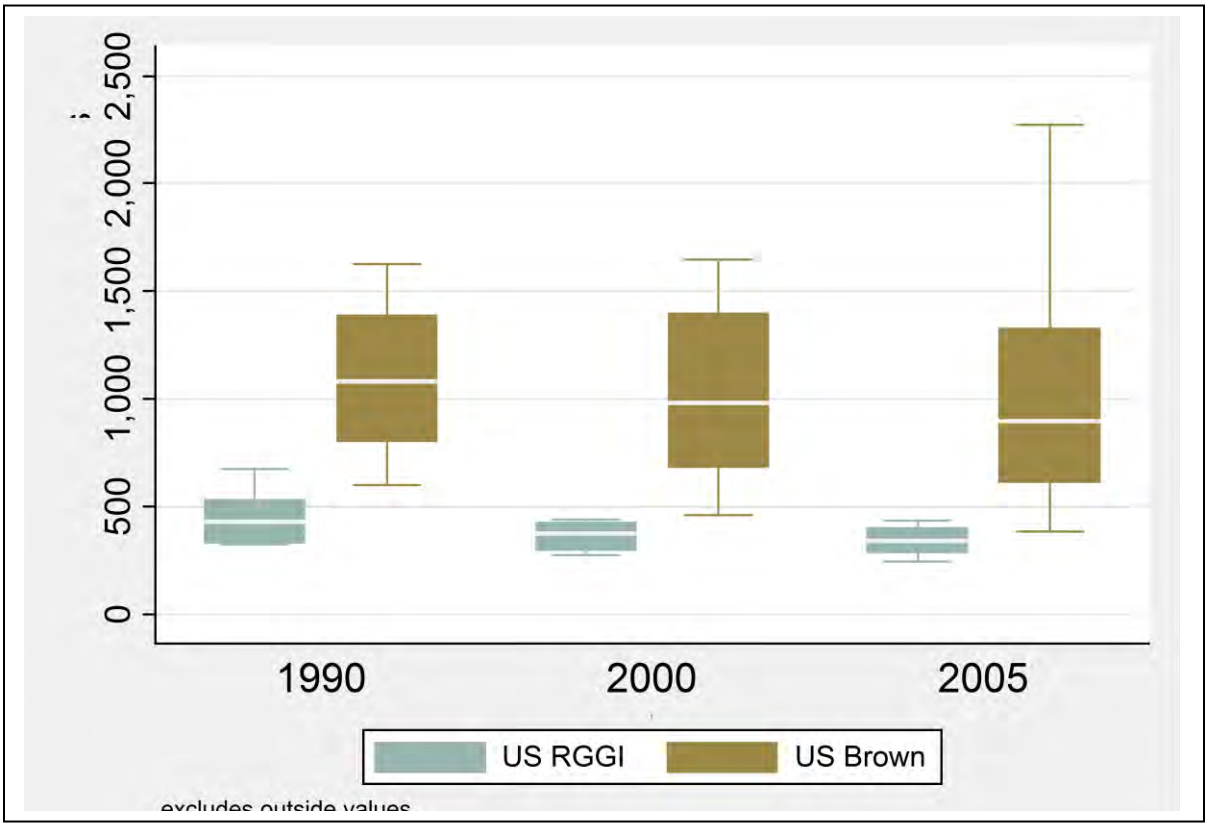


Figure 11: Carbon Emissions Intensities, 1990 – 2005: US Brown States vs. EU12