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Harmonization of Automobile Emission Standards Under International Trade Agreements: Lessons from the European Union Applied to the WTO and the NAFTA

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HARMONIZATION OF AUTOMOBILE EMISSION STANDARDS UNDER INTERNATIONAL TRADE AGREEMENTS: LESSONS FROM THE EUROPEAN UNION APPLIED TO THE WTO AND THE NAFTA

WILLIAM F. DIETRICH*

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* Mr. Dietrich is an associate at Baker & McKenzie in San Francisco, California. He holds a B.A. from the University of California at Santa Barbara (1979); an M.B.A. from the Haas School of Business, University of California at Berkeley (1984); an M.P.P. from the John F. Kennedy School of Government, Harvard University (1994); and a J.D. from the School of Law (Boalt Hall), University of California at Berkeley (1995).

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Dedicated to my mother, Ruth, and to the memory of my father, John—they instilled in me a love of learning.

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I. INTRODUCTION

A. Purpose

Humanity stands at the confluence of raging rivers created by its own hand: population growth that demands economic growth, rapidly changing technology that spawns myriad new products, increased trade that spreads these products across

the globe, and burgeoning environmental degradation that threatens global biospheric cycles. How we steer the ship of humanity through this confluence will determine our standards of living and environmental quality for generations.

One industry that flows within all these currents is that of motor vehicles. As a major sector of industrial economies, the motor vehicle industry has achieved maturity in the industrial world. We currently drive about 450 million automobiles, 100 million commercial vehicles, and at least 100 million two- and three-wheeled vehicles.¹ According to the Organization for Economic Cooperation and Development ("OECD"), seventy-five percent of vehicles are owned by fifteen percent of the world's population, mostly in the industrialized countries.²

In the developing world, the industry is growing rapidly. Many developing countries have engaged in production, often in partnership with large firms, and most developing countries desire to obtain more cars. For example, in China, new car sales have jumped from 78,000 in 1990 to 430,000 in 1994.³ DRI McGraw-Hill forecasts sales of one million cars by 1999.⁴

While increased demand presents great opportunities for vehicle manufacturers, the prospect of such motor vehicle growth brings the specter of additional air pollution. Besides the traditional problems of "smog" and particulates,⁵ motor vehicles contribute substantially to greenhouse gases.⁶

Vehicle emission standards and fuel standards are critical determinants of the environmental and health impact of the expected increase in vehicles. Such standards also play a crucial role in the marketplace because they may be barriers to trade.⁷ On the other hand, harmonization of such standards could lead to

¹ Haig Simonian, *Drive for the Clean, Lean Car*, FIN. TIMES, Mar. 15, 1995, at 10 [hereinafter *Drive for the Clean, Lean Car*].

² *Drive for the Clean, Lean Car*, *supra* note 1.

³ Kevin Done, *East Offers Best Outlook for Growth*, FIN. TIMES, Oct. 4, 1994, at 11 [hereinafter *East Offers Best Outlook*].

⁴ *Id.*

⁵ For example, in 1990, highway vehicles (including passenger cars, light-duty trucks, heavy-duty gasoline engine trucks, and heavy-duty diesel engine trucks) were responsible for a substantial proportion of anthropogenic air pollutant emissions in the United States—specifically, 50.4% of carbon monoxide, 27.3% of volatile organic compounds, 28.6% of nitrogen oxides, and 19% of fine particles (PM₁₀, meaning particulate matter less than 10 microns in diameter). See MOTOR VEHICLE MANUFACTURERS ASSOCIATION OF THE UNITED STATES, INC., MOTOR VEHICLE FACTS & FIGURES '92 84 (1992) [hereinafter FACTS & FIGURES '92], citing U.S. EPA, NATIONAL AIR POLLUTANT EMISSION ESTIMATES, 1940-1990 (Nov. 1991).

⁶ See generally IPCC (WORLD METEOROLOGICAL ORGANIZATION/UNITED NATIONS ENVIRONMENT PROGRAMME INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE), CLIMATE CHANGE: THE IPCC SCIENTIFIC ASSESSMENT (J.T. Houghton et al. eds., 1990).

⁷ In a related example, the United States and Japan engaged in a heated battle over trade in automobiles and automotive parts in 1995 after the failure of two years of negotiations. Bernard Simon, *US-Japan Car Talks Run Out of Road*, FIN. TIMES, May 5, 1995, at 4. One key dispute was whether Japan's elaborate automobile inspection system served more to restrict imports from foreign firms than it served to prevent traffic accidents. *Id.* Just as the Japanese inspection system acts as a barrier to entry, whether or not it has unrelated legitimate reasons for existing, stringent emission standards can be a

economies of scale and efficiencies leading to positive economic welfare effects.

Will harmonization of vehicle emission standards occur? If so, will such harmonization be upwards, toward greater stringency, or downwards, toward the "lowest common denominator?" To build an analytical framework for answering these questions under different international trading regimes, this article explores the past and potential harmonization of automobile and light truck emission standards under three trading regimes—the European Union ("EU" or "Union"),⁸ the World Trade Organization/General Agreement on Tariffs and Trade 1994 ("WTO/GATT") and the North American Free Trade Agreement ("NAFTA"). This initial effort should provide a framework for future research, and ultimately guidance, for policymakers, firms, and interest groups.

B. Summary of Conclusions

Based on the analysis of automobile emission standards in the European Union, I conclude that several critical factors influence a trading regime's approach toward the tension between free trade and internal regulations, and the direction of harmonization, if any. These factors are: large consumer markets, supplier preferences, state power, domestic political support, and the structure of the international regime and its institutions. In the EC, West Germany, which had power due to its political and economic position, in general, and its large and attractive market, in particular, led the drive for more stringent emission standards and cleaner fuels. Along with the help of other "greener" states and the rise in influence of environmentalists in recalcitrant states, EU standards gradually became more stringent. The EU used several approaches to achieve upward harmonization: (1) compromise through product differentiation, (2) threats from the largest market and the dominant political player, and (3) federalization/centralization.

In contrast, for the World Trade Organization, neither the market dynamics nor the relatively weak WTO/GATT structure will reproduce the upward harmonization seen in Western Europe. Instead, stringent domestic rules may be challenged by: (1) existing major producers to knock down maverick countries with high standards, or (2) infant producers seeking to export to the more advanced countries.

Finally, under the North American Free Trade Agreement, the United States will continue to dominate the setting of vehicle emission standards and fuel quality standards. Because automobile manufacturing in Mexico is operated by U.S. and Asian firms (or joint ventures thereof), independent Mexican firms are not a significant factor in influencing emission standards. The U.S. and Asian firms already must meet stringent standards for export to the United States. The only

barrier to entry.

⁸ Since much of the case study takes place prior to the change in name from the European Communities ("EC") to the European Union ("EU"), the term EC is used frequently herein. Similarly, "West Germany" is used for the Federal Republic of Germany prior to German reunification in 1990.

question is whether it will be profitable and desirable to manufacture less-controlled ("dirtier") cars for the Mexican and South American markets. To the extent that the United States exerts pressure on Mexico to harmonize its standards, production of dirtier cars for the Mexican market is less likely.

Advice for participants in the policy debate flows from this analysis. Manufacturers should assess possible economies of scale that might be achieved under harmonized standards. (Of course, a manufacturing firm may conclude harmonization is not in its interest due to limited ability to pass increased costs per vehicle onto consumers.) Environmentalists should strive to obtain stringent standards in large markets for the product. Strict standards in these markets (such as California and West Germany, for automobiles) will facilitate upward harmonization, where firms desire to serve these markets.

Beyond these conclusions, this article provides a road map for assessing the probability of harmonization of environmental standards under various international trading regimes for a selected economic sector. To make this assessment, the analyst must gather information regarding the legal and institutional structure of the trading regime, the major producers and markets, and domestic and international politics.

C. Scope and Organization

The scope of this case study includes emission standards for both automobiles and light-duty trucks that operate on gasoline.⁹ This study excludes heavy-duty trucks and buses, which burn diesel fuel, because the adoption of emission regulations for trucks and buses follows a parallel but different path. The study period begins in 1970, when regulation of vehicle emissions first began in earnest in Europe, and extends to the mid-1990s.

Part II lays out the legal, economic, and political framework for the vehicle exhaust emissions case in Western Europe. It discusses the world motor vehicle market and the EC motor vehicle market. Part III lays out the history of vehicle exhaust emissions policy in the EC from 1970 to the mid-1990s. Part III also analyzes the EC case to determine what key factors influenced the degree and direction of harmonization in the EC. Part IV lays out the legal, economic, and political framework for automobile exhaust emissions regulation under the WTO/GATT and evaluates the potential for harmonization under this regime. Similarly, Part V discusses the underlying features of NAFTA and its markets and then evaluates the potential for harmonization. The NAFTA discussion is last because NAFTA adopts many elements of the WTO/GATT which are easier to understand after discussion of the WTO/GATT. In addition, although NAFTA is an intermediate level of economic integration between the EU and the WTO, the

⁹ References to "the market" mean the market for passenger automobiles and light trucks. For ease of reading, references to "motor vehicles" or "vehicles" mean only automobiles and light-duty trucks, unless otherwise stated.

NAFTA analysis is the simplest due to its members and market structure. Finally, Part VI provides overall conclusions.

II. LEGAL, ECONOMIC, AND POLITICAL FRAMEWORK FOR THE AUTOMOBILE EXHAUST EMISSIONS CASE IN EUROPE

A. *Legal Framework: Instruments of European Integration and Their Effect on Environmental Regulation*

1. *The Treaty of Rome*

In 1957, six western European states signed the Treaty of Rome, thereby forming the beginning of a customs union called the European Economic Community.¹⁰ The six signatories agreed to eliminate tariffs between member states and establish a common tariff to imports from outside the group.

The Treaty of Rome contains no mention of environmental standards, presumably because these were not deemed terribly important, as trade barriers or otherwise, at the time. Nevertheless, as member states fashioned their own environmental regulations in the early 1970s and subsequent years, the EC also adopted a variety of environmental regulations and directives.

Most environmental directives were arguably justified under Article 100 of the treaty, which permits action by the Community in response to an existing state measure that affects the functioning of the common market.¹¹ The European Commission and the European Parliament generally held Article 100 to be an adequate source of authority.¹² In areas bearing some relationship to economic activities, but less clearly linked to the common market, the EC relied upon Article 235.¹³

¹⁰ TREATY ESTABLISHING THE EUROPEAN ECONOMIC COMMUNITY, Mar. 25, 1957, 298 U.N.T.S. 11 [hereinafter EEC TREATY].

¹¹ Article 100 of the EEC Treaty provides: "The Council, acting by means of a unanimous vote on a proposal of the Commission, shall issue directives for the approximation of such legislative and administrative provisions of the Member States as have a direct influence on the establishment or functioning of the Common Market . . ." EEC TREATY art. 100.

¹² Dirk Vandermeersch, *The Single European Act and the Environmental Policy of the European Economic Community*, 12 EUR. L. REV. 407, 410 (1987). In 1980, the Court of Justice of the European Communities held that Article 100 could be a basis for environmental policy if linked to the need to preserve the common market. See Case 91/79, *Commission v. Italy*, 1980 E.C.R. 1099, 1106, cited in Vandermeersch, *supra*, at 410 n.13.

¹³ Article 235 of the EEC Treaty provides:

If action by the Community appears necessary to achieve, in the functioning of the Common Market, one of the aims of the Community in cases where this treaty has not provided for the requisite powers of action, the Council, acting by means of a unanimous vote on a proposal of the Commission and after the Assembly has been consulted, shall enact the appropriate provisions.

EEC TREATY art. 235. Vandermeersch explains that the wording in Article 100 compared to that in Article 235 supports the view that this link need not be as close. See Vandermeersch, *supra* note 12,

Because the Treaty of Rome provided no explicit guidance regarding the level of environmental protection desired, when tradeoffs had to be made between economic integration and the environment, integration tended to win. Critics charged that many EC environmental directives reflected the "lowest common denominator of national regulations."¹⁴

2. *The Single European Act of 1987*

The members amended the Treaty of Rome in 1987 by enacting the Single European Act ("S.E.A.").¹⁵ The S.E.A. serves several key functions: it further integrates the common market; it codifies environmental policy goals; and it allows more stringent environmental regulation in "greener" members. The latter two functions are of concern here.

Article 130r declares as environmental objectives the protection of the environment and human health, and prudent use of natural resources.¹⁶ This declaration fills the "environmental policy gap" of the original treaty. Furthermore, the new Article 100a sets "a high level of protection" as the goal when the Commission undertakes health, safety, environmental, and consumer protection.¹⁷ Finally, Article 130r dictates that "[e]nvironmental protection requirements shall be a component of the Community's other policies."¹⁸ This article has the practical effect of strengthening the position of the Commission's Environmental Directorate ("DG XI") in its battles with other Directorates.¹⁹

A crucial effect of the S.E.A. for vehicle emissions regulation was to replace the previous rule of consensus with qualified majority voting for Council decisions in certain areas.²⁰ This replacement allowed the majority to overrule Denmark regarding the Luxembourg Compromise.²¹

B. *World Automobile Market Structure*

Both the world and European automobile markets are important to this analysis because export patterns and the U.S. auto emission standards played an

at 411. However, the apparent incongruity between the EEC Treaty and Vandermeersch's statement is a mystery.

¹⁴ See DAVID VOGEL, *TRADING UP: CONSUMER AND ENVIRONMENTAL REGULATION IN A GLOBAL ECONOMY* 60 (1995).

¹⁵ 1987 O.J. (L 169) 1-28.

¹⁶ Article 130r, para. 1, provides: "Action by the Community relating to the environment shall have the following objectives: to preserve, protect and improve the quality of the environment; to contribute towards protecting human health and; to ensure a prudent and rational utilization of natural resources." EEC TREATY art. 130r, para. 1 (as amended 1987).

¹⁷ See *id.* art. 100a (as in effect in 1987).

¹⁸ See *id.* art. 130r, para. 2 (as amended 1987).

¹⁹ See VOGEL, *supra* note 14, at 60.

²⁰ See EEC TREATY art. 149 (as in effect in 1987).

²¹ See *infra* part III.B.4.

influential role in the European standards debate. The following sections discuss world and regional demand and supply, including the major producers and the most important markets.

1. *Demand*

Historically, the big automobile and light truck markets have been North America, Western Europe, and Japan. While the United States was the largest market in the first half of the century, demand in Western Europe and Japan rose dramatically in the 1960s and 1970s.²² Furthermore, U.S. consumers demanded more Japanese and European automobiles during the late 1970s and early 1980s due to the fuel inefficiency and the lower quality of U.S.-made vehicles. Thus, Western European and Japanese production blossomed to fulfill both domestic and foreign demand.

In the future, the greatest increase in vehicle consumption is likely to occur in the developing countries, especially in Asia. According to Alex Trotman, chairman and chief executive of Ford Motor Company, about eighty percent of the world's population lives outside the traditional markets (i.e., North America, Western Europe, and Japan), but only consumes about eight percent of current car and truck production.²³ Trotman forecasts Asian markets (outside Japan) to hold the most promise for future sales growth.²⁴ This forecast has important implications for future vehicle trade and emissions standards.

2. *Supply and Location of Production and Assembly Facilities*

In describing motor vehicle supply, one must distinguish carefully between statistics for motor vehicle production *by region* and *by manufacturer*. These statistics have diverged substantially in recent years due to construction of plants in foreign countries. Furthermore, the trend toward foreign investment has important implications for harmonization of environmental standards.

By region, prior to 1958, the United States produced more than half the motor vehicles in the world.²⁵ In 1967, Europe overtook the United States in number of vehicles produced and has remained the largest regional producer ever since.²⁶ In 1980, Japan overtook the United States in production,²⁷ in part due to the higher fuel efficiency of Japanese cars after the second oil price shock (1979-1980).

²² MOTOR VEHICLE MANUFACTURERS ASSOCIATION OF THE UNITED STATES, INC., WORLD MOTOR VEHICLE DATA 4 (1994) [hereinafter WORLD MOTOR VEHICLE DATA 1994].

²³ Kevin Done, *Car Producers Race for Global Presence*, FIN. TIMES, Oct. 4, 1994, (World Car Industry) at 1.

²⁴ *Id.*

²⁵ MOTOR VEHICLE MANUFACTURERS ASSOCIATION OF THE UNITED STATES, INC., MOTOR VEHICLE FACTS & FIGURES '80 18 (1980).

²⁶ *Id.*

²⁷ *Id.*

In 1991, Europe produced 38% of the world's 46.4 million vehicles, while Japan made 28%, North America made 25%, and other countries made the remaining 9%.²⁸ Table 1 shows world motor vehicle production statistics by region for selected years.

TABLE 1: MOTOR VEHICLE PRODUCTION BY REGION/NATION²⁹
(in millions of motor vehicles)

Year	World	North America	N. Am. % of world	U.S.	West. Eur.	Eur. % of world	West Germ.	Japan	Japan % of world
1974	26.0	8.7	34%	7.3	N/A	N/A	2.8	3.9	15%
1979	41.5	13.4	32%	11.5	16.4	39%	3.9	6.2	15%
1983	39.8	10.9	27%	9.2	15.9	40%	3.9	11.1	28%
1987	45.7	12.7	28%	10.9	17.6	39%	4.3	12.2	27%
1991	46.4	11.7	25%	8.8	17.6	38%	4.6	13.2	28%

In the late 1970s and 1980s, vehicle makers engaged in foreign joint ventures and spread manufacturing and assembly operations to foreign countries.³⁰ Volkswagen built its first car in the United States in 1978.³¹ U.S., Japanese, and European multinational corporations had production facilities in the United Kingdom, the Netherlands, Spain, and Belgium.³² Renault formed deep ties with American Motors Corporation.³³ The Japanese ventured into the United States, with Honda facilities in Ohio, Nissan in Tennessee, and Mazda in Michigan.³⁴

By 1985, nearly all U.S. firms owned substantial shares in Asian manufacturers.³⁵ For example, General Motors Corporation ("GM") started a joint venture with Toyota in California, and GM had a strong interest in Isuzu and Suzuki.³⁶ Ford Motor Company became a partial owner of Mazda.³⁷ Chrysler

²⁸ FACTS & FIGURES '92, *supra* note 5, at 11.

²⁹ American Automobile Manufacturers Association statistics (formerly MVMA, see notes in text).

³⁰ MOTOR VEHICLE MANUFACTURERS ASSOCIATION OF THE UNITED STATES, INC., MOTOR VEHICLE FACTS & FIGURES '85 2 (1985) [hereinafter FACTS & FIGURES '85].

³¹ *Id.*

³² See VOGEL, *supra* note 14, at 63.

³³ FACTS & FIGURES '85, *supra* note 31, at 2.

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.*

invested in Mitsubishi.³⁸

Therefore, *by manufacturer*, market shares are different than the regional production figures discussed above. North American companies dominated firms from other regions until the late 1980s, as shown in Table 2. Western European firms overtook North American firms recently to claim about one-third of the world market. Japanese firms also rose to about one-third of the market.

TABLE 2: MOTOR VEHICLE PRODUCTION BY GROUPS OF MANUFACTURERS³⁹
(in millions of motor vehicles)

Year	World	North American Firms	North Amer. % of world	Western Europe Firms	Europe % of world	Japan Firms	Japan % of world
1983	39.8	14.1	35%	10.4	26%	11.2	28%
1986	45.2	16.4	36%	11.1	24%	12.9	28%
1990	35.8	9.8	27%	11.1	31%	11.5	32%

C. European Vehicle Market Structure

The following sections discuss European demand and supply, including the major producers, the relative market sizes, and trading patterns.

1. Demand

As mentioned above, demand in Western Europe rose dramatically in the 1960s and 1970s.⁴⁰ Table 3 shows new passenger car registrations over the last two decades for the largest four markets: Germany,⁴¹ Italy, France, and the United Kingdom. The medium-sized markets are Spain, the Netherlands, Belgium, Switzerland, Austria, Portugal, Sweden, and Greece.⁴² The small markets are

³⁸ *Id.*

³⁹ *Id.* Years differ due to source availability. Data not available for earlier years.

⁴⁰ WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 4.

⁴¹ It is assumed that the source data provides only West German data prior to unification.

⁴² New registrations (in thousands) for 1991 for Western European countries are, in descending order: Germany (4,159); Italy (2,220); France (2,031); United Kingdom (1,599); Spain (887); the Netherlands (491); Belgium (462); Switzerland (310); Austria (304); Portugal (231); Sweden (188); Greece (167); Finland (92); Denmark (84); Ireland (69); Norway (53); and Luxembourg (39). Data for the 1970s and 1980s is not readily available. WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 98, 105, 108, 117, 132, 158, 164, 170, 186, 188, 192, 201, 209, 217, 239, 256.

Finland, Denmark, Ireland, Norway, and Luxembourg.⁴³

TABLE 3: NEW PASSENGER CAR REGISTRATIONS FOR SELECTED EUROPEAN NATIONS⁴⁴
(in millions)

Year	Total of 4	West Germ.	West Germ. % of the 4	Fr.	Fr. % of the 4	U.K.	U.K. % of the 4	Italy	Italy % of the 4
1974	5.7	1.7	30%	1.5	27%	1.2	21%	1.3	22%
1979	7.7	2.6	34%	2.0	26%	1.7	22%	1.4	18%
1983	7.7	2.4	31%	2.0	26%	1.8	23%	1.5	19%
1987	9.0	2.9	32%	2.1	24%	2.0	23%	1.9	21%
1991	10.0	4.2	42%	2.0	20%	1.6	16%	2.2	22%

For Western Europe

1991	13.5	4.2	31%	2.0	15%	1.6	12%	2.2	16%
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Germany has the most market power because its demand was thirty-one percent of the total European market in 1991.⁴⁵ Italy, France, and the United Kingdom together composed an additional forty-three percent.⁴⁶ Thus, we can expect vehicle manufacturers that export to the European market to be quite concerned about domestic vehicle emission standards in these four countries.

2. Supply

During the study period, 1970 to the mid-1990s, there were producers in several but not all of the EC member states, with the largest domestic firms in West Germany, France, Spain, and Italy. Table 4 shows annual passenger car production

⁴³ See *supra*, note 42.

⁴⁴ *Id.* at 114, 132, 158, 186, 256. Data for EC/EU as a whole is not readily available. For 1991, passenger car registrations in Western Europe were 13.5 million. (This includes more than just EU. *Id.* at 114).

⁴⁵ See *supra* Table 3.

⁴⁶ See *supra* Table 3.

for West Germany, France, Italy, and the United Kingdom for selected years.⁴⁷ West Germany and France together comprise over half of the total production in Western Europe.

TABLE 4: PASSENGER CAR PRODUCTION FOR SELECTED EUROPEAN NATIONS⁴⁸
(in millions)

Year	Total of 4	West Germ.	West Germ. % of the 4	Fr.	Fr. % of the 4	U.K.	U.K. % of the 4	Italy	Italy % of the 4
1974	8.7	2.8	33%	2.7	31%	1.5	18%	1.6	19%
1979	9.7	3.9	41%	3.2	33%	1.1	11%	1.5	15%
1983	9.3	3.9	42%	3.0	32%	1.0	11%	1.4	15%
1987	10.3	4.4	43%	3.1	30%	1.1	11%	1.7	17%
1991	10.7	4.7	43%	3.2	30%	1.2	12%	1.6	15%

For Western Europe

1991	12.7	4.7	37%	3.2	25%	1.2	10%	1.6	13%
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In 1991, national production of passenger cars was, in millions: West Germany (4.7), France (3.2), Spain (1.8), Italy (1.6), United Kingdom (1.2), Belgium (0.3), and the Netherlands (0.08).⁴⁹ The following paragraphs provide an overview of the manufacturers and their production quantities in 1991, a year for which useful data are available.⁵⁰

The German manufacturers producing more than 500,000 cars in 1991 were Volkswagen (almost 1.5 million units), Opel, Ford, Daimler-Benz, and BMW.⁵¹ Smaller firms were Audi (about 450,000 units) and Porsche (about 20,000),

⁴⁷ Because most Spanish firms are joint ventures or investments from firms in the other countries, Spain is not featured in Table 4.

⁴⁸ WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 112, 113, 120, 141, 173, 246. Data for EC/EU as a whole is not readily available. For 1991, passenger car production in Western Europe was 12.7 million. (This includes more than just EU. *Id.* at 113.)

⁴⁹ *Id.* at 109-11.

⁵⁰ Although it would be helpful to have export data from the crucial late 1970s and 1980s, the best data available are from the early 1990s.

⁵¹ *Id.* at 144.

followed by other very minor firms.⁵² Opel is a European brand name of GM.⁵³

France and Spain contain a number of large firms. French firms include Peugeot S.A. (with over 1.8 million units in 1991), Renault (1.4 million units), and Citroen (700,000 units).⁵⁴ Spanish production is dominated by foreign firms: Group Seat-VW-Audi, GM, Ford, Fasa-Renault, and Group PSA.⁵⁵ All produced between 248,000 and 528,000 units in 1991.⁵⁶

The Italian firms are dominated by Fiat, with nearly 1.2 million units in 1991.⁵⁷ In addition, there were several producers of less than 200,000 units in 1991: Alfa Romeo, Lancia, and Autobianchi.⁵⁸ Tiny specialty firms include Innocenti, Ferrari, Maserati, and Lamborghini.⁵⁹

The preeminent British car manufacturers are the Rover Group (Austin Rover and Land Rover), Ford, and Vauxhall (GM), all with between 250,000 and 400,000 units in 1991.⁶⁰ Smaller producers include Nissan, Peugeot/Talbot, Jaguar/Daimler, and miscellaneous others.⁶¹

Foreign producers make or assemble about 900,000 cars in Belgium—in other words, about twice as many cars as the domestic Belgian market consumes.⁶² The firms in Belgium include GM (about 370,000 cars in 1992), Ford Werke, Volkswagen, Renault, Volvo, and Apal.⁶³

In the Netherlands, only Volvo has passenger car facilities.⁶⁴ Denmark, a major voice in the auto emissions debate, has no production facilities.

3. Trade

One of the significant factors in the European vehicle emission standards debate was the extent to which European manufacturers exported to the United States because the United States had more stringent emissions limits.⁶⁵ Up through 1985, virtually the only countries to export to the United States were Japan, Canada,

⁵² *Id.* All lists of manufacturers in specified countries are shown in descending order of passenger vehicle production in 1991, unless otherwise stated.

⁵³ GM also uses the brand name Vauxhall in Germany. Kevin Done, *Espace—the Final Frontier*, FIN. TIMES, Apr. 12, 1995, at 14.

⁵⁴ WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 126.

⁵⁵ *Id.* at 213.

⁵⁶ *Id.*

⁵⁷ *Id.* at 175.

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *Id.* at 247. In 1986, the Rover Group and Ford were about the same size, but Vauxhall (GM) was smaller. *Id.*

⁶¹ *Id.*

⁶² *Id.* at 100.

⁶³ Shown in order of passenger vehicle production in 1992. *Id.*

⁶⁴ Production dropped from about 125,000 in 1987, to 85,000 in 1991. *Id.* at 191.

⁶⁵ See *infra* Appendix Table A-1, for U.S. passenger car emission limits over time.

and Western European countries.⁶⁶ In 1985, the exporters of passenger cars to the United States were, in descending order: Japan (2.5 million), Canada (1.1 million), West Germany (473,000), Sweden (143,000), France (40,000), the United Kingdom (24,000), Belgium (10,000), Italy (9,000), and others (24,000).⁶⁷

To illustrate European exports to the American market more fully, Table 5 shows passenger car exports to the United States for selected countries and selected years.⁶⁸ The table shows that West Germany's stake in exporting to the United States was much higher than the other countries'. Approximately half of German exports were to the United States.⁶⁹ Almost half of these exports were to California, which had the strictest regulations in the world.⁷⁰ These firms also exported luxury vehicles to Japan.

TABLE 5: EXPORTS OF PASSENGER CARS TO THE UNITED STATES FOR SELECTED EUROPEAN NATIONS AND SELECTED YEARS⁷¹
(in thousands)

Year	Total of 4	West Germ.	West Germ. % of the 4	Fr.	Fr. % of the 4	U.K.	U.K. % of the 4	Italy	Italy % of the 4
1974	859	655	76%	23	3%	73	8%	108	13%
1979	486	332	68%	34	7%	46	9%	74	15%
1983	542	277	51%	242	45%	17	3%	6	1%
1987	483	377	78%	48	10%	50	10%	8	2%
1991	180	162	90%	1	1%	14	8%	3	2%

Total exports to all countries

1991	5,382	1,931	36%	2,208	41%	605	11%	638	12%
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Daimler-Benz and BMW could achieve economies of scale by installing

⁶⁶ FACTS & FIGURES '92, *supra* note 5, at 45.

⁶⁷ *Id.*

⁶⁸ The drop in 1991 is likely due to the shift of production facilities for export to other countries outside Europe.

⁶⁹ See VOGEL, *supra* note 14, at 95.

⁷⁰ *Id.*

⁷¹ WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 128, 152, 179, 249, 250.

the same pollution control equipment on all units of a given class. Thus, if standards in the EC conformed to those of the chief export markets, the United States and Japan, these large firms could theoretically increase profits.⁷² Thus, German producers had more of an economic incentive to keep up with the strict U.S. standards than did the other EC countries.

D. *Technological Considerations*

The major variables that determine pollutant emissions from vehicles are the quality of the fuel, engine characteristics, and post-combustion treatment.⁷³ The subject of this article is automobile and light-truck emissions. These vehicles generally have Otto-type engines, which burn gasoline, although a minority have diesel engines.⁷⁴ Motor vehicle emissions consist of crankcase emissions, evaporative emissions (from the fuel in the tank), and exhaust emissions.⁷⁵ This article concerns exhaust emissions.⁷⁶ Factors which determine the amount of exhaust emissions include: fuel composition, air-fuel ratio, temperature, engine geometry, and others.⁷⁷ The amounts of carbon monoxide ("CO") and unburned hydrocarbons ("HC") are particularly dependent upon the ratio of air and fuel in the cylinder—if there is an excess of fuel, more carbon will be insufficiently oxidized and more CO and HCs created.⁷⁸ Production of nitrogen oxides ("NO_x") also depends greatly on air-fuel ratio along with engine geometry.⁷⁹

Engine modifications to reduce pollution aim to control tightly the air-fuel ratio and to refine engine geometry.⁸⁰ Such measures include electronic fuel injection, quick-heating intake manifolds, ignition without spark plugs, and cylinder head modifications.⁸¹ Alternative fuel mixtures can be used to reduce CO.⁸²

Possible methods to reduce oxides of nitrogen are exhaust gas recirculation, catalytic reduction, and engine modifications.⁸³ The most popular method, catalytic

⁷² See VOGEL, *supra* note 14, at 250.

⁷³ 2 ENCYCLOPEDIA OF ENVIRONMENTAL CONTROL TECHNOLOGY (AIR POLLUTION CONTROL) 765 (Paul N. Cheremisinoff ed., 1989) [hereinafter ENVIRONMENTAL CONTROL TECHNOLOGY].

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ Although not the focus of this article, significant efforts have been made to reduce other emissions related to vehicle use. These efforts include controlling emissions from gasoline dispensing facilities. See, e.g., Bay Area Air Quality Management District (California): Regulation 8, Organic Compounds, Rule 7, Gasoline Dispensing Facilities, June 1, 1994. For example, in smoggy areas, vapor recovery systems reduce the escape of fumes during filling of gasoline station tanks from tanker trucks. *Id.* § 8-7-301.1. Similarly, vapor recovery systems at the pump reduce emissions while transferring fuel from the station tanks to motor vehicles. *Id.* § 8-7-302.1.

⁷⁷ ENVIRONMENTAL CONTROL TECHNOLOGY, *supra* note 73, at 768-73.

⁷⁸ C.S. RAO, ENVIRONMENTAL POLLUTION CONTROL ENGINEERING 270 (1991).

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Id.* at 271.

⁸² *Id.*

⁸³ *Id.* at 273.

reduction, employs a catalyst system in which NO_x is reduced to molecular nitrogen while HCs and CO are oxidized to carbon dioxide and water simultaneously.⁸⁴ Then air is injected, and the mixture passed over an oxidative catalyst where the remaining HCs and CO are oxidized.⁸⁵

In the early 1970s, firms were just creating the catalytic converter technology, which was the most promising technology to reduce vastly emissions from Otto engines. In addition, firms were able to achieve significant reductions through engine modifications and other changes, with varying degrees of success. These technologies matured in the 1980s and regulations forced catalytic converters to become standard equipment in the United States and the EC.⁸⁶ Cars with catalytic converters require unleaded gasoline, because lead gasoline poisons the catalyst.⁸⁷

E. *Political Situation*

Politics, especially the political power of environmentalists, naturally played a crucial role in the European auto emission control story. There are two dimensions to this story: relative power among states and domestic politics within states.

1. *Relative State Power and Other Actors at the Europe-Wide Level*

Germany, France, the United Kingdom, and Italy are the most politically powerful states in the EU. Germany and France have been the chief proponents of the Common Market as an economic way to tie countries together in order to prevent future wars in Continental Europe. Despite British reluctance, circumstances essentially forced the United Kingdom to join in order to avoid losing influence over European matters.

Germany sees its loss of some sovereignty and its net payments to the common EU funds as ways to gain military security and to cement its powerful economic position within Europe. At times, the United Kingdom has been skeptical about further integration. The smaller countries that are part of the EU have mixed motives, including freer access to markets and political security.

Besides state actors, business and non-governmental organizations ("NGOs") also operate at the Union level. Prior to 1990, two organizations represented the car industry in Brussels: the Liaison Committee of the Automobile Industry of the Countries of the European Communities ("CLCA") and the

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ See VOGEL, *supra* note 14, at 69-70.

⁸⁷ See *id.* at 66.

Committee of Common Market Automobile Constructors ("CCMC").⁸⁸ For example, in 1984, the CCMC lobbied the Commission against efforts by West Germany to introduce unilateral emission standards.⁸⁹

2. *Internal Politics*

Turning to domestic politics, the more "liberal" mainstream parties in many countries, such as the Social Democratic parties, often have strong environmental planks in their platforms.⁹⁰ The Green Party has been the vanguard of environmentalism and maintained a philosophy of peace,⁹¹ although it has never been more than a fringe party in any country.⁹² It reached its height of influence in the mid-1980s.

West Germany, the Netherlands, and Denmark had the strongest environmental movements during the 1970s and 1980s.⁹³ The Green Party seemed most vocal in Germany.⁹⁴ In contrast, environmentalists did not have nearly the same level of political power in France, Italy, or the United Kingdom during this period.⁹⁵ Partly because they were not as affected by acid rain and the pollution of central rivers such as the Rhine, and perhaps because they were poorer, Greece, Spain, and Portugal had relatively undeveloped environmental movements.⁹⁶

Regarding the domestic political strength of the automobile industries in various countries, countries without such firms and without production facilities, such as Denmark, are probably not influenced by the industry as much as countries with firms and/or production facilities. Assessing the political strengths of the automobile manufacturers in the producing countries is beyond the scope of this paper, but the industries in West Germany, France, the United Kingdom, and Italy have played a substantial role in the emissions control debate.⁹⁷

The remaining important interest group is labor. In the beginning of the

⁸⁸ Andrew McLaughlin & Grant Jordan, *The Rationality of Lobbying in Europe: Why Are Euro-Groups So Numerous and So Weak? Some Evidence from the Car Industry*, in LOBBYING IN THE EUROPEAN COMMUNITY 122, 125 (Sonia Mazey & Jeremy Richardson eds., 1993).

⁸⁹ See *id.* at 126.

⁹⁰ See, e.g., FRANK L. WILSON, *EUROPEAN POLITICS TODAY: THE DEMOCRATIC EXPERIENCE* 222 (1994).

⁹¹ "The Greens are a political party that emerged out of the environmental, feminist, peace, and antinuclear energy movements of the 1970's." See *id.* at 220-22.

⁹² For example, in Germany, the Greens commanded 5.6% of the vote in the 1983 Bundestag elections and 8.3% in 1987. But in the 1990 elections, the Greens won only about 4% of the vote, insufficient to win any seats in the Bundestag. (Five percent is required.) See *id.* at 206, 212-13, 221-22. By comparison, in Italy, the Greens won between two and three percent of the votes and secured a small number of members in the Chamber of Deputies. See *id.* at 308.

⁹³ See David Vogel, *Trading Up: Consumer and Environmental Regulation in a Global Economy* 94 (1995) (unpublished manuscript, on file with WM & MARY ENVTL. L. & POL'Y REV.).

⁹⁴ *Id.* at 101.

⁹⁵ *Id.* at 94-95.

⁹⁶ *Id.* at 94.

⁹⁷ See *supra* part II.E.1.

modern environmental movement, around 1970, European labor unions sided with manufacturers in opposing environmentalists.⁹⁸ To take an American example, the United Automobile Workers opposed fuel efficiency standards due to feared loss of jobs.⁹⁹ Later, as environmental concerns became mainstream political issues, organized labor has incorporated certain pro-environmental positions.¹⁰⁰ Due to the difficulty of obtaining source data, this article does not characterize the positions of the individual labor unions in the European emission standards debate.

III. ANALYSIS OF EC EFFORTS TO HARMONIZE AUTOMOBILE EMISSIONS STANDARDS

A. Definition of Harmonization; Alternative Approaches to Managing the Conflict Between Free Trade and Internal Environmental Policies

There are at least three approaches for handling the conflict between free trade agreements and domestic environmental policies: domestic treatment, mutual recognition and harmonization.¹⁰¹ At one end of the spectrum is "domestic treatment," under which governments may apply their own internal standards to imports. Under this approach, countries may restrict or ban imports that do not meet domestic standards.¹⁰² For example, as mentioned below, Germany threatened to stop imports of French and Italian vehicles that did not meet Germany's emission standards.¹⁰³ At the other end of the spectrum is "mutual recognition," where governments are prohibited from applying their own standards to imports; rather, they must accept products that meet the environmental standards of the exporting country. In the middle is "harmonization," where governments agree to follow a common environmental standard.

Upward harmonization occurs when governments raise standards toward the most stringent environmental standard among them.¹⁰⁴ Upward harmonization

⁹⁸ See, e.g., BORGE LORENTZEN ET AL., *Industrial Relations and the Environment: Denmark in 1* EUROPEAN FOUNDATION FOR THE IMPROVEMENT OF LIVING AND WORKING CONDITIONS, *INDUSTRIAL RELATIONS AND THE ENVIRONMENT: TEN COUNTRIES UNDER THE MICROSCOPE* 87, 93 (Andrea Oates & Denis Gregory eds., 1993).

⁹⁹ ERIC J. TODER ET AL., *TRADE POLICY AND THE U.S. AUTOMOBILE INDUSTRY* 1 (1978).

¹⁰⁰ LORENTZEN ET AL., *supra* note 98, at 93.

¹⁰¹ These three may coexist, as they do in the EU. For a discussion of two approaches (bans and upward harmonization), see Richard H. Steinberg, *State Power and Trade-Environment Negotiations: Lessons from the EU, NAFTA, and GATT/WTO* 6 (Berkeley Roundtable on the International Economy ("BRIE") Working Paper No. 75, Feb. 1995) (on file with author).

¹⁰² This approach is the default when there is no international trading regime.

¹⁰³ See *infra* text accompanying notes 142-47.

¹⁰⁴ Professor Vogel calls the "ratcheting upwards of regulatory standards in competing political jurisdictions," the "California effect." See VOGEL, *supra* note 14, at 5-8, 94. He refers to the upward pressure that California has been able to exert on U.S. auto emissions standards. *Id.* at 6. The 1967 Clean Air Act Amendments allowed California to have stricter vehicle emission standards than the rest of the United States, due to the serious pollution in the Los Angeles air basin. California maintained

does not necessarily mean adopting the standards of the most stringent country. It may mean adopting a standard which raises the average among nations, but not all the way to the top.

Downward harmonization occurs when governments drop toward the least stringent standard among them.¹⁰⁵ Again, the result is a lower average, not necessarily equal to the laxest standard among the nations.

B. *The Automobile Emissions Case in the European Community*

1. *Introduction*

As in the United States, serious regulation of automobile emissions in Western Europe began around 1970. In both the United States and Western Europe, air pollution laws were a response to the nascent environmental movement, which enjoyed enough political support to achieve its first legislative successes.

Also like the United States, the EC reduced emission standards for *new* vehicles rather dramatically over the next twenty years.¹⁰⁶ Appendix Figure A-1 shows a rough time trend of EC standards. While Appendix Figure A-1 appears to suggest great progress in reducing pollution from vehicles, it is only part of the story. First, these emission standards only apply to *new* vehicles. While some developed nations have imposed various inspection and maintenance requirements on older vehicles, they have not required retrofitting. Therefore, only as the vehicle fleet turns over and old cars are taken out of service completely do the clean, new cars substantially lower the average of all vehicle emissions. Second, two trends result in *increases* in *total* emissions (as compared with emissions *per vehicle*): (1) the growth in the total number of vehicles, and (2) the increase in miles driven per vehicle. These trends counteract the smaller emissions per mile of new vehicles.

Although beyond the scope of this paper, the first controversy regarding automobile emissions concerned lead added to gasoline, and it deserves brief

higher standards, and the auto manufacturers reluctantly met them, partly because California is roughly 10% of the domestic market. FACTS & FIGURES '92, *supra* note 5, at 21 (stating new passenger car registrations in California in 1990 were 1,003,613 of a U.S. total of 9,103,204, or 11%). In the 1990 Clean Air Act Amendments, Congress raised the standards for the United States, while allowing *other states* to adopt the same higher standards as California. *See id.* at 259. Subsequently, twelve northeastern states banded together, initially proposing to adopt California's standards. *Id.*

¹⁰⁵ Murphy describes a dramatic example of movement toward the "least common denominator" in his discussion of ship flags-of-convenience. *See* Dale D. Murphy, Open Economies' Competition for Comparative Regulatory Advantage 21-28 (Nov. 1993) (on file with author).

Professor Vogel calls this the "Delaware effect," referring to state-by-state competition to achieve the most management-friendly corporation laws. Delaware is the acknowledged winner of this "race to the bottom." *See* VOGEL, *supra* note 14, at 5-6.

¹⁰⁶ Appendix Table A-1 shows U.S. emission standards for automobiles for the last 20 years (converted from grams per mile to grams per kilometer). Unfortunately, due to the manner of expression of European standards, it was not possible within the time available for this research to make a complete year-by-year comparison.

mention as an introduction to controversies about other pollutants. By the late 1960s, scientific evidence showed that high lead levels in the bloodstream were associated with adverse neurological effects, especially in children. In the United States, studies showed the sources of lead to include vehicular emissions and their fallout (on dirt), lead-paint chips, and others. Inner-city children (especially with a common childhood syndrome of eating things such as paint and dirt) were highly exposed to these sources. The U.S. policy response was to phase out lead in both paint and gasoline.

In Europe in 1972, West Germany instituted stringent lead restrictions for gasoline, 0.4 grams per liter ("g/l") by 1972 and 0.15 g/l by 1976.¹⁰⁷ Britain imposed looser limits of 0.84 g/l.¹⁰⁸ No other countries regulated lead gasoline at this time.¹⁰⁹ Because engine modifications were needed to run on reduced-lead and unleaded gasoline, these fuel changes had implications for the vehicle industry and trade.

These domestic laws were challenged as a barrier to free trade, of not only gasoline, but also of vehicles that required lead fuel. Therefore, in 1973, the Commission suggested to the Council of Ministers a uniform standard for lead content in gasoline. Germany pushed for a strict standard, and Britain and other nations also moved toward greater stringency, though not as far as Germany.¹¹⁰ Finally a Directive was adopted, which set both minimum (0.15 g/l) and maximum (0.4 g/l) standards.¹¹¹ This accommodated Germany's strict 0.15 g/l standards. Similar dynamics will be seen in the discussion of other pollutants below.

2. Early Actions: Adoption of the UN-ECE Standard in the 1970s

In the 1960s, various European countries established individual vehicle emission standards. In addition, the United Nations Economic Commission on Europe ("UN-ECE") drew up rather minimal standards.¹¹² The EC, however, had no standards of its own.

The EC's lack of standards fits within its first, rather relaxed phase of environmental protection.¹¹³ During this initial period, from 1964 to 1973, the EC

¹⁰⁷ See VOGEL, *supra* note 14, at 64-65.

¹⁰⁸ *Id.*

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² The membership of the UN-ECE included the EC members, the European Free Trade Association ("EFTA") countries and, despite its name, the United States and Canada.

¹¹³ See Daniel P. McGrory, *Air Pollution Legislation in the United States and the Community*, 15 EUR. L. REV. 298, 304 (1990). McGrory designates the first phase of EC environmental protection as the period 1964-1973, when environmental protection was not linked to the establishment and operation of the Common Market. *Id.* The second phase followed the development of a true environmental program in 1972. *Id.* By comparison, the United States passed its first comprehensive regulatory scheme for air pollution in 1967, and its first strong program in the 1970 Clean Air Act. See *id.* at 299.

lacked any environmental mandate in its "constitution,"¹¹⁴ and it passed only minimal environmental legislation geared toward reducing barriers to trade.¹¹⁵ Policymakers realized that consistent pollution laws would eliminate "unfair" competition between members with minimal or no standards and those members with such laws.¹¹⁶

The first EC strategy for harmonization was the adoption of a "borrowed" standard which was nearly a least common denominator. In the face of internal disagreement between the "greener" countries and the "less-green" countries, in 1970 the EC adopted the UN-ECE standard for two pollutants: CO and unburned HCs.¹¹⁷ This action satisfied the political pressure from the nascent environmental movement for adopting some Community-wide standards.

The adoption of the relatively low common denominator illustrates several points. First, when the member states' primary goal was liberalizing trade, free trade trumped environmental concerns. The EC's chief priority in considering emission standards was restraining "greener" states from unilaterally imposing stricter standards that would be a barrier to trade. (In contrast, as the EC's list of goals expanded to include environmental concerns, for example in the 1987 S.E.A., free trade no longer necessarily superseded these concerns.)

Second, domestic politics within each member state played a crucial role in the adoption of the EC's standard. Of course, domestic politics generally determine a state's objectives. But the point worth making is that the adoption of the UN-ECE standards coincided with a nascent and immature environmental movement. The political power of the mainstream environmentalists (and the fringe Green Party) had not yet been firmly established. Serious environmental regulation was a relatively new governmental activity, not widely understood or accepted. With a poor power base, the environmentalists failed to achieve stricter standards. Thus, with free trade as the top goal and a milieu of unmobilized political support, the result was a "least common denominator."

3. The Beginnings of EC Environmental Programmes and Tightening of the Vehicle Emission Standards

This section briefly summarizes the standards adopted in the 1970s. It then discusses the politics behind the development of these standards.

Responding to growing political pressure from the environmental movement, in 1972 the Commission proposed to create a common EC environmental policy.¹¹⁸ The members agreed, and the policy was promulgated in

¹¹⁴ See *infra* part II.A. (discussing the EEC Treaty).

¹¹⁵ McGrory, *supra* note 113, at 304.

¹¹⁶ *Id.*

¹¹⁷ Council Directive 70/220/EEC of June 15, 1974 Approximation of the Laws of the Member States Relating to Measures to Be Taken Against Air Pollution by Gases from Positive-Ignition Engines of Motor Vehicles, 1970 O.J. (L 76).

¹¹⁸ See Vandermeersch, *supra* note 12, at 409.

1973.¹¹⁹ In 1974, following the initiation of the first true environmental program, the EC reduced the limits for CO and HCs.¹²⁰ In 1977, the EC established restrictions for oxides of nitrogen.¹²¹ Then in 1978, the Commission reduced the limits for CO, HCs, and NO_x.¹²²

Turning to the politics behind these decisions, during the late 1970s and the 1980s, the countries with strong environmental movements—West Germany, the Netherlands, and Denmark—supported the stricter standards.¹²³ Those with weak environmental movements—France, Italy, and the United Kingdom—opposed them.¹²⁴

Second, the manufacturers of large, expensive cars, namely Daimler-Benz, BMW, and Audi, in Germany, and the small British and French manufacturers, favored the move to catalytic converters.¹²⁵ These manufacturers exported luxury cars to the United States and Japan and had already installed catalytic converters for those markets. Adoption of these standards for the EC would reduce these firms' costs by dropping the separate production lines for dirtier cars.¹²⁶ In other words, using Murphy's terminology, these firms had high multinational asset specificity; therefore, they supported uniform standards in their target markets.¹²⁷

In contrast, countries producing small cars, namely France and Italy (with Renault, Peugeot, and Fiat), opposed the standards primarily because of the additional cost of catalytic conversion. Because buyers of smaller cars have greater elasticity of demand (i.e., are more sensitive to price increases), these producers worried that small cars sales would drop.

Britain, with no major domestic firms but foreign-owned plants which produced medium-sized cars, sided with the small car producers.¹²⁸ The British favored a "lean-burn" engine instead of the end-of-pipe catalytic converter.¹²⁹ This

¹¹⁹ First Programme of Action on the Environment, 1973 O.J. (C 112).

¹²⁰ Council Directive 74/290/EEC of 28 May 1974 Adapting to Technical Progress Council Directive No. 70/220/EEC on the Approximation of the Laws of the Member States Relating to Measures to Be Taken Against Air Pollution by Gases from Positive-Ignition Engines of Motor Vehicles, 1974 O.J. (L 159) 61. The limits are expressed in terms of mass of pollutant per test in grams, according to vehicle reference weight. Council Directive 74/290/EEC, Annex, 1974 O.J. (L 159) 61, 63. As such, these standards are difficult to compare to standards expressed in typical U.S. terms, such as grams per kilometer ("g/km").

¹²¹ Commission Directive 77/102/EEC, 1976 O.J. (L 32) 32.

¹²² Commission Directive 78/665/EEC, 1978 O.J. (L 223) 48. Again, these limits are expressed in terms of mass of pollutant per test in grams, according to vehicle reference weight. *Id.* at 51. *See supra* note 120.

¹²³ *See* VOGEL, *supra* note 14, at 67.

¹²⁴ *See id.*

¹²⁵ *See id.* at 68.

¹²⁶ *See id.* at 68-69. Professor Vogel notes two other factors contributing to this support: the availability of unleaded gas, and German tax incentives for purchasing lower-emissions cars. *Id.* at 69.

¹²⁷ *See* Murphy, *supra* note 105, at 7-8.

¹²⁸ *See* VOGEL, *supra* note 14, at 69.

¹²⁹ *See id.*

stance may be attributed to Ford U.K.'s inexperience with catalytic converter technology and its investment in "lean-burn" research.¹³⁰

Due to these divergent views, the approach taken by Directive 70/220/EEC (and subsequent directives until at least 83/351/EEC in 1983) was "permissive" or "optional," rather than mandatory.¹³¹ The EC used a compromise strategy which did not require the "dirtier" countries to come all the way up to West Germany's standards. This strategy was "optional harmonization,"¹³² meaning that members were not obligated to adopt EC standards as their own national standards, but they could not refuse national or European Economic Community ("EEC") "type approval" of a vehicle if it met the EC directive.¹³³

Thus, the directives formed a "ceiling," or maximum stringency, not a "floor," or minimum stringency. Despite the weakness of the floor concept, there was some environmental improvement, since producers who wished to export within the EC had to meet the EC standard.

This *ceiling* approach was a compromise that forced the "greener" countries, such as West Germany, to accept dirtier cars from France and Italy as long as they met the EC standard. At the same time, it forced French and Italian firms to come up to the EC standard. The advantage of this strategy was that "greener" countries could maintain their own higher standards if they wanted, thereby satisfying their own domestic environmental constituencies.

4. *Movement Toward U.S. Standards in the Early 1980s*

In the early 1980s, technical advances made lower emissions possible, and the EC implemented stricter limits.¹³⁴ In 1983, the EC reduced the limits for CO, HCs, and NO_x.¹³⁵ However, in order to preserve the common market, the EC continued the "optional harmonization" policy, preventing members from banning vehicles not meeting even stricter domestic standards.¹³⁶

¹³⁰ See *id.*

¹³¹ This approach contrasts with the 1970 U.S. Clean Air Act Amendments which established *ambitious* goals and *uniform* national standards (with the exception of California). In other words, in the United States, all states (except California) had to meet the same target; no variation was allowed. Furthermore, California did not have to accept cars meeting the federal standards. California could keep out cars which did not meet its higher standards. In contrast, Germany could not keep out French and Italian cars that fell below German standards but met EC standards.

¹³² AIR POLLUTION CONTROL IN THE EUROPEAN COMMUNITY: IMPLEMENTATION OF THE EC DIRECTIVES IN THE TWELVE MEMBER STATES 161 (Graham Bennett ed., 1991) [hereinafter AIR POLLUTION CONTROL IN THE EC].

¹³³ See, e.g., Council Directive 74/290/EEC, art. 2, 1974 O.J. (L 159) 61, 62. See also AIR POLLUTION CONTROL IN THE EC, *supra* note 132, at 161 (explaining that "type approval" shows that a vehicle type conforms with certain standards of design and construction).

¹³⁴ Most of the Directives contain language assigning the reason for the reduced limits to technical advances.

¹³⁵ Council Directive 83/351/EEC, 1983 O.J. (L 197) 1.

¹³⁶ See VOGEL, *supra* note 14, at 57.

Then in 1984, the Commission broke with the past by proposing further reductions in these three pollutants by seventy percent and the elimination of lead from gasoline.¹³⁷ These requirements went hand in hand because the emission reductions were based on catalytic converters which required unleaded gas. This proposal matched the U.S. standards of 1983 (commonly referred to as "US '83")¹³⁸ but was not successful at the Council level.¹³⁹

5. *The Luxembourg Compromise: 1985-1987*

Faced with continuing disagreement between the "northern" and "southern" factions regarding catalytic conversion, as described above, the Commission then fashioned a compromise that proposed stricter standards for large cars and somewhat stricter standards for small cars. This compromise satisfied the German firms that exported luxury cars to the United States in that luxury cars from elsewhere in Europe would face the same regulation. The compromise satisfied southern European manufacturers of small cars which felt that the relative price increase of catalytic converters, if required for small cars, would significantly reduce demand. Finally, it satisfied those supporting stricter standards in the sense that some progress was made.

The key economic factor of this agreement was the relative price increase. All members supported the American standards for big European-made cars because many large cars already had fuel injection and the increased cost for the converter alone was relatively small.¹⁴⁰ The dispute centered on small and medium-sized cars, which would bear a large absolute increase due to fuel injection and a larger proportional increase in terms of total cost.¹⁴¹

The turning point in the debate was Germany's threat to unilaterally impose its own emission standards.¹⁴² This would have prevented entry of French and Italian cars into Germany. Accompanying the threat of market closure, the political threat (perhaps implied) was that Germany would stall further integration.

At this point in the case history, a digression regarding state power is necessary. As discussed in Part II, West Germany in the 1980s (and unified Germany today) was the most economically and politically powerful member of the

¹³⁷ See *id.* at 66.

¹³⁸ Several members of EFTA had already adopted standards patterned after the ones adopted by the United States. *Id.*

¹³⁹ In addition, because meeting the U.S. standards would require three-way catalysts and electronic fuel injection, the European debate turned to the acceptability of these technical requirements. See VOGEL, *supra* note 14, at 67.

¹⁴⁰ See *id.* at 68.

¹⁴¹ *Id.*

¹⁴² *Id.* at 70.

EC (and EU today). Steinberg demonstrates that powerful countries¹⁴³ desiring upward harmonization attempt to coerce and/or compensate resistant countries into agreeing to upward harmonization.¹⁴⁴ Powerful states may coerce such countries by threatening to close their domestic markets to imports¹⁴⁵ or compensate them by opening up their own domestic markets to imports from the resistant states.¹⁴⁶ Thus, depending upon (1) the power of the demandeur rich-green countries, (2) the extent of their interest in such demands, and (3) the existence of means by which demandeur states may coerce or compensate through the mechanisms of a trade regime, powerful states may achieve upward harmonization.

Thus, Germany used its power to coerce and compensate the southern European countries into upward movement. The threat to close its borders to French and Italian cars was one example of such coercion.

Germany's threat to impose unilateral standards, however, was not carried out. German manufacturers, fearing initiation of a trade-war, urged their government to retreat.¹⁴⁷ Ultimately, Germany passed legislation requiring catalytic converters but delayed implementation until 1988 for autos with engines larger than 2.0 liters and until 1989 for all other cars.

The Council compromised by allowing medium-sized cars to use "lean-burn" engines or comparable measures and by adopting laxer standards for smaller vehicles.¹⁴⁸ The net result for Germany was laxer standards for autos made outside Germany (since under EC rules, Germany could not block their entry) but stricter standards for its own producers.

The final "Luxembourg Compromise" adopted different standards for large capacity (greater than 2.0 liters), medium capacity (1.4 to 2.0 liters), and small (less than 1.4 liters) cars.¹⁴⁹ Again, the Directive set a ceiling, not a floor ("optional harmonization"). The result was less stringent than the U.S. '83 standards, although the EC claimed it was just as stringent.¹⁵⁰

In essence, the small car manufacturers had evaded the strict standards in the short-term, although they faced a provision requiring the EC to adopt stricter standards for small and medium-sized cars in 1987, to be effective in 1992 and 1993. Despite this apparent victory, the compromise was scuttled when Denmark, an advocate of stricter standards, vetoed the compromise.¹⁵¹ From 1985 to 1987, no rule was passed.

¹⁴³ Steinberg defines "power" in economic terms as the "magnitude of an offer of compensation in the form of improved market access and the magnitude of a threat to close a market." See Steinberg, *supra* note 101, at 13.

¹⁴⁴ See *id.*

¹⁴⁵ *Id.* at 2.

¹⁴⁶ These market openings are quasi-Coasian solutions. See *id.* at 2, 10-12. Here the victim pays.

¹⁴⁷ See VOGEL, *supra* note 14, at 70.

¹⁴⁸ *Id.*

¹⁴⁹ Council Directive 88/76/EEC, Annex, 1988 O.J. (L 36) 1, 4-5.

¹⁵⁰ See VOGEL, *supra* note 14, at 115.

¹⁵¹ See *id.* at 72.

After the 1987 S.E.A., the "Luxembourg Compromise" finally became law.¹⁵² With the S.E.A., just a qualified majority, rather than a consensus, was required for Council approval. Thus, Denmark's veto was overridden. After approval by the European Parliament (which by then had approval power), the compromise became law in November 1987.¹⁵³

6. *The Late 1980s—Upward Harmonization*

By the late 1980s, several factors combined to promote upward harmonization. Stronger environmental movements emerged in several countries, including Britain.¹⁵⁴ The momentum toward greater economic integration in 1992 spurred more pressure for true harmonization. Finally, both Renault and Fiat were building cars with three-way catalysts for sale in the Netherlands.¹⁵⁵

In February 1988, the Commission proposed a compromise that would equate the standards for small and medium-sized cars, but at less stringent standards for both.¹⁵⁶ The Council tentatively approved this compromise in June 1988, with Denmark, the Netherlands, and Greece in opposition.¹⁵⁷

Vigorous environmentalist lobbying in the European Parliament, just prior to an election, spurred a more stringent proposal.¹⁵⁸ In addition, the Netherlands unilaterally decided to require catalytic converters for all vehicles sold within its borders.¹⁵⁹ The result was a second and much stricter version of the Small Car Directive.¹⁶⁰ In July 1989, the members approved this directive by a qualified majority, opposed by Denmark and Greece.¹⁶¹ The limits were stricter than even the 1987 large car limits.

7. *The Early 1990s—Current Trends in European Regulation*

In 1990, Denmark enacted emission standards stricter than those of the Community, based on the S.E.A.'s allowance for environmental laws stricter than Community standards if necessary to improve environmental quality.¹⁶² This enactment raised the specter of internal barriers to trade. The Commission decided not to challenge Denmark in the European Court of Justice because the Council was

¹⁵² 1987 O.J. (L 169) 1-28.

¹⁵³ See VOGEL, *supra* note 14, at 73.

¹⁵⁴ *Id.*

¹⁵⁵ As explained below, the Netherlands required such converters, although in violation of EC law. Member countries did not choose to take the Netherlands to the European Court of Justice over this violation.

¹⁵⁶ See VOGEL, *supra* note 14, at 74.

¹⁵⁷ See *id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.* at 75.

¹⁶⁰ Council Directive 89/458/EEC, 1989 O.J. (L 226) 1.

¹⁶¹ See VOGEL, *supra* note 14, at 76.

¹⁶² S.E.A. Article 100A, para. 4.

about to raise emissions standards comparably anyway.¹⁶³ Further directives in 1991 and 1993 tightened standards even more.¹⁶⁴

8. *Results*

As a result, according to Jean-Pierre Reynier, Secretary General of the European Automobile Manufacturers Association, a new European car today emits 93% less CO and 85% less hydrocarbons-plus-NO_x than an equivalent vehicle in 1970.¹⁶⁵ As shown in Appendix Figure A-1, the EC reduced CO and HCs by 50% by 1975, and by about 90% by July 1992, based on the dates of enforcement of EC directives. The EC began to regulate NO_x in 1977, resulting in emission reductions of about 75% by July 1992.¹⁶⁶ Of course, these figures concern only the vehicle emissions per mile, whereas growth in the number of vehicles and the number of miles traveled per vehicle continues to offset reduced emissions per mile.¹⁶⁷

On the other hand, lead has been eliminated from most Western European gasoline. This elimination is a significant air quality improvement.

Because West Germany and the Netherlands never carried out their mid-1980s threats to erect barriers to non-conforming vehicles, the EC managed to stave off such barriers through the 1980s. On the other hand, in the 1990s, higher national standards are being tolerated (e.g., Denmark). Thus, the final result in Europe (under S.E.A. Article 100A) allows members to maintain stricter national environmental standards despite possible barriers to trade.

C. *Summary of Approaches the EC Took to Achieve Upward Harmonization*

1. *Upward Harmonization by Compromise Through Product Differentiation*

A method for partial, but upward, harmonization in Europe was attained through differentiation of emission standards by product class. In the 1985 Luxembourg Compromise, different standards were adopted for different size cars.

¹⁶³ See VOGEL, *supra* note 14, at 77.

¹⁶⁴ See *id.*

¹⁶⁵ *Drive for the Clean, Lean Car*, *supra* note 1. Although the source indicates a 93% reduction in CO₂, this must be a typographical error. Carbon monoxide, not carbon dioxide, has been reduced.

¹⁶⁶ *Id.*

¹⁶⁷ According to one source, this has left total emissions from automobiles "virtually unchanged." See *id.* (stating that emission reductions achieved through increasing fuel efficiency, removing lead from gasoline, and using catalytic converters, have been counteracted by increasing numbers of vehicles and longer average journeys, leaving pollution levels "virtually unchanged"). Nevertheless, there were air quality improvements in Europe from control of stationary air pollution sources.

2. Upward Harmonization Through Threats from the Largest Market and the Dominant Political Player

Due to the political and economic strength of the leader, West Germany, even compromises resulted in steady upward harmonization. Were the political and economic leader *not* inclined toward stricter standards, such a result would have been unlikely.¹⁶⁸

We may infer that the key characteristic allowing successful threats by dominant market participants is the existence of one or more players with a market large enough to make a ban a very serious threat to the profitability of exporters in other countries.

3. Upward Harmonization Through Federalization/Centralization

It was not until the S.E.A. and qualified majority voting that the EC could attain upward harmonization where there was serious dispute. In contrast, in the United States, a highly-developed federal system, the central federal government has extensive control over commerce; the states' power over commerce is severely curtailed; and harmonization is easier to accomplish.¹⁶⁹ Having a weak federal government, the EC members struggled against each other, with slower results.

As the EC, now the EU, advanced toward greater integration, the federal characteristics grew stronger. Consequently, the Council and Commission grew in their ability to enact more stringent directives *and* to allow maverick states with serious environmental concerns to push forward. This is similar to the United States allowing states with severe air quality problems, such as California, to have stricter standards.¹⁷⁰

One of the important elements of centralized policymaking is the international institutions, if any, through which policymaking takes place. The structure and authority of the international institutions in Europe facilitated the upward harmonization which took place with increasing integration.¹⁷¹ As the EC institutions gained authority, the Commission grew bold enough to make its 1984 proposals, radical departures from prior policy.

¹⁶⁸ See VOGEL, *supra* note 14, at 96.

¹⁶⁹ Even though the U.S. system has made harmonization easier, the leading force behind increased stringency has been California. Because of its unusual climate which exacerbates ozone formation, California adopted motor vehicle regulations in the 1950s, long before similar federal regulations. California has led efforts to decrease emissions since that time. See, e.g., Haig Simonian, *Smog Clears over Carmakers*, FIN. TIMES, Jan. 11, 1996, at 9 (discussing California's leadership in reducing vehicle emissions).

¹⁷⁰ See 42 U.S.C. § 7543(b) (1988) (allowing waiver of prohibition against state standards, as long as the EPA Administrator finds the state standards to be at least as protective of public health and welfare as the federal standards).

¹⁷¹ See VOGEL, *supra* note 14, at 251-52.

D. Summary of Factors Determining the Approach and Direction of Harmonization, If Any

From this analysis, the critical factors influencing the direction of harmonization are large consumer states, supplier preferences, state power, domestic political support, and the structure of the international regime and its institutions.

1. Market Structure: Large Consumer Markets

As explained above, the threat of keeping foreign cars out of Europe's largest market, Germany, was formidable. Therefore, one or more large consumer states can influence the direction of harmonization.

2. Supplier Preferences

Supplier preferences may sound like an economic oxymoron (because one usually speaks of suppliers meeting consumer preferences), but this phrase refers to preferences stemming from market opportunities. As described above, German manufacturers exported to "greener" markets and preferred uniform standards within Europe. Uniform standards would: (1) promote economy-of-scale gains for German suppliers, and (2) apply to all suppliers, thereby "leveling the playing field." Thus, the most powerful reasons for manufacturers to support upward harmonization are: (1) potential cost reductions and increased profits, and (2) eliminating the advantages of lower-cost competitors.

3. State Power

While the EC/EU has no single dominant member, Germany, France, and the United Kingdom have played pivotal roles. As the leading economic power in Europe, Germany had substantial influence over integration policy. With this power, Germany had leverage. Nevertheless, Germany, the Netherlands, and Denmark had difficulty moving the EC towards more stringent emission controls.¹⁷²

4. Political Support

Of course, one of the most important factors in implementing more stringent product standards is environmentalists' political power and the acceptance of environmental goals by mainstream political parties.

¹⁷² While an explanation of the complex linkages involved in EC decisionmaking in the 1970s and 1980s are beyond the scope of this paper, it is clear that the greater the number of parties and the greater the number needed to make a decision, the more difficult is harmonization.

5. *Coincidence of Political Support and Supplier Preference*

West Germany happened to have both strong political support for emission controls and powerful export-oriented firms which desired uniform standards. The congruence of these two factors produced a leader espousing upward harmonization.

6. *Institutional Structure and Decisionmaking Rules*

As the integration of Western Europe increased, so did the call and need for harmonization. Although never a federal system, under which harmonization is relatively easy, the EC adopted more stringent regulations when its central institutions grew stronger and when qualified voting replaced consensus voting.

E. *Conclusions*

Exploration of a single case study does not necessarily reveal a comprehensive analysis of circumstances that may influence harmonization trends upward or downward. But this case reveals a number of important factors that are likely to influence harmonization in a given economic sector:¹⁷³

- Existence of large consumer markets
- Leadership and preferences of largest producers
- Political power of the “greener” countries
- Internal political support
- Coincidence of all of the above
- Institutional structure and rules of the trading regime.

Furthermore, this analysis is useful for examining vehicle emission standards under other trade regimes. Predictions for harmonization under the WTO and NAFTA follow.

IV. APPLICATIONS FOR FUTURE HARMONIZATION UNDER THE WORLD TRADE ORGANIZATION

A. *Legal, Economic, and Political Framework for Automobile Exhaust Emissions Regulation Under the World Trade Organization*

1. *Legal Framework: Instruments*

The 1947 General Agreement on Tariffs and Trade (“GATT”) expired in

¹⁷³ Research on different sectors may lead to more general results.

1994 and was replaced by the Agreement Establishing the World Trade Organization ("WTO"). Nevertheless, the WTO included a "reinvigoration" of GATT as "GATT 1994."¹⁷⁴ Thus, many of the provisions of GATT 1947 are in force under the WTO.

The first important WTO/GATT rules for this analysis are "national treatment" and its exceptions. Under the 1947 GATT, the Contracting Parties ("CPs") agreed that "internal taxes and other internal charges, and laws, regulations and requirements affecting the internal sale, . . . or use of products, . . . should not be applied to imported or domestic products so as to afford protection to domestic production."¹⁷⁵ Further, the CPs agreed that imports from another CP "shall be accorded treatment no less favorable than that accorded to like products of national origin in respect of all laws, regulations and requirements."¹⁷⁶ In other words, domestic environmental regulations cannot be applied to ban imports *in order to protect domestic industry*.

But GATT provides general exceptions to national treatment and other GATT requirements for certain health and safety and environmental measures. GATT Article XX(b) allows a general exception for measures "necessary to protect human, animal or plant life or health," subject to such measures not constituting arbitrary or unjustifiable discrimination between countries. This provision suggests that automobile emission standards set forth to protect air quality could fall under the Article XX(b) exception to national treatment. GATT Article XX(g) provides an exception for measures "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption." This provision could provide an exception for automobile fuel efficiency standards.

The second important WTO/GATT characteristic is the dispute resolution mechanism, which is a dramatic departure from GATT 1947. Under GATT 1947, if an exporting country believed that an importing country (assuming both were CPs) were using an internal regulation as a barrier to trade, it brought forward an allegation. The CPs then formed a "GATT Panel" to hear the issue. The GATT panel "issued" a decision, which had to be "adopted" by the CPs by unanimous consensus. The consensus requirement was a significant barrier to enforcement because the violator could veto adoption of the Panel report.

Under the WTO, the decision rule is reversed. A complaining party, similar to a plaintiff, still brings an allegation, and a Panel is formed. Rather than have the

¹⁷⁴ Agreement Establishing the World Trade Organization [WTO Agreement] art. 2, para. 4 provides: The General Agreement on Tariffs and Trade 1994 as specified in Annex IA (hereinafter referred to as "GATT 1994") is legally distinct from the General Agreement on Tariffs and Trade, dated 30 October 1947, annexed to the Final Act Adopted at the Conclusion of the Second Session of the Preparatory Committee of the United Nations Conference on Trade and Employment, as subsequently rectified, amended or modified (hereinafter referred to as "GATT 1947").

¹⁷⁵ GATT art. III, para. 1.

¹⁷⁶ *Id.* para. 4.

adoption of the panel report depend upon consensus of the parties,¹⁷⁷ however, the report must be *rejected* by consensus, *or else it is approved*.¹⁷⁸ In other words, a WTO panel decision can only be “overruled” by unanimous consensus. Suppose that a Panel report found a defendant party’s domestic vehicle emission standard to be a barrier to trade and not a valid exception. Under the old GATT, the defendant could veto the report. Under the WTO, the defendant cannot veto it.

2. *Market Structure*

For practical purposes, the market structure relevant to the WTO is the world market structure described in Part II.B. All of the major producing countries are members of the WTO. The major consuming countries are also represented, with the exception of China. The largest consuming nations are the United States and the western European nations.¹⁷⁹

3. *Political Situation*

In comparison to the EU, the WTO is a loose trade agreement, lacking the structure of political and economic integration present in the EU. On the other hand, the WTO is a tighter agreement than the GATT 1947 because it has a larger and more powerful central organization and a more powerful dispute resolution mechanism.

B. *The Improbability of Harmonization of Automobile Emission Standards Under the World Trade Organization*

1. *Supplier Preferences, Consumer Markets, and Political Support*

Supplier preferences in terms of the WTO encompass essentially all producers. Producers in large countries currently in the EU or NAFTA already are standardizing upward in order to meet the converging high standards of the United States and the EU. To the extent that the largest markets for these producers

¹⁷⁷ WTO Agreement art. 9, para. 1 provides: “The WTO shall continue the practice of decision-making *by consensus* followed under GATT 1947.” (emphasis added) (footnote omitted) (omitted footnote defines “consensus”: “The body concerned shall be deemed to have decided by consensus on a matter submitted for its consideration, if no Member, present at the meeting when the decision is taken, formally objects to the proposed decision.”).

¹⁷⁸ WTO Agreement Annex 2, art. 16, para. 4, provides:

Within 60 days after the date of circulation of a panel report to the Members, the report *shall be adopted* at a DSB meeting unless a party to the dispute formally notifies the DSB of its decision to appeal or the DSB decides *by consensus* not to adopt the report. . . .

(emphasis added) (footnote omitted).

¹⁷⁹ See *supra* part II.B.

demand low-emission vehicles, the producers will have the incentive to promote upward harmonization in order to achieve economies of scale in design and manufacture. Thus, as the U.S. 1990 Clean Air Act Amendments ("CAAA") put greater demands on manufacturers,¹⁸⁰ this incentive is likely to lead to upward pressure.

On the other hand, the emerging markets are primarily in Asian countries, such as China, Thailand, and South Korea.¹⁸¹ Although pressures for environmental improvement in these countries undoubtedly exist, these pressures are in an immature state. With the exception of South Korea, these countries also do not have large producers attempting to export to the West. Therefore, it seems unlikely that automobile producers in these developing countries will generate either the high domestic demand for low-emission vehicles or the domestic political support for stringent standards.¹⁸²

Furthermore, political support and supplier preferences do not coincide because the political support is generally strongest in industrialized countries, but the suppliers in industrialized countries may not have the economic incentive to support higher standards in developing markets because these markets are small.

In developing markets, the production of vehicles with fewer emission controls ("dirtier vehicles") may provide efficiency when the factories that produce these vehicles are located in these countries and only produce vehicles for local markets. Without an extensive microeconomic analysis beyond the scope of this paper, a definitive conclusion is not possible. It seems unlikely, however, that world-class manufacturers will push for upward harmonization in developing Asian markets.

2. *Political Power Structure*

Although some argue that the WTO has no single dominant member or group, the Group of 7 ("G7")¹⁸³ appears to exercise strong influence. Nevertheless, the numerous parties and emerging trading blocs, such as the recent Asian trading agreement, mean that power is diffuse. This diffusion of power goes hand in hand with the relatively weak nature of GATT 1947.¹⁸⁴ Only time will tell how much stronger the WTO turns out to be. Based on these observations, it is unlikely the

¹⁸⁰ The 1990 CAAA imposes stricter new vehicle emission standards. See 42 U.S.C. § 7521 (1994). It also requires states with certain types of ozone and carbon monoxide nonattainment areas to revise their implementation plans to establish clean-fuel vehicle programs. See 42 U.S.C. §§ 7581-7590 (1994).

¹⁸¹ See *supra* part II.B.1.

¹⁸² This refers to locally-owned domestic developing country producers, such as Maruti Udyog and Hindustan Motors of India—not foreign-owned plants, such as Ford, Mercedes-Benz, or Honda's assembly plants in Indonesia. See WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 45, 48.

¹⁸³ The Group of Seven consists of the United States, the United Kingdom, Japan, Germany, France, Italy, and Canada.

¹⁸⁴ See *supra* part IV.A.

WTO will provide the forum for strong upward harmonization.

3. *Institutional Structure and Decisionmaking Rules*

Because the WTO is a much weaker organization than the EU, it seems unlikely that the WTO structures will be the catalysts for upward harmonization. On the contrary, the WTO could be a mechanism for downward harmonization in that strict domestic standards may fall when attacked.

Because the WTO Dispute Panel rules, unlike GATT 1947, are stacked in favor of the complainant rather than the party that allegedly violated the rules, if a member violates a norm by having stricter standards, the member is likely to lose.¹⁸⁵ Therefore, bans of vehicles which do not meet strict domestic emission standards are more susceptible to successful challenges by the countries producing less-controlled vehicles than was the case in the EU.

The realities of the vehicle market, however, will probably cancel out this tendency. The large manufacturers from the major OECD countries already design and build vehicles which meet the strict standards of the United States, the EU, and/or Japan. These manufacturers have assembly facilities in developing countries, but much of their output is destined for the highly regulated markets. Such firms may produce less-controlled vehicles for the low-stringency developing country markets,¹⁸⁶ but they are unlikely to attempt to produce "dirty cars" in these countries and export them back to their home markets which have stringent air pollution standards. Such an attempt would harm their corporate images.

On the other hand, major manufacturers may have the incentive to equalize any differences in standards. For example, the EU attacked three U.S. vehicle-related regulations in 1994: the luxury car tax, the gas-guzzler tax, and the corporate fuel efficiency standards. In this case, the GATT panel found that the U.S. laws were an allowable exception. Nevertheless, the potential exists for future attacks against the standards of the most stringent country, if significantly above other OECD standards.¹⁸⁷

This potential problem leaves in question manufacturers based in developing countries like India. In general, these firms do not export to the OECD at this time but rather serve domestic markets.¹⁸⁸ Unless these countries and firms attempt an industrialization strategy based upon vehicle exports, they are unlikely

¹⁸⁵ See *supra* part IV.A.1.

¹⁸⁶ Telephone Interview with Paul Hughes, Manager, Alternative Fuels Section, California Air Resources Board (Apr. 21, 1995) [hereinafter Hughes Interview].

¹⁸⁷ Of course, "home country" is a loose term. In this era of globalization, the "home" of a multinational corporation could be where it is incorporated or where its major assets are located. Despite these difficulties, most major firms in the automobile industry are identified with a single home. For instance, General Motors is identified with the United States, and Volkswagen with Germany.

¹⁸⁸ For example, from the available data, it appears that India has no exports, and China has extremely small numbers of exports. See WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 42, 44-47.

to try to penetrate the saturated markets of the OECD.

The possible exception to this conclusion is South Korea. Hyundai, Daewoo, and Kia are strong and growing manufacturers. South Korea had substantial exports to North America and the EU in 1992,¹⁸⁹ but the Koreans have already met stringent standards in order to export to the industrialized countries.

4. *Conclusions*

The WTO is likely to be relatively useless for upward harmonization of motor vehicle emission standards. On the contrary, the WTO may provide a forum for striking down maverick countries with the most stringent requirements. Large manufacturers from industrialized countries will most likely sponsor such attacks, although the actual production may take place in developing countries. Manufacturers in developing countries do not seem ready to launch major challenges of this type themselves.

V. APPLICATIONS FOR FUTURE HARMONIZATION UNDER NAFTA

A. *Legal, Economic, and Political Framework for Automobile Exhaust Emissions Regulation in North America*

1. *Legal Framework: Instruments of North American Economic Cooperation*

a. *The Auto Pact and the Free Trade Agreement Between Canada and the United States*

In 1987, the United States and Canada reached an agreement on the framework of a free trade area.¹⁹⁰ Their Free-Trade Agreement came into force in 1988, eliminating tariffs in many areas under specified conditions.¹⁹¹ This agreement contained a chapter devoted to automobiles.¹⁹²

Prior to this agreement, the United States and Canada negotiated the Agreement Concerning Automotive Products, commonly referred to as the Auto Pact, which entered into force in 1966.¹⁹³ The Free-Trade Agreement reaffirmed the parties' commitment to the Auto Pact but made some changes. Under the Auto Pact, participating manufacturers and their suppliers could import vehicles and parts into Canada duty-free from anywhere in the world, as long as they met Auto Pact

¹⁸⁹ *Id.* at 82.

¹⁹⁰ See generally TRADE-OFFS ON FREE TRADE: THE CANADA-U.S. FREE TRADE AGREEMENT (Marc Gold & David Leyton-Brown eds., 1988) (discussing the implications of the agreement).

¹⁹¹ Canada-U.S.: Free Trade Agreement, Jan. 2, 1988, reprinted in 27 I.L.M. 281 (1988).

¹⁹² See Paul Wonnacott, *Autos and the Free Trade Agreement: Toward a More Secure Trading Relationship*, in TRADE-OFFS ON FREE TRADE, *supra* note 190, at 269 (discussing chapter 10 of the Free-Trade Agreement).

¹⁹³ See *id.* at 271 (discussing the Auto Pact).

requirements concerning the production-to-sales ratio in Canada and the local value-added.¹⁹⁴

Under the Free-Trade Agreement, new vehicles and original equipment parts can cross the border without tariff if they satisfy a rule of origin, which requires that the imported parts manufacturer incur fifty percent of the direct production costs in Canada or the United States.¹⁹⁵ The big three North American manufacturers and their suppliers, who are members of the Auto Pact, qualify to import vehicles and parts into Canada duty-free as described above.¹⁹⁶ Other manufacturers, however, who cannot be part of the Auto Pact, do not receive this benefit.¹⁹⁷

For the purposes of this analysis, the bottom line is that the United States and Canada have essentially harmonized their automobile trade already. Therefore, NAFTA has little incremental effect on these two trading partners in the automobile sector.

b. The North American Free Trade Agreement and the North American Agreement on Environmental Cooperation U.S.-Canada-Mexico 1993

NAFTA lies somewhere between the level of integration of the EU and the WTO. While the WTO, like GATT, remains primarily a restraint on barriers to trade, NAFTA envisions some harmonization but does not go nearly as far as the EU in its vision of economic and political integration.

NAFTA came into force on January 1, 1994, and sets up a framework for gradual tariff elimination between the United Mexican States ("Mexico"), the United States, and Canada.¹⁹⁸ It adopts the "national treatment" concept of Article III of GATT, including the interpretive notes.¹⁹⁹ NAFTA also bans quantitative restrictions, such as quotas, except for such restrictions that may be allowed by Article XI of GATT.²⁰⁰

NAFTA does not follow GATT's general exceptions, such as Article XX(b).²⁰¹ Instead, NAFTA explicitly lays out rules regarding a number of sectors, including automobiles. In addition, due to the immense controversy surrounding NAFTA, particularly arguments by U.S. environmental groups and labor unions, the parties made side agreements on environmental and labor issues.

Regarding automobiles, NAFTA specifically applies the principle of

¹⁹⁴ TRADE-OFFS ON FREE TRADE, *supra* note 190, at 265-66.

¹⁹⁵ *Id.* at 265.

¹⁹⁶ See *supra* note 194 and accompanying text.

¹⁹⁷ TRADE-OFFS ON FREE TRADE, *supra* note 190, at 265-66.

¹⁹⁸ North American Free Trade Agreement [NAFTA] 1993, art. 302, para 1; Annex 302.2, para. 1.

¹⁹⁹ *Id.* art. 301, para. 1. See *supra* Part IV.A.1 (discussing the "national treatment" concept of Article III of GATT).

²⁰⁰ See NAFTA, art. 309, para. 1.

²⁰¹ See *supra* part IV.A.1.

national treatment.²⁰² Prior agreements between the United States and Canada, however, are not overridden.²⁰³ Furthermore, Mexico may maintain its 1989 Decree for Development and Modernization of the Automotive Industry²⁰⁴ and implementing regulations²⁰⁵ until 2004.²⁰⁶ Among other provisions, the Decree and its regulations allow the government to restrict the number of motor vehicles that a manufacturer may import into Mexico in relation to the total number of motor vehicles that the manufacturer sells in Mexico.²⁰⁷ Therefore, NAFTA does not truly implement the free trade of automobiles between Mexico and the other two parties.

Turning to environmental policy, the preamble of NAFTA sets forth the goals of promoting sustainable development and strengthening the development and enforcement of environmental laws and regulations.²⁰⁸ The important environmental guidelines are in the North American Agreement on Environmental Cooperation U.S.-Canada-Mexico 1993.²⁰⁹ Under this agreement, the parties established a Commission for Environmental Cooperation,²¹⁰ to be governed by a Council of cabinet-level or equivalent representatives of the parties.²¹¹ The Council is to "promote and facilitate cooperation between the Parties with respect to environmental matters."²¹²

As part of this mandate, the Council is to initiate a process of harmonization "[w]ithout reducing levels of environmental protection, [by] establishing a process for developing recommendations on greater compatibility of environmental technical regulations, standards and conformity assessment procedures in a manner consistent with the NAFTA."²¹³ Despite this high sounding language, the Environmental Cooperation Agreement does not actually require harmonization, although Article 10, paragraph 3(b), indicates that any harmonization shall not be "downward."

Although Mexico had stringent laws on its books, one of the major contentions of environmental critics with regard to NAFTA was that these laws

²⁰² See *id.* Annex 300-A, para. 1 (Trade and Investment in the Automotive Sector): "1. Each Party shall accord to all existing producers of vehicles in its territory treatment no less favorable than it accords to any new producer of vehicles in its territory under the measures referred to in this Annex. . . ."

²⁰³ See NAFTA, Appendix 300-A.1.

²⁰⁴ Decreto para el Fomento y Modernizac'ion de la Industria Automotriz [Decree for Development and Modernization of the Automotive Industry] Dec. 11, 1989.

²⁰⁵ Acuerdo que Determina Reglas para la Aplicacio'n del Decreto para el Fomento y Modernizac'ion de la Industria Automotriz [Resolution that Establishes Rules for the Implementation of the Auto Decree] Nov. 30, 1990.

²⁰⁶ See NAFTA, Appendix 300-A.2.

²⁰⁷ *Id.* Annex 300-A, para. 17.

²⁰⁸ *Id.* preamble.

²⁰⁹ North American Agreement on Environmental Cooperation U.S.-Canada-Mexico 1993, Sept. 13, 1993, [Environmental Cooperation Agreement].

²¹⁰ *Id.* art. 8, para. 1.

²¹¹ *Id.* art. 9, para. 1.

²¹² *Id.* art. 10, para. 1(f).

²¹³ *Id.* para. 3(b).

were not enforced.²¹⁴ In response, the parties agreed that the Council “shall encourage . . . effective enforcement by each Party of its environmental laws and regulations.”²¹⁵ In order to bolster its image as an enforcer under the agreement, Mexico increased the number of environmental inspectors from 12 to 500.²¹⁶ During 1994, Mexico inspected 46,000 plants and shut down about 500.²¹⁷ Nevertheless, if there is upward harmonization under NAFTA, the ultimate question is whether Mexico will effectively enforce its laws. This question remains unanswered in light of Mexico’s 1994-1995 difficult economic situation and the cost of increased environmental protection.

2. Market Structure

As we have seen, there are several prominent European manufacturers which dominate markets in the EU member states and have substantial exports. But as a group, they are third largest in sales volume, after the American and Japanese manufacturers.

In comparison, North America is dominated by manufacturers from a single nation, the United States. Additionally, there is a strong presence from Japanese manufacturers operating production facilities (alone or jointly with U.S. firms) in the United States and Mexico.

In the United States, the “big three” producers are General Motors, Ford, and Chrysler. Annual production has been in the range of five to seven million from 1989 to 1992.²¹⁸ In 1991, production by firm was: GM, 2.5 million; Ford, 1.2 million; Chrysler, 0.5 million; Honda, 0.45 million; Toyota, 0.3 million; and lesser amounts for Mazda, Nissan, and others.²¹⁹

In Canada, the largest producers are Ford and GM.²²⁰ There are smaller presences by Honda, Chrysler, Toyota, Hyundai, and others.²²¹ Canada produces about one million cars annually.²²²

In Mexico, annual production of passenger cars has grown roughly from 300,000 in 1980 to 800,000 in 1992.²²³ In 1992, fifty-five percent were for the domestic market and forty-five percent were for export.²²⁴ Almost all exports went

²¹⁴ See, e.g., Steinberg, *supra* note 101, at 26.

²¹⁵ Environmental Cooperation Agreement, art. 10, para. 4(a).

²¹⁶ Richard H. Steinberg, Lecture, International Trade Seminar, University of California at Berkeley, School of Law (Boalt Hall) (Apr. 20, 1995).

²¹⁷ *Id.*

²¹⁸ WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 329.

²¹⁹ *Id.*

²²⁰ *Id.* at 307.

²²¹ *Id.*

²²² *Id.* at 307-08. (Exports to the United States must accidentally include Canadian consumption in this data source.)

²²³ *Id.* at 314-15.

²²⁴ *Id.*

to the United States and Canada in 1991 and 1992.²²⁵

The Mexican manufacturers, in descending order for 1992 production, are Ford, Chrysler, Volkswagen, GM, and Nissan.²²⁶ While there are domestic producers of trucks and buses, such as Diesel Nacional and Mexicana DeAutobuses, these firms do not produce passenger cars.²²⁷

3. *Political Situation*

In contrast to the EU, there is no political integration goal under NAFTA. Although economic interests have played a significant role, Western Europe's primary agenda in creating the EC (and later the EU) was to create collective self-interest to ensure peace.²²⁸ NAFTA's purpose is increased trade and economic growth, not a federation of North American (or American) states.²²⁹

B. Potential Harmonization of Auto Emission Standards Under the North American Free Trade Agreement

The NAFTA case is far simpler analytically than either the EU or WTO cases because only three countries are involved and two of these, the United States and Canada, already have stringent standards. Mexico has no independent domestic automobile producers. While there has been talk of expanding NAFTA to include various Central and South American countries, it is beyond the scope of this article to hypothesize about the future structure of NAFTA. The question boils down to how standards may increase in stringency in the United States and Canada, and what standards will be adopted and enforced in Mexico. NAFTA may play a role as a conduit for the United States, Canada, and various interest groups to exert pressure on Mexico.

1. Supplier Preferences, Consumer Markets, and Political Support

Supplier preferences in terms of NAFTA are essentially those of the "big three" U.S. producers, with minor roles by Japanese firms that have sited production facilities in North America. There are no independent automobile producers in Mexico. Because both U.S. and Japanese firms in Mexico already face stringent requirements for export to the United States and Canada, the issue is whether separate designs and production lines for the Mexican, Central American, and South American markets (and other lax standard countries) make economic

²²⁵ *Id.* at 319.

²²⁶ *Id.* at 315.

²²⁷ *Id.*

²²⁸ Frederick M. Abbott, *The Second Phase of North American Integration: Looking Forward in a Period of Crisis* 12 (Mar. 14, 1995 draft for presentation at Boalt Hall, Mar. 23, 1995).

²²⁹ *Id.* at 11.

sense. Thus, the manufacturers may install the gamut of pollution control equipment on autos destined for the United States and Canada (a bit less than forty-five percent of production) and less pollution control equipment on cars destined for the Mexican market *plus* the tiny portion of exports headed to Central America, South America, and other countries (fifty-five percent of production).²³⁰ Because the majority of the Mexican/South American production goes to Mexico, this question boils down to how stringent Mexican emission standards are, and whether it is economical to produce dirtier cars for Mexico. In all likelihood, such production would be economical.²³¹

There may be some political support for tighter vehicle air pollution control in Mexico because of the extremely poor air quality in Mexico City. On the other hand, consumer preferences in Mexico are likely to focus on the individual cost of automobiles, with a preference for cheaper cars with less controls, because of lower average per capita income than in the United States and Canada.

2. *Political Power Structure: Institutional Structure and Decisionmaking Rules*

Unlike the EU and the WTO, NAFTA has a single dominant member, the United States. Canada has followed U.S. automobile emission control policy. The United States has imposed upon Mexico the adoption of stricter environmental laws; therefore, harmonization, including upward movement, has been, and most likely will continue to be, driven by the United States.

The Commission for Environmental Cooperation will likely be rather weak. Its potential for upward harmonization looks limited. Its greatest promise is to be a vehicle (no pun intended) for the United States and Canada to encourage Mexico to enforce its environmental laws. Because the production facilities in Mexico are primarily operated by U.S. firms, they will be more susceptible to direct pressure from U.S. constituencies than independent firms.

3. *Conclusions*

NAFTA does not promise to play an important role in upward harmonization of motor vehicle emission standards. Upward harmonization depends primarily upon the stringency of emission standards in the United States. Although U.S. threats have succeeded in making Mexico put stringent laws on the books, the general problem with environmental protection in Mexico is enforcement.²³² Under NAFTA, the United States was successful in obtaining

²³⁰ For example, between 20,000 and 30,000 cars were exported to South America in 1991 and 1992. See WORLD MOTOR VEHICLE DATA 1994, *supra* note 22, at 319.

²³¹ See Hughes Interview, *supra* note 186.

²³² Indeed, the general problem with environmental laws in many countries, including the United States, is enforcement. But, as a matter of degree, such laws are *currently* not enforced as well in developing countries as in certain developed countries.

Mexico's promise to improve enforcement, with U.S. monitoring.²³³ Also, enforcement may not be an issue with large sophisticated automobile manufacturers with corporate environmental goals to achieve.

In sum, environmental advocates would spend their resources most efficiently by increasing the stringency of standards in the United States and using the Commission for Environmental Cooperation to address specific instances of lack of Mexican enforcement, if any. As under the WTO, manufacturers must decide whether product differentiation between high- and low-control markets is more profitable than achieving economies of scale through standardization of design and process across all North American facilities.

VI. CONCLUSIONS

A. *Lessons from the European Case Study*

Based on this analysis, several critical factors influence a trading regime's approach toward the tension between free trade and internal regulation and its direction of harmonization, if any. These factors are large consumer markets, supplier preferences, state power, domestic political support, and the structure of the international regime and its institutions.

The approaches that the EU took to achieve upward harmonization were:

- Compromise through product differentiation, before integration was very deep;
- Threats from the largest market and the dominant political player; there was such a country (West Germany), and it had several motivations for desiring "greener" standards;
- Federalization/centralization, as economic and political integration deepened.

This article demonstrates the power of leadership by large "green" markets with stringent standards. Dire air quality problems led to strict standards in California. Because California was a substantial part of the U.S. market, California standards influenced U.S. automobile emission standards. Because the United States (and specifically California) was a large export market for West Germany in the 1980s, German manufacturers desired harmonization of European standards with U.S. standards.

Both California, as a significant market within the United States, and West Germany, as a significant market within the EU, had sufficient market power to coerce vehicle manufacturers into accepting standards which were stricter than they would have liked or than they thought were competitively viable. In addition,

²³³ SEE VOGEL, *supra* note 14, at 262-64.

environmental forces in both California and Germany wanted higher standards.²³⁴ Moreover, German manufacturers favored stricter standards because they had invested heavily in production capacity to serve an even stricter regulatory regime, California. Germany was not immediately successful in the international negotiations in Europe but exerted strong leadership which gradually resulted in upward harmonization.

On the other hand, small markets with stringent standards have less effect on upward harmonization. The maverick regulations of Denmark and the Netherlands, by themselves, were not sufficient to change the magnitude and direction of European standards, although these moves did play a role.

B. Predictions for Other Trading Regimes

The vehicle emissions standards case in the EU demonstrates the potential for upward harmonization of environmental standards under a highly integrated customs union. The combination of factors resulting in upward harmonization included potential efficiency gains for suppliers exporting to markets with stringent standards and having powerful environmental lobbies. In addition, as the central institutions grew in power, they took greater initiatives toward upward harmonization.

In contrast, for members of the WTO, neither the market dynamics nor the relatively weak WTO/GATT structure will reproduce the upward harmonization seen in Western Europe. Instead, stringent domestic rules may be challenged by: (1) existing major producers seeking to knock down maverick countries with high standards, or (2) infant producers seeking to export to the more advanced countries.

Finally, under NAFTA, the United States will continue to dominate the setting of vehicle emission standards. U.S. and Canadian standards are already harmonized. Regarding Mexican standards, Mexico is likely to follow the U.S. lead. Because automobile manufacturing in Mexico is operated by U.S. and Asian firms (or joint ventures thereof), independent Mexican firms are not a significant factor in influencing emission standards. The U.S. and Asian firms already meet stringent standards to export to the United States. The only question is whether it will be profitable, and desirable, to manufacture dirtier cars for the Mexican, Central American, and South American markets. To the extent the United States exerts pressure on Mexico to harmonize its standards, production of dirtier cars for the Mexican market is less likely.

In the overview, upward harmonization occurs more readily when an economically and politically strong progressive leader pushes for environmental improvements. On the other hand, downward harmonization or lack of harmonization is likely to occur under a loosely integrated trading scheme, when the production leaders are not committed to upward harmonization in their product

²³⁴ The analogy probably ends there because California is just a state within a federal system, whereas Germany is a sovereign within an increasingly integrated community.

categories.

C. Application of the Methodology Developed in This Article

This article provides a road map for assessing the probability of harmonization of environmental standards under various international trading regimes for a selected economic sector.²³⁵ First, the analyst must understand the legal structure of the trading regime and the institutional arrangements thereunder. Next, the analyst must gather sufficient information regarding the major producers in the sector and their markets (both domestic and foreign), along with the present and likely future stringency of environmental regulations in those target markets. Finally, the analyst must assess the domestic politics within the member states and the politics between the member states. Here, the question is who has relatively more power in what areas, and why (especially the "power" of having a large and attractive domestic market in the sector). Taking all of these considerations together, the analyst may make a forecast of the likely direction of harmonization of environmental policies, if any.

In addition, the methodology and results of this article provide general advice to participants in the policy debate. Manufacturers should assess possible economies of scale that might be achieved under harmonized standards. These economies could flow from common designs, standardized production and assembly lines, substitution of products from one plant for products from another plant to meet unexpected demand changes in particular markets, and other factors. (Of course, a firm may conclude harmonization is not in its interest, due to its limited ability to pass increased costs per vehicle onto consumers.)

Environmentalists should strive to obtain stringent standards in large markets for the product. Strict standards in these markets will facilitate upward harmonization where firms desire to serve these markets. For example, the influence of California air quality standards over standards in North America and Europe has been profound. While high standards in small markets (such as Denmark) exert some upward force, when environmentalists must choose where to spend their scarce resources, they may achieve the most success by focusing on policies in large markets.

²³⁵ By an "economic sector," a product-group market is meant, such as automobiles or food products.

APPENDIX TABLE A-1: BASIC EMISSION STANDARDS FOR PASSENGER CARS²³⁶
(incomplete; variations and waivers omitted)

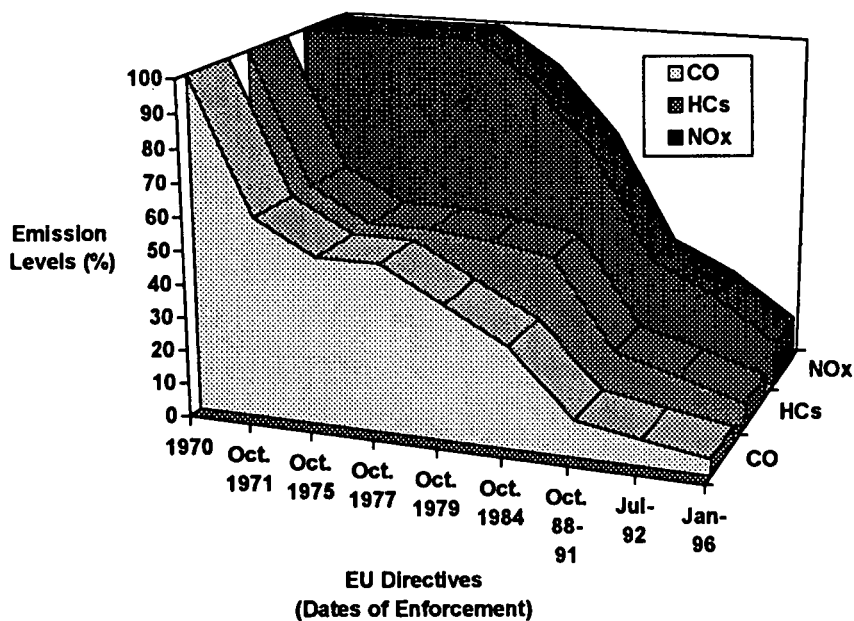
	Carbon Monoxide		HC	NO _x	Combined HC + NO _x	Combined HC + NO _x
Year	U.S. 49-state g/km	EC g/km	U.S. 49-state g/km	U.S. 49-state g/km	U.S. 49-state g/km	EC g/km
No std.	50.40		6.36	2.46	8.82	
1968	20.40		2.46	No std.	2.46	
1969	20.40		2.46	No std.	2.46	
1970	20.40		2.46	No std.	2.46	
1971	20.40		2.46	No std.	2.46	
1972	16.80		1.80	1.86	3.66	
1973	16.80		1.80	1.86	3.66	
1974	16.80		1.80	1.86	3.66	
1975	9.00		0.90	1.86	2.76	
1976	9.00		0.90	1.86	2.76	
1977	9.00		0.90	1.20	2.10	
1978	9.00		0.90	1.20	2.10	
1979	9.00		0.90	1.20	2.10	
1980	4.20		0.25	1.20	1.45	
1981	2.04		0.25	0.60	0.85	
1982	2.04		0.25	0.60	0.85	
1983	2.04		0.25	0.60	0.85	
1984	2.04		0.25	0.60	0.85	
1985	2.04		0.25	0.60	0.85	
1986	2.04		0.25	0.60	0.85	
1987	2.04		0.25	0.60	0.85	

²³⁶ Data incomplete due to difficulties in calculation. European standards have been expressed in terms not easily convertible to grams per kilometer. It was not possible within the time available for this research to make a complete year-by-year comparison.

	Carbon Monoxide		HC	NO _x	Combined HC + NO _x	Combined HC + NO _x
Year	U.S. 49-state g/km	EC g/km	U.S. 49-state g/km	U.S. 49-state g/km	U.S. 49-state g/km	EC g/km
1988	2.04		0.25	0.60	0.85	
1989	2.04		0.25	0.60	0.85	
1990	2.04		0.25	0.60	0.85	
1991	2.04		0.25	0.60	0.85	
1992	2.04	2.72	0.25	0.60	0.85	0.97
1993		2.72				0.97
1994		2.72				0.97
1995		2.72				0.97

APPENDIX FIGURE A-1: EMISSION STANDARDS IN THE EUROPEAN COMMUNITIES/
EUROPEAN UNION, 1970-1996²³⁷
(Relative to 1970 Baseline Emission Standard)

Emission Levels from New Passenger Cars in Europe



²³⁷ Modified from figure accompanying *Drive for the Clean, Lean Car*, *supra* note 1. (Graphic by Anne Kelleher)