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SEPARATE AND UNEQUAL: A COMMENT ON THE URBAN DEVELOPMENT ASPECT OF BROWNFIELDS PROGRAMS

*Georgette C. Poindexter**

Several states and the federal government have proposed and enacted what are termed "Brownfields Programs." These initiatives have two goals: 1) creation of employment in economically distressed areas surrounded by urban "brownfields" (contaminated properties); and 2) preservation of "greenfields" (pristine land) from development.

This Article discusses the efficacy of the urban development aspect of these initiatives. Specifically it argues that while cities (notably those in the northeast and northcentral United States) may have suffered the impact of deindustrialization disproportionately to their respective suburbs, these programs create a duality of environmental protection that will consign the cities to permanent second class environmental status. These programs provide a short term fix for a long term problem. This Article proposes that what is needed is a reexamination of environmental standards as they apply to both city and suburbs.

Imagine a woman. She is not healthy; in fact, she has cancer. This particular type of cancer can be cured by Drug #1. Unfortunately, Drug #1 is beyond the economic means of our patient. If left unchecked, the cancer surely will kill her.

Onto the market comes Drug #2. This new drug will alleviate many of the symptoms of the woman's cancer, and may even prolong her life. Drug #2 will not, however, cure the cancer. Furthermore, Drug #2 is cross-resistant to Drug #1. That is, if a cancer patient takes Drug #2, Drug #1 (which would have cured the cancer) will be rendered permanently ineffective.

Let us consider the plight of our patient. She is certainly going to die from cancer unless she can find a way to afford Drug #1. In the meantime, if she chooses to alleviate her symptoms by taking

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Drug #2, she will foreclose the possibility of ever being cured with Drug #1. The cancer patient is therefore faced with a choice, to pursue the immediately attainable but fatally limited goal of alleviating her symptoms, or to continue to suffer the symptoms in the hopes that she will be able to afford the cure before she dies.

Like our hypothetical patient, many of our nation's cities are facing a choice between taking intermediate steps to fight the symptoms that plague them, and taking a longer range view, in hopes of curing the "cancer" that threatens their existence. The symptoms crippling America's cities include illegal drugs, homelessness and crime. The "cancer" at the root of these symptoms is the economic desolation of the cities' burgeoning underclass. Treating the symptoms will not cure the underlying illness. The only cure for the cities' illness is the eradication of this economic desolation through urban development. The bedrock of urban development is economic development.[1]

The federal government,[2] and several state governments[3] have sought to spur such urban development through programs designed to make economic activity in urban centers more attractive to developers. At the center of these programs is the reduction of environmental standards in urban centers. These changes are aimed at reducing the economic burdens[4] facing developers

1. *See, e.g.*, Michael E. Porter, *The Competitive Advantage of the Inner City*, HARV. BUS. REV., May-June 1995, at 55, 56-57 ("The real need—and the real opportunity—is to create wealth .... We must stop trying to cure the problems of the inner city by perpetually increasing social investment and hoping for economic activity to follow."); Phillip L. Clay, *Choosing Urban Futures: The Transformation of American Cities*, 1 STAN. L. & POL'Y REV. 28, 32 (1989) ("biggest challenge [to urban transformation is] bringing the underclass into the mainstream").

2. *See generally* Announcement of Competition for Final Five Brownfield Economic Redevelopment Initiative Pilots, 59 Fed. Reg. 60,012 (1994) (EPA is providing funding for fifty Brownfields Pilots throughout the United States in 1995-1996).

3. The states with programs currently in place include Arkansas (ARK. CODE ANN. § 8-7-520 (Michie 1995)), Illinois (ILL. ANN. STAT. ch. 415, para. 5/22.2b) (Smith-Hurd 1995)), Indiana (IND. CODE ANN. § 13-7-8.9-18 (Burns 1995)), Massachusetts (MASS. GEN. LAWS ANN. Ch. 21E § 4 (West 1995)), Michigan (MICH. COMP. LAWS ANN. § 299.614 (West 1995)), Minnesota (MINN. STAT. ANN. § 115B.175 (West 1995)), Ohio (OHIO REV. CODE ANN. § 3746 (Anderson 1995)), Pennsylvania (1995 Pa. Laws 2), and Texas (1995 Tex. Gen. Laws 986).

4. For example, the federal government offers buyers of contaminated properties "Covenants Not to Sue" after cleanup. STEVEN A. HERMAN, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, GUIDANCE ON AGREEMENTS WITH PROSPECTIVE PURCHASERS OF CONTAMINATED PROPERTY (1995). Also, some states have formalized flexible cleanup standards tailored to proposed land use (as opposed to prophylactic application of standards). *See, e.g.*, IND. CODE ANN. § 13-7-8.9 (Burns Supp. 1995); the Michigan Environmental Response Act, MICH. STAT. ANN. § 13.32(1) (Callaghan 1993).

who seek to build-up abandoned urban properties that are environmentally contaminated—"brownfields"—and therefore unusable under current environmental standards.[5] It is believed that by making these properties available for development, through easing regulatory burdens, new employment opportunities will be created in the economically disadvantaged areas surrounding the brownfields sites.

The Brownfields Programs are not, however, restricted to the goal of encouraging urban redevelopment. Because the easing of environmental restrictions will permit developers to use brownfields for their undertakings, the need to seek out less contaminated, and therefore less costly, alternative properties will be reduced. Thus, the Brownfields Programs also will promote the preservation of presently undeveloped greenfields. It can therefore be said that in addition to constituting economic policy initiatives, the Brownfields Programs are also environmental policy initiatives.[6]

The job creation strategy of the Brownfields Programs is premised upon reuse of abandoned industrial sites located in economically disadvantaged areas.[7] Both implicit[8] and explicit[9] language

5. Such properties are referred to as "brownfields." In contrast, pristine, uncontaminated lands are referred to as "greenfields." Throughout this article, these terms will be employed. The governmental programs aimed at promoting the reuse of brownfields through the easing of environmental regulations will be referred to as "Brownfields Programs."

6. While environmental preservationists applaud the saving of undeveloped greenfields, some question the true motives behind the Brownfields Programs. Employing the classic "slippery slope" argument, preservationists fear that once the door to relaxed environmental standards is opened it will never fully close. *See* Judith Evans, *Cleaning Up The Nation's 'Brownfields'*, WASH. POST, Nov. 25, 1995, at E01.

7. For example, the EPA's pilot program for the city of Birmingham, AL states that "many of the distressed neighborhoods within and surrounding the City's brownfields are socio-economically depressed." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfield Pilot - Birmingham, AL (July 1995) (on file with the author). *See also* The Arkansas Program (1995 Ark. Acts 125).

8. For example, two EPA pilot programs have implicit requirements that programs concentrate in urban areas. The program in Louisville, KY plans to "address a brownfields site in Louisville's heavy industrial corridor." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - Louisville, KY (July 1995) (on file with the author). The Rochester, NY pilot program states that "the ultimate objective of Rochester's Brownfields effort is to eliminate the current bias against urban brownfields." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - Rochester, NY (July 1995) (on file with the author).

9. Some of the EPA pilot programs do have specific requirements that the programs focus in urban areas. The goal of the Baltimore, MD pilot program is stated as

sets out the requirement that the programs concentrate in *urban* areas. Such stipulations will create a duality in environmental standards between cities and suburbs. Once environmental standards are altered in the city, they will forever remain lower than suburban standards (absent a cataclysmic shift of political will). While the initial job creation promoted by the Brownfields Programs may provide some relief from the city's symptoms, the newly created environmental disparity between the cities and the suburbs will ultimately ensure that the cities' illness will continue to flourish. As land uses, unable to overcome the higher suburban environmental standards, gravitate to the regulatorily friendly cities, these areas will ultimately become a haven for the least desirable economic activity, thereby ensuring their continued desolation. The city, therefore, like our cancer patient, has been offered a new drug to alleviate its symptoms. By accepting this new drug, however, the city eliminates the possibility of a cure.

Some scholarly legal analyses of the Brownfields Programs concede the economic basis of the initiatives and concentrate on the environmental aspects.[10] Others neglect to discuss the environmental questions while analyzing the economic dimension.[11] What

"encouraging economic growth and redevelopment in urban areas." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - Baltimore, MD (July 1995) (on file with the author). Similarly, the Bridgeport, CT program states that "the ultimate objectives of Bridgeport's pilot are to return contaminated inner city derelict land to productive use." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - Bridgeport, CT (July 1995) (on file with the author). The St. Louis, MO program seeks "to develop a solution to reverse the years of disinvestment and under-utilization that currently plague the city." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - St. Louis, MO (July 1995) (on file with the author). Additionally, one state-run program specifically states that it is for primarily urban areas. The Michigan Site Reclamation Program targets its program at "underutilized urban properties with economic development potential." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - Detroit, MI (July 1995) (on file with the author).

10. James T. O'Reilly, *Environmental Racism, Site Cleanup and Inner City Jobs: Indiana's Urban In-fill Incentives*, 11 YALE J. ON REG. 43 (1994); Terry J. Tondro, *Reclaiming Brownfields to Save Greenfields: Shifting the Environmental Risks of Acquiring and Reusing Contaminated Land*, 27 CONN. L. REV. 789 (1995); Jane F. Clokey, *Wisconsin's Land Recycling Act: From Brownfield to Greenfield*, 2 WIS. ENVTL. L.J. 35 (1995); James W. Creenan & John Q. Lewis, *Pennsylvania's Land Recycling Program: Solving the Brownfields Problem with Remediation Standards and Limited Liability*, 34 DUQ. L. REV. 661 (1996).

11. Fran Ansley, *Standing Rusty and Rolling Empty: Law, Poverty, and America's Eroding Industrial Base*, 81 GEO. L.J. 1757 (1993); Staughton Lynd, *Towards a Not-*

is missing from the discussion, however, is an acknowledgment that unless the two prongs (economic and environmental) stand together, the initiative as a whole must be reconsidered.

This Article challenges the duality implicit in the goals of the Brownfields Programs. The Article concludes that the potential inconsistency in environmental standards created by Brownfields Programs will result in long term environmental apartheid. I challenge this conflicting environmental treatment not on an environmental basis, but on an economic basis. Cities and suburbs are economic complements, not substitutes.[12] Cities hit hardest by deindustrialization[13] have suburbs also shaken by this process.

Proponents of the Brownfields Programs may point to evidence that even if cities and suburbs are complements, central cities do not recover from deindustrialization in the same manner as their suburbs.[14] Cities face unemployment and poverty concerns generally not found in the suburbs. The economic benefits of the Brownfields Programs may address such concerns. The discussion of these programs, however, should not end there. Brownfields Programs may alleviate the symptoms of limited economic opportunity, but they do not cure the cancer itself. In fact, these programs may prevent the cure by relegating cities to a second-class environmental status. As second-class environmental concerns, the cities will be unable to attract the most desirable economic uses, and will be forced to settle for those uses which can find no place in the environmentally protected suburbs. If cities choose to accept disparate environmental treatment, however, I maintain that any discussion of these programs must acknowledge that environmental goals will be traded for economic development. Such discussion will crystallize the long- and short-range advantages and disadvantages of the Brownfields Programs.

Part I briefly describes the various state and federal Brownfields Programs, with emphasis on the environmental and economic goals of the programs. Part II introduces quantitative data showing that while both cities and suburbs in the northeast and northcentral parts of the United States have suffered as a result of deindustrial-

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for-profit Economy: Public Development Authorities for Acquisition and Use of Industrial Property, 22 HARV. C.R.-C.L. L. REV. 13 (1987).

12. *See* Richard Voith, *City and Suburban Growth: Substitutes or Complements?*, BUS. REV., Sept.-Oct. 1992 (published by the Federal Reserve Bank of Philadelphia) (describing the positive correlation between declining cities and slowly growing suburbs).

13. Namely the cities in the northeast and northcentral United States.

14. *See infra* part II.A.2.

ization, these cities and suburbs differ in their ability to absorb manufacturing job loss into other employment sectors. Part III synthesizes the previous sections, applying the empirical data to the economic goals of the Brownfields Programs to determine the legitimacy of these initiatives as they respond to the impact of deindustrialization. Part III also explores the long-term environmental and economic impact of the programs.

I. Program Descriptions

Because one of the goals of the Brownfields Programs is to protect clean land from development by reusing land that is already contaminated, it differs little from traditional environmental protectionist policy that favors the preservation of pristine land.[15] Brownfields Programs, however, have an additional goal. They seek to promote economic development by specifying that the brownfields be reused in such a way as to generate employment for the area surrounding the contaminated site. For this reason, Brownfields Programs stipulate that the land being redeveloped may not be used for residential or recreational purposes.

A. Environmental Goals of Brownfields Programs

Requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA")[16] and state environmental laws have created demand for previously unused greenfields. The regulatory structure has created several incentives which have spurred this demand. First, there are cost considerations. Cost of remediation is a function of the level of clean-up required by the regulations before the contaminated land may be reused. Whatever the level required by the regulations, the worse the land is to start, the more it will cost to bring it up to regulatory standards.[17]

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15. In the 1970s, with the environmental movement in full swing, there was an "epic legislative battle between environmentalists, who wanted to preserve as much as possible of our last wild and primitive state in a pristine condition, and those who wanted to exploit the land and resources for economic purposes." PHILIP SHABECOFF, A FIERCE GREEN FIRE: THE AMERICAN ENVIRONMENTAL MOVEMENT 132 (1993).

16. Pub. L. No. 96-510, 94 Stat. 2767 (codified as amended at 42 U.S.C. §§ 9601 *et. seq.* (1994)).

17. It has been noted that the degree of clean and the remediation methods required under CERCLA are vague and unscientific, and enacted more out of public panic than scientific proof. *See* Casey S. Padgett, *Selecting Remedies at Superfund Sites: How Should "Clean" Be Determined?*, 18 VT. L. REV. 361 (1994). However, cost-effectiveness has been one of the criteria with which remedy selection is weighed

Second, CERCLA imposes strict joint and several liability for property not meeting its standards.[18] Liability for clean-up costs is not apportioned according to harm done, but is imposed as a consequence of property ownership. The result is that the value of contaminated properties, such as brownfields, is driven down by the potential environmental liability. Where the potential liability drives the true value of the property below its asking price, it becomes unsalable.[19]

In light of the above, it is not surprising that developers, rather than incur the costs of bringing a brownfield up to regulatory standards, seek land that is free from any possible contamination. The result is the gobbling up of greenfields while brownfields lie vacant.

Brownfields Programs speak directly to these problems. Cost is directly addressed by exploring alternative remediation strategies. Liability is diminished with Covenants Not to Sue. Brownfields Programs seek to reverse the trend toward development of clean land by offering limitations on clean-up costs and potential liability for reuse of existing infrastructure. By giving up, to various degrees, strict environmental remediation of previously contaminated sites, the need to seek out greenfields for development is obviated, and clean land is therefore preserved.

Land preservation is in keeping with the historical goals of environmentalists. In the nineteenth century, Henry David Thoreau and John Muir both addressed the issue of the "human species as part of the larger community of life and the importance of a mutually enhancing bond between man and nature."[20] From these early writings, concern for the environment has grown to a movement encompassing the protection and preservation of public land and its natural wildlife. In 1970, President Nixon signed the National

since Congress passed the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), Pub. L. No. 99-499, 100 Stat. 1613. 40 C.F.R. § 300.430(f)(1)(I)(B) provides that in addition to cost-effectiveness, the other four criteria are: long-term effectiveness and permanence; reduction of toxicity; mobility or volume through treatment; short-term effectiveness; and implementability. *See* Keith Schneider, *New View Calls Environmental Policy Misguided*, N.Y. TIMES, Mar. 21, 1993 at A1.

18. CERCLA § 107(a) (42 U.S.C. § 9607(a)).

19. CERCLA driven liability uncertainty is not the only factor in development decisions. Information asymmetries also have an effect on property development. *See* James Boyd *et al.*, *The Effects of Environmental Liability on Industrial Real Estate Development*, 12 J. REAL EST. FIN. AND ECON. 37, 53 (Jan. 1996) (advocating indemnity contracts to correct information asymmetries).

20. Joanna Underwood, *Groping Our Way Toward an Environmental Ethic*, *in* VOICES FROM THE ENVIRONMENTAL MOVEMENT 55 (Donald Snow ed., 1992).

Environmental Policy Act ("NEPA"),[21] the first in a string of environmental legislation directed at preserving natural resources and land. Today, the focus of the environmental movement rests on the concept of "respecting natural resources and species other than our own and according them the same rights to be protected and sustained as those accorded to our species."[22] By promoting the preservation of greenfields through the reuse of contaminated properties, the Brownfields Programs fit squarely within traditional environmental thinking.

B. Economic Goals of Brownfields Programs

As the problems of urban America have worsened because of the poverty of those living in the nation's cities,[23] policymakers have searched for programs linking economic development with the creation of employment opportunities. By relying on the reuse of abandoned industrial sites,[24] the Brownfields Programs approach implicitly the issue of poverty by addressing the employment vacuum caused by deindustrialization.

The U.S. economy, once driven by manufacturing, is now driven by the service sector. This "deindustrialization" is a "widespread, systematic disinvestment in the nation's basic industrial capacity."[25]

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21. Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified at 42 U.S.C. §§ 4321, 4331-4347).

22. Underwood, *supra* note 20, at 55.

23. In 1991, 36 million people (14.7% of the total United States population) lived in poverty. 42% of the poor people lived in America's "center" cities. *The Economic Crisis of Urban America*, BUS. WK., May 18, 1992, at 38. The "essence of the [city's] trouble is not race but . . . poverty." *America's Cities: Doomed to Burn?*, ECONOMIST, May 9, 1992, at 21; *see also* JANET PACK, POVERTY AND URBAN PUBLIC EXPENDITURES (Wharton Real Estate Center Working Paper No. 215) ("Cities in the United States bear a disproportionate responsibility for the public expenditures that grow out of poverty because they contain disproportionate numbers of the poor . . . .").

24. In approving the Brownfields Pilot Program for the City of St. Louis, MO, the EPA stated: "Over the past 45 years, the City of St. Louis has lost half of its jobs and two thirds of its population to areas outside St. Louis. This has resulted in urban decay . . . ." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - St. Louis, MO (July 1995) (on file with the author). Also, the EPA pilot program for the city of Baltimore, MD addresses the fact that "old industrial sites in Baltimore have been abandoned, causing Baltimore to lose over 50% of its manufacturing jobs between 1970 and 1990." Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Quick Reference Fact Sheet: Brownfields Pilot - Baltimore, MD (July 1995) (on file with the author).

25. Barry Bluestone, *Is Deindustrialization a Myth? Capital Mobility Versus Absorptive Capacity in the U.S. Economy*, ANNALS AM. ACAD. POL. & SOC. SCI., Sept. 1984, at 40.

In 1950, 25.5% of U.S. workers were employed in the manufacturing sector.[26] By 1990, this number had dropped to 17.4%.[27]

Deindustrialization is an expected process of the post-industrial thesis.[28] This thesis posits that, as an economy matures and evolves, there will be a drop in the sectoral share of manufacturing combined with an increase in services and high-tech activities.[29] The shift away from dependence on the manufacturing sector is a restructuring of the economy towards new sectors outside of manufacturing.[30]

The Brownfields Programs attempt to provide an antidote to the bitter pill of deindustrialization by reusing the existing, vacant infrastructure through "reindustrialization." Economic life can be pumped into a dying neighborhood by lifting regulatory barriers that prevent productive use of abandoned property.[31] By concentrating on areas of economic stress that surround abandoned industrial sites, the programs seek to ameliorate the effect of deindustrialization by reusing the site to replace lost jobs.

When the impact of deindustrialization is analyzed and the data broken down, it is possible to see how individual regions of the United States have fared in relation to others.[32] It is clear from this analysis that the effects of deindustrialization are felt dispropor-

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26. U.S. Dep't of Commerce, 1950 Census of the Population, General Social and Economic Characteristics.

27. U.S. Dep't of Commerce, 1990 Census of the Population, General Social and Economic Characteristics.

28. Lloyd Rodwin, *Deindustrialization and Regional Economic Transformation, in* DEINDUSTRIALIZATION AND REGIONAL ECONOMIC TRANSFORMATION: THE EXPERIENCE OF THE UNITED STATES 12 (Lloyd Rodwin & Hidehiko Sazanami eds., 1989). *See* DANIEL BELL, THE COMING OF POST-INDUSTRIAL SOCIETY: A VENTURE IN SOCIAL FORECASTING 127 (1976).

29. Rodwin, *supra* note 28, at 12.

30. Glenn Yago *et al., Investment and Disinvestment in New York 1960-80*, ANNALS AM. ACAD. POL. & SOC. SCI., Sept. 1984, at 29-30.

31. A policy of deliberate industrialization follows from the traditional view that industrialization promotes growth through linkages. *See* M.I. Ansari, *Growth Effects of Recent Structural Changes in the Canadian Economy: Some Empirical Evidence*, 24 APPLIED ECON. 1233, 1234 (1992) (citing KALDOR, CAUSES OF THE SLOW RATE OF ECONOMIC GROWTH OF THE UNITED KINGDOM (1966) and KALDOR, STRATEGIC FACTORS IN ECONOMIC DEVELOPMENT (1967)).

32. Gerald A. Carlino, *What Can Output Measures Tell Us About Deindustrialization in the Nation and its Regions*, BUS. REV. (Fed. Reserve Bank of Philadelphia), Jan./Feb. 1989, at 17. *See also* Ann R. Markusen & Virginia Carlson, *Deindustrialization in the American Midwest: Causes and Responses, in* DEINDUSTRIALIZATION AND REGIONAL ECONOMIC TRANSFORMATION: THE EXPERIENCE OF THE UNITED STATES 33 (Lloyd Rodwin & Hidehiko Sazanami eds., 1989); Bluestone, *supra* note 25, at 40.

tionately in the former industrial core of the United States.[33] Of the fifteen states experiencing deindustrialization both in terms of output and employment between 1967 and 1986, ten were in the industrial core.[34] While the nation suffered a decline of more than 10% in manufacturing jobs between 1979 and 1986, the midwestern rate was double that.[35] Furthermore, on a regional level there is evidence that manufacturing job loss correlates with urban poverty.[36] In other words, the more manufacturing jobs a region has lost, the more likely that region now suffers from urban poverty.

Another arm of research concentrates on the impact of deindustrialization on central cities. This research is undertaken either as analysis of a specific city[37] or a generalized view of all U.S. cities taken as a whole.[38] Whether specific or general, research consistently shows that urban deindustrialization is a factor contributing to social and economic isolation of the urban poor.[39]

The missing research link, insofar as the Brownfields Programs are concerned, is a comparison of the impact of deindustrialization on the central city with the impact of deindustrialization on their respective suburbs. In other words, is the cancer of the city (economic desolation) linked to deindustrialization in a way which it is not in the suburbs?

II. Data Analysis - Linking Deindustrialization to the Goals of the Brownfields Programs

The effectiveness of the Brownfields Programs in achieving their economic goals hangs on two distinct, though obviously connected, questions. The first is whether deindustrialization has affected cities differently from suburbs. The second question arises because,

33. The industrial core includes the states in the northeast and midwest that have historically tended to specialize in the production of manufactured goods. Carlino, *supra* note 32, at 19.

34. These states are New York, New Jersey, Pennsylvania, Delaware, Maryland, West Virginia, Ohio, Indiana, Illinois, and Michigan. Carlino, *supra* note 32, at 19-20.

35. Markusen & Carlson, *supra* note 32, at 33.

36. *See* Mark A. Hughes, *Employment Decentralization and Accessibility: A Strategy for Stimulating Regional Mobility*, 57 J. OF AM. PLAN. ASSOC. 288, 291 (1991) (manufacturing deconcentration in the northeast and midwest was the most important variable in predicting urban poverty concentration between 1970 and 1980).

37. *E.g.*, Yago, *supra* note 30 (New York); Hughes, *supra* note 36 (Newark, New Jersey).

38. *E.g.*, WILLIAM JULIUS WILSON, THE TRULY DISADVANTAGED: THE INNER CITY, THE UNDERCLASS AND PUBLIC POLICY (1987); Robert Leekley and Michael Seeborg, *Income and Poverty Across SMSAs: A Two Stage Analysis*, 19 EASTERN ECON. J. 43 (1993).

39. WILSON, *supra* note 38, at 12.

even if job loss occurs, the ability of other employment sectors to pick up such loss is clearly connected to the economic health of the city. So, for a complete picture of the impact of deindustrialization on central cities we must ask where those who lost their urban manufacturing jobs went (e.g., to other employment sectors, to unemployment or out of the city).[40]

A. Deindustrialization in the Northeast and Northcentral United States

Cities, especially those in the northeast and northcentral regions, traditionally have been the manufacturing anchors of the United States. Of the fifty largest cities in the United States in 1950, those in the northeast or northcentral regions[41] had a greater percentage of their employed population working in manufacturing than did the nation as a whole.[42]

It follows, then, that the effects of deindustrialization have been more pronounced in these regions of high manufacturing concentration. Because the Brownfields Programs focus on areas affected by deindustrialization, the urban centers of the northeast and northcentral regions are hence ripe for the application of these initiatives. For this reason, the following analysis centers on the cities in these regions.[43]

Statistics demonstrate that, like the rest of the nation, the cities of the northeast and northcentral regions have suffered a steep decline in manufacturing employment in recent years.[44] What is not evident from the raw numbers, however, is what part of this decline is a function of national deindustrialization and what part is due to endogenous factors associated with the cities? In other words, why

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40. Although it may be swimming against the tide, I believe that empirical research has an important place in legal scholarship. Such research allows us to fill in the gap between abstract policy goals and factual problems. "Empirical scholarship is a window on the pathologies of the law and allows us to gauge the effect . . . of particular legal mechanisms . . . ." Craig A. Nard, *Empirical Legal Scholarship: Reestablishing a Dialogue Between the Academy and Profession*, 30 WAKE FOREST L. REV. 347, 349 (1995).

41. With the exception of Boston (23.7%) and Minneapolis (24.3%), which were slightly below the national proportion.

42. U.S. Dep't of Commerce, 1950 Census of the Population, General Social and Economic Characteristics.

43. Namely Philadelphia, Pittsburgh, Chicago, Baltimore, New York, Cincinnati, Cleveland, Toledo, Detroit, Boston, Milwaukee, St. Louis, Kansas City (Missouri), Indianapolis, Newark, Buffalo, Minneapolis.

44. U.S. Dep't of Commerce, 1990 Census of the Population, General Social and Economic Characteristics.

did these cities suffer disproportionately as compared with the rest of the nation?

1. *Urban Decrease in Manufacturing vs. National Decrease in Manufacturing*

To examine the relationship between the decrease in manufacturing in the cities of the northeast and northcentral regions as compared with that of the rest of the nation, "shift-share" analysis has been employed.[45] Shift-share analysis is a method by which changes in local employment in an industry are isolated from national changes in order to facilitate identification of the components of the change in that locality.[46] "Positive Shift" denotes the comparative advantage of a locality for that industry. "Negative Shift" denotes the comparative disadvantage of a locality for that industry. While shift-share analysis is often used as a predictive model for employment,[47] it is used in this article as a descriptive model.

The mathematical model developed to calculate shift-share in this article is:

$$CS_i^{0,t} = i_c^0 \cdot \left(g_{ic}^{0,t} - g_{i_N}^{0,t}\right)$$

where

i_c^0 — the employment share of Sector i in the labor force of the city at year 0;

$g_{ic}^{0,t}$ — the growth index of the employment share of Sector i in the labor force of the city between year 0 and t;

$g_{i_N}^{0,t}$ — the growth index of the employment share of Sector i in the labor force of the nation between year 0 and t.

As shown in Table 1, cities in the northeast and northcentral United States had a negative shift-share for the period 1950-1990. This means that the cities' loss in manufacturing jobs was not attributable solely to national trends.

2. Urban Decrease in Manufacturing vs. Suburban Decrease in Manufacturing

As stated above, Brownfields Programs do not balance cities against the nation: they balance cities against suburbs. The obvi-

45. HARVEY S. PERLOFF ET AL., REGIONS, RESOURCES, AND ECONOMIC GROWTH (1960).

46. Benjamin L. Stevens & Craig L. Moore, *A Critical Review of the Literature on Shift-Share as a Forecasting Technique*, 20 J. OF REGIONAL SCI. 419 (1980).

47. *See id.*

Table 1
Shift Share Manufacturing 1950-1990 City vs. Suburb

City	City 1950	City 1990	Shift Share of City	Suburb 1950	Suburb 1990	Shift Share of Suburb
Philadelphia, PA	32.91%	12.26%	-9.826470	36.95%	17.23%	-7.561611
Pittsburgh, PA	26.34%	7.72%	-9.960301	40.24%	14.65%	-12.352688
Chicago, IL	35.01%	16.55%	-6.942408	37.96%	18.08%	-7.394107
Baltimore, MD	27.36%	11.14%	-7.220292	31.23%	11.97%	-8.987360
New York, NY	26.07%	10.39%	-7.103870	22.08%	11.76%	-3.059223
Cincinnati, OH	29.79%	14.16%	-5.830440	33.82%	20.04%	-2.659036
Cleveland, OH	40.07%	19.88%	-7.009863	36.48%	20.72%	-3.755478
Toledo, OH	35.77%	17.63%	-6.373339	38.21%	20.60%	-5.036612
Detroit, MI	42.72%	16.47%	-12.193145	46.66%	24.94%	-6.368844
Boston, MA	21.96%	9.08%	-5.653266	29.75%	14.74%	-5.221627
Milwaukee, WI	41.18%	20.26%	-7.373659	43.28%	24.49%	-4.550291
St. Louis, MO	32.45%	13.45%	-8.320078	32.55%	18.50%	-3.342100
Kansas City, MO	21.44%	12.71%	-1.676399	25.78%	14.87%	-2.431014
Indianapolis, IN	31.25%	14.99%	-5.975826	34.05%	19.37%	-3.479059
Newark, NJ	35.63%	17.58%	-6.323736	38.39%	16.35%	-9.411964
Buffalo, NY	34.86%	14.30%	-9.084511	42.32%	16.86%	-11.532590
Minneapolis, MN	23.30%	13.18%	-2.45427237	25.42%	19.62%	2.55688341

Source of Raw Data: 1950 and 1990 Census of the Population, U.S. Dept. of Commerce: General Social and Economic Characteristics

ous question, then, is whether northeast and northcentral suburban areas likewise suffered the effects of deindustrialization disproportionately *vis-á-vis* the nation.

The shift-share formula was modified to calculate suburban shift-share:

$$SS_i^{0,t} = i_s^0 \cdot \left(g_{i_s}^{0,t} - g_{i_N}^{0,t}\right),$$

where

i_s^0 — the employment share of Sector i in the labor force of the suburb at year 0;

$g_{i_s}^{0,t}$ — the growth index of the employment share of Sector i in the labor force of the suburb between year 0 and t;

(Suburban labor force is SMSA[48] labor force minus central city labor force.)

Like their respective cities, suburbs of the northeast and northcentral United States have fared poorly as compared with the rest of the nation.[49] As shown in Table 1, suburbs suffered the same disproportionate decline as did their central cities.[50]

48. Standard Metropolitan Statistical Area.

49. With the exception of Minneapolis suburbs.

50. In some cases the suburbs suffered a steeper decline than their respective cities (e.g. Pittsburgh).

From this data we can infer conclusion number 1: *cities and suburbs in the northeast and northcentral United States both suffered the effects of the shift away from manufacturing employment.* In essence, cities and suburbs are complements, not substitutes. The application of this conclusion to the policy driving the Brownfields Programs is therefore troublesome. If cities and suburbs both suffer the effects of deindustrialization, why modify environmental standards only as they apply to the cities? What is the policy goal that allows for different treatment of the suburbs in the same situation?

B. Other Employment Sectors in the Northeast and Northcentral United States

Perhaps the answer to the above question lies in the second prong of the post-industrial thesis. The thesis contends that not only will there be a shift away from manufacturing in a maturing economy (deindustrialization) but that manufacturing job loss will be picked up by other employment sectors.[51] The impact of deindustrialization is therefore a function of the difference between the rate of deindustrialization and the rate of growth in the service and other sectors.[52] In other words, was the loss of manufacturing jobs compensated for by an increase in opportunities in the service sector and other employment sectors in both cities and suburbs?

To answer this question, shift-share calculations were performed on the city and suburban labor forces for the following employment sectors: service;[53] financial, insurance, and real estate ("FIRE"); agriculture, forestry and fisheries; mining, construction, transportation and communications; public utilities; wholesale and retail trade; and public administration.[54] The formulas used were updated to reflect the different employment categories.

As shown in Table 2, cities generally had a positive shift-share in services, a negative shift-share in FIRE, and mixed results in those sectors falling under the heading of Other.

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51. Yago, *supra* note 30, at 29. *See also* BELL, *supra* note 28.

52. Rodwin, *supra* note 28, at 13.

53. "Service" consists of four major categories: business and repair services, personal services, entertainment and recreation services, and professional and related services.

54. Agriculture, Forestry and Fisheries, Mining, Construction, Transportation, Communications and other Public Utilities, Wholesale and Retail Trade, and Public Administration are hereinafter aggregated under the heading "Other."

Table 2
Shift Share 1950-1990 All Employment Sectors (City)

City	Mfg Shift Share	Serv Shift Share	FIRE Shift Share	Other Shift Share	Total Shift Share
Philadelphia, PA	-9.826470	4.181042	-0.694769	4.312937	-2.027261
Pittsburgh, PA	-9.960301	7.661873	-1.082979	-0.642068	-4.023476
Chicago, IL	-6.942408	2.123357	-1.196311	1.668985	-4.346376
Baltimore, MD	-7.220292	1.056015	-1.492449	3.192734	-4.463992
New York, NY	-7.103870	1.999031	-2.524435	0.119513	-7.509761
Cincinnati, OH	-5.830440	-0.263699	-1.757721	3.042801	-4.809059
Cleveland, OH	-7.009863	0.985054	-0.971341	3.839634	-3.156516
Toledo, OH	-6.373339	4.462721	-1.094773	4.175403	1.170013
Detroit, MI	-12.193145	2.950708	-1.653065	4.379790	-6.515712
Boston, MA	-5.653266	5.652678	-0.718476	-5.200410	-5.919474
Milwaukee, WI	-7.373659	4.097337	-0.542647	3.454243	-0.364726
St. Louis, MO	-8.320078	3.140434	-2.424426	2.414565	-5.189506
Kansas City, MO	-1.676399	-2.057442	-3.962700	0.088051	-7.608489
Indianapolis, IN	-5.975826	-1.495264	-1.756485	6.568106	-2.659469
Newark, NJ	-6.323736	-0.258129	-3.796448	5.855497	-4.522816
Buffalo, NY	-9.084511	6.543386	0.086732	1.227615	-1.226778
Minneapolis, MN	-2.454272	2.641133	-4.294794	-4.031666	-8.139599

Source of Raw Data: 1950 and 1990 Census of the Population, U.S. Dept. of Commerce: General Social and Economic Characteristics

In the suburbs of these cities, the same general pattern follows: an increase relative to the nation in services, a decrease (or minimal increase) in FIRE, and an increase in the Other sectors (see Table 3). If, however, the shift-shares for all employment sectors are summed, evidence that there has been a different impact on cities than on suburbs begins to emerge. Comparing the total shift columns of Tables 2 and 3, it is apparent that while suburban loss in manufacturing[55] was offset by increases in other sectors, urban loss in manufacturing was not.[56] Thus, for the suburbs, the post-industrial thesis holds true—losses in manufacturing have been offset by gains in other sectors. In the cities, however, the theory has not been borne out.

These results lead to conclusion number two: *there is a difference in the shifts to employment sectors other than manufacturing between northeast and northcentral cities and their respective suburbs.*

C. Decomposition of Manufacturing Job Loss

Because cities in the northeast and northcentral United States have behaved differently from their respective suburbs with regard to employment shifts to other sectors, the next question is: where

55. Except New York, Minneapolis and Cleveland suburbs.
56. Except in Toledo.

Table 3
Shift Share 1950-1990 All Employment Sectors (Suburb)

City-SUBURB	Mfg Shift Share	Serv Shift Share	FIRE Shift Share	Other Shift Share	Total Shift Share
Philadelphia, PA	-7.561611	2.974382	-0.300569	7.758069	2.870272
Pittsburgh, PA	-12.352688	9.181069	1.390078	9.233587	7.452045
Chicago, IL	-7.394107	0.653020	1.349385	7.758864	2.367162
Baltimore, MD	-8.987360	1.343070	0.506981	9.764261	2.626952
New York, NY	-3.059223	-4.859148	-2.777726	0.495345	-10.200752
Cincinnati, OH	-2.659036	1.686467	-1.604619	5.828743	3.251555
Cleveland, OH	-3.755478	-0.324148	-2.073420	5.188439	-0.964607
Toledo, OH	-5.036612	10.719423	0.263149	2.775342	8.721302
Detroit, MI	-6.368844	5.088089	0.884582	9.680339	9.284166
Boston, MA	-5.221627	0.916206	-2.409736	7.102436	0.387278
Milwaukee, WI	-4.550291	3.155577	-0.147123	6.478044	4.936206
St. Louis, MO	-3.342100	2.700520	-0.597385	3.191740	1.952776
Kansas City, MO	-2.431014	1.819958	0.502939	1.053967	0.945850
Indianapolis, IN	-3.479059	2.579868	-0.167195	5.075756	4.009371
Newark, NJ	-9.411964	4.121693	-0.938109	7.893555	1.665176
Buffalo, NY	-11.532590	7.329774	1.472399	9.784916	7.054498
Minneapolis, MN	2.556883	-1.960357	-1.495685	-1.163724	-2.062883

Source of Raw Data: 1950 and 1990 Census of the Population, U.S. Dept. of Commerce: General Social and Economic Characteristics

did these workers go? If the former manufacturing workers were not absorbed into the labor force by other employment sectors, did they join the ranks of the unemployed? The imperfect shift may be explained by the fact that shift-share analysis does not account for those unemployed workers because it is concerned only with the growth in different employment sectors.[57]

The loss in the manufacturing sector is decomposed according to the following formula:

57. Except for Indianapolis and Toledo, both of which grew dramatically in square miles, all of the studied cities lost absolute population between 1950 and 1990. U.S. Bureau of the Census, *County and City Data Book: 1953* (1994). We need to approximate how many of those people leaving the city had lost their urban manufacturing jobs before we approximate the shift to unemployment. We therefore need to estimate the "migration impact." To accomplish this I first estimated the migration from a city each year and ran a regression of the population on the age structure for each city. This regression line estimates the remaining labor force after migration each year. I then integrated the remaining labor force from 1951 to 1990. This integration is the migration impact on the labor force in 1990.

$$MD = MP + MU + MM,$$

where,

MD — total number who lost jobs in the manufacturing sector of a city between 1950 and 1990;

MP — MD employment which is absorbed by other employment sectors in the city;

MU — MD employment that is not absorbed into other employment sectors that became unemployed;

MM — MD that moved out of the city.

I assumed that those who lost jobs in the manufacturing sector suffered at least the average unemployment rate of the city in 1990. Please refer to the Appendix for an explanation of this formula's components.

Table 4
Decomposition of Manufacturing Job Loss 1950-1990
(Average Unemployment Rate 1990)

City	Mfg Job Loss	Mfg Jobs Absorbed by All Other Emp. Sectors	Mfg Jobs Absorbed by Unemployment	Mfg Jobs to Emigration	% Absorbed by All Other Sectors	% Absorbed by Unemployment	% to Emigration
Philadelphia, PA	202172	80853	48248	73071	39.99%	23.86%	36.14%
Pittsburgh, PA	60413	8779	7471	44163	14.53%	12.37%	73.10%
Chicago, IL	367881	112451	96791	158639	30.57%	26.31%	43.12%
Baltimore, MD	74827	28983	19081	26763	38.73%	25.50%	35.77%
New York, NY	544605	495599	49006	0	91.00%	9.00%	0.00%
Cincinnati, OH	39293	13137	8272	17885	33.43%	21.05%	45.52%
Cleveland, OH	123311	0	17620	105691	0.00%	14.29%	85.71%
Toledo, OH	20058	18065	1993	0	90.06%	9.94%	0.00%
Detroit, MI	280023	1524	55183	223316	0.54%	19.71%	79.75%
Boston, MA	45223	34775	10448	0	76.90%	23.10%	0.00%
Milwaukee, WI	59117	51111	8006	0	86.46%	13.54%	0.00%
St. Louis, MO	100020	0	10963	89057	0.00%	10.96%	89.04%
Kansas City, MO	16164	14992	1172	0	92.75%	7.25%	0.00%
Indianapolis, IN	2108	1989	119	0	94.35%	5.65%	0.00%
Newark, NJ	49464	1831	11127	36506	3.70%	22.49%	73.80%
Buffalo, NY	65589	7875	9796	47918	12.01%	14.94%	73.06%
Minneapolis, MN	29028	13485	5529	10014	46.45%	19.05%	34.50%

Source of Raw Data: 1950 and 1990 Census of the Population, U.S. Dept. of Commerce: General Social and Economic Characteristics

The results of the decomposition of manufacturing job loss are shown in Table 4. In some cities, 1 in 4 workers went from manufacturing job loss to unemployment. If we use the minority unemployment rate instead of the aggregate unemployment rate the result is more stark. See Table 5.

Table 5
Decomposition of Manufacturing Job Loss 1950-1990
(Minority Unemployment Rate 1990)

City	Mfg Job Loss	Mfg Jobs Absorbed by All Other Emp. Sectors	Mfg Jobs Absorbed by Unemployment	Mfg Jobs to Emigration	% Absorbed by All Other Sectors	% Absorbed by Unemployment	% to Emigration
Philadelphia, PA	202172	80853	48248	73071	39.99%	23.86%	36.14%
Pittsburgh, PA	60413	8779	7471	44163	14.53%	18.90%	66.57%
Chicago, IL	367881	112451	96791	158639	30.57%	26.31%	43.12%
Baltimore, MD	74827	28983	19081	26763	38.73%	25.50%	35.77%
New York, NY	544605	495599	49006	0	87.10%	12.90%	0.00%
Cincinnati, OH	39293	13137	8272	17885	33.43%	21.05%	45.52%
Cleveland, OH	123311	0	17620	105691	0.00%	20.50%	79.50%
Toledo, OH	20058	18065	1993	0	79.50%	20.50%	0.00%
Detroit, MI	280023	1524	55183	223316	0.54%	22.20%	77.26%
Boston, MA	45223	34775	10448	0	76.90%	23.10%	0.00%
Milwaukee, WI	59117	51111	8006	0	81.40%	18.60%	0.00%
St. Louis, MO	100020	0	10963	89057	0.00%	18.10%	81.90%
Kansas City, MO	16164	14992	1172	0	86.20%	13.80%	0.00%
Indianapolis, IN	2108	1989	119	0	87.90%	12.10%	0.00%
Newark, NJ	49464	1831	11127	36506	3.70%	22.49%	73.80%
Buffalo, NY	65589	7875	9796	47918	12.01%	18.80%	69.19%
Minneapolis, MN	29028	13485	5529	10014	46.45%	19.05%	34.50%

Source of Raw Data: 1950 and 1990 Census of the Population, U.S. Dept. of Commerce: General Social and Economic Characteristics

This leads to conclusion number three: *In a city-by-city analysis, there is evidence that loss of jobs in the manufacturing sector leads to central city unemployment even after factoring in the migration impact.* Therefore, although northeast and northcentral cities and their suburbs both suffered the effects of deindustrialization more harshly than the rest of the nation, the suburbs picked up the difference by expanding other employment sectors while the cities did not. In most cities, workers moved away from manufacturing employment to unemployment in decisive numbers.

III. Legitimacy of Brownfields Programs

Disparate environmental treatment of the suburbs and the cities may be justified based on the disparate impact of the effects of deindustrialization on these areas.[58] This economic incentive is further bolstered by the strong positive correlation between the de-

58. The economic goal of the programs may be acceptable to some based on a simple comparison of city versus suburban unemployment regardless of the underlying causes. This approach, though, uncouples the economic goal from the environmental goal of the programs. The recasting of environmental standards becomes the means to an economic end - not an end in and unto itself. Without the environmental

gree of industrialization and multiplier effects in other employment sectors.[59]

The environmental aspect of the Brownfields Programs is not, however, so easily justified. Although the Brownfields Programs may solve present day employment problems, they also may create future environmental catastrophes. The programs allow cities and suburbs to move along different environmental trajectories. While preserved suburban land will remain uncontaminated in the future, city land will be perpetually polluted. Like the cancer patient opting for intermediary relief that forecloses the long- term cure, cities may be losing more than they gain.

City leaders should ask themselves the same preliminary question as our cancer patient: does this drug alleviate the symptoms of my cancer? Given the mathematical conclusions reached earlier in this comment, it appears that the quick answer to the above question is "yes." One of the underlying assumptions of the Brownfields Programs is that the cities' cancer grows from the shift in the American economy away from manufacturing employment. In other words, the regional duality in environmental standards may be justified by disparate recoveries from the effect of deindustrialization.

But before jumping at the opportunity to create employment, city leaders should ask the next question: will this measure prevent an ultimate cure? In other words, are cities preventing the possibility of economic parity with the suburbs by consigning themselves to second-class environmental status? Leaving aside moral arguments,[60] the long-term economic implication of environmental disparity assigns "clean" jobs to the suburbs and "dirty" jobs to the city in a downward spiral.

In a somewhat anomalous position, city leaders resist extending brownfield-like environmental standards to all properties: city and suburb.[61] Fearing that all the money, and jobs, would migrate to the suburbs, city leaders want to keep this environmental exception

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goal of green space preservation, the disparate environmental treatment of city property is an even more stark tradeoff.

59. Se-Hark Park, *Linkages Between Industry and Services and Their Implication for Urban Employment Generation in Developing Countries*, 30 J. OF DEV. ECON. 359 (April 1989).

60. Such as, for example, environmental justice. For a discussion of this topic, see Georgette C. Poindexter, *Addressing Morality in Urban Brownfield Redevelopment*, 15 VA. ENVTL. L.J. 37 (1995); Robert R.M. Verchick, *In a Greener Voice: Feminist Theory and Environmental Justice*, 19 HARV. WOMEN'S L.J. 23 (1996).

61. Rich Henson, *City Sees Loopholes in Ridge Plan for Polluted Sites*, PHILADELPHIA INQUIRER, Mar. 30, 1995, at B1. (Deputy Mayor of Philadelphia Mark Gaige

to themselves. I submit that this position is short-sighted. The effects of this policy direction will be felt long after the current mayors leave office. For the long-term viability of central cities, leaders should demand an even application of environmental standards that addresses the brownfields problems but does not create environmental apartheid. This situation calls for an honest and frank dialogue to establish workable environmental standards applied to both city and suburbs.

Of course, such a dialogue would require a reconsideration of the very foundation of the goals of the environmental laws. Through their application, CERCLA and the state environmental laws have lost sight of the long range goals of environmental protection by breaking up protection into incremental policies that, not suprisingly, have begun to conflict with one another. That incremental and piecemeal approach has contributed to the very existence of brownfields today.[62]

This foundational reconsideration may tear at the very heart of regulatory theory.[63] But it need not. We can simply reexamine the standards of the present regulatory system with a new and critical eye and ask whether the standards as an entire regime—not as an individual program or regulation—are effectuating the goals of environmental protection. For example, we can explore "reflexive" environmental standards that go beyond traditional governmental mandates or market driven limitations. Reflexive environmental law would require a process-oriented restructuring of environmental standards.[64]

Our cancer patient should not settle for the temporary alleviation of her symptoms. Despite the pain, she must hold to the hope that one day the cure will be within her grasp.

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commented, "If the law applies to every site, then where is the incentive to reuse brownfields?").

62. For a discussion of this topic, *see* J.B. Ruhl, *Complexity Theory as a Paradigm for the Dynamical Law-And-Society System*, 45 DUKE L.J. 849, 883 (1996).

63. Such as acknowledging the complexity of the societal environment and avoiding the reductionist theory that underpins environmental law today. *See id.*

64. Eric W. Orts, *Reflexive Environmental Law*, 89 Nw. U. L. REV. 1227, 1264 (1995) ("Rather than detailed pronouncements of acceptable behavior, the law adopts procedures for regulated entities to follow. The procedures are adopted with a design in mind to encourage thinking and behavior in the right direction.").

Appendix

The components of the formula on page 17, *supra*, were estimated using the following boundaries:

For MP:

If the job creation in other sectors between 1950 and 1990 (JOBS) is 0, then MP=0:

If JOBS=0, then MP=0.

If MD (excluding the unemployment rate in the city in 1990 (r_u)) is greater than the number of manufacturing jobs absorbed by JOBS (assuming that JOBS absorbed the job losses in all the sectors proportionally) (SHARE), then absorption into other sectors is in proportion to manufacturing's share in total employment:

If $MD(1-r_u) > SHARE$, then MP=SHARE.

If MD (excluding the unemployment rate in the city in 1990) is less than or equal to the number of manufacturing jobs absorbed by JOBS (assuming that JOBS absorbed the job losses in all the sectors proportionally), then absorption into other sectors is MD (excluding the unemployment rate in the city in 1990):

If $MD(1-r_u) \leq SHARE$, then $MP=MD(1-r_u)$.

For MU:

If, estimated with manufacturing's share in total employment, unemployment in manufacturing (UM) is less than unemployment in those who lost jobs in manufacturing (estimated with the unemployment rate in the city in 1990), then MU is the same as the city's unemployment rate:

If $UM < MD(r_u)$, then $MU=MD(r_u)$.

If, estimated with manufacturing's share in total employment, unemployment in manufacturing is greater than or equal to unemployment in those who lost jobs in manufacturing (estimated with the unemployment rate in the city in 1990), and estimated unemployment in manufacturing is less than MD minus MP, then MU equals unemployment in manufacturing:

If $UM \geq MD(r_u)$ and $UM < MD-MP$, then MU=UM.

If, estimated with manufacturing's share in total employment, unemployment in manufacturing is greater than or equal to unemployment in those who lost jobs in manufacturing (estimated with the unemployment rate in the city in 1990) and estimated unemployment in manufacturing is greater than or equal to MD minus MP, then MU equals MD-MP:

If UM ≥ MD(r_u) and UM ≥ MD-MP, then MU=MD–MP.

For MM:

If MD–MP–MU > 0, then MM=MD–MP–MU.
If MD-MP-MU ≤ 0, then MM=0.