

REGULATION, UNEMPLOYMENT, AND COST-BENEFIT ANALYSIS

*Jonathan S. Masur and Eric A. Posner**

INTRODUCTION..... 580

I. UNEMPLOYMENT IN THE REGULATORY STATE..... 585

 A. *The Varying Agency Approaches to Unemployment* 585

 1. *Industry-Level Analysis* 586

 2. *Economy-Wide Treatment of Unemployment*..... 595

 B. *A Cross-Sectional Snapshot*..... 597

II. THE ECONOMICS OF UNEMPLOYMENT 603

 A. *Cost-Benefit Analysis* 603

 B. *Is Unemployment a Cost?* 604

 C. *The Labor Market and Unemployment* 608

 D. *Measuring the Cost of Unemployment* 613

 1. *Wage Effects*..... 613

 2. *Nonpecuniary Effects*..... 615

 3. *Variation*..... 616

 4. *Summary* 618

 E. *Cost-Benefit Analysis and Unemployment* 619

 F. *Compensating Differentials and Unemployment Insurance* 621

 G. *Objections*..... 623

III. UNEMPLOYMENT INTEGRATED WITH COST-BENEFIT ANALYSIS..... 626

* Jonathan S. Masur is an Assistant Professor of Law and the Herbert and Marjorie Fried Teaching Scholar at the University of Chicago Law School; Eric A. Posner is the Kirkland & Ellis Professor of Law and the Aaron Director Research Scholar at the University of Chicago Law School. The authors would like to thank Omri Ben-Shahar, Alex Boni-Saenz, Tom Ginsburg, Bruce Meyer, William Hubbell, Prasad Krishnamurthy, Saul Levmore, Richard McAdams, Thomas Miles, Martha Nussbaum, and audience members at the University of Chicago Law School, Hofstra Law School, and Berkeley Law and Economics Seminar, the John F. Kennedy School of Government at Harvard, and the Office of Information and Regulatory Affairs for helpful comments, and to Carl Newman and David Woolston for valuable research assistance. Professor Posner would like to thank the Microsoft Fund and the Russell Baker Scholars Fund at the University of Chicago Law School for financial assistance; Professor Masur would like to thank the David and Celia Hilliard Fund for financial assistance.

CONCLUSION: THE TRADEOFF BETWEEN EMPLOYMENT AND OTHER GOODS	633
--	-----

INTRODUCTION

During a hearing before the House Subcommittee on Environment and the Economy, Congressman Cory Gardner asked an Environmental Protection Agency (“EPA”) official, “Is it standard procedure for an economic analysis to ignore the impact on jobs?”¹ Gardner was referring to the EPA’s use of cost-benefit analysis, which does not take into account the effect of environmental regulations on employment. The EPA official was unable to deliver a coherent answer, and the “who’s on first” routine that followed became a hit in the wonkier corners of the Internet.

The question was a good one, and yet it is not surprising that the EPA official had such trouble answering it. Cost-benefit analysis, as traditionally performed and as it appears in textbooks,² does not take into account employment effects.³ Cost-benefit analysis of a regulation compares the benefits for the public with the costs of complying with the regulation. The benefits of an environmental regulation, for example, take the form of improvements to human health; the costs are measured in terms of losses to consumers and shareholders.

Yet there is no obvious reason for excluding unemployment costs from cost-benefit analysis. These costs are no different analytically from the costs incurred by consumers and shareholders. The Obama administration itself has directed agencies to take into

¹ Energyandcommerce, EPA Admits Jobs Don’t Matter, YouTube (Apr. 14, 2011).

² See, e.g., Harry F. Campbell & Richard P. C. Brown, *Benefit-Cost Analysis: Financial and Economic Appraisal Using Spreadsheets*, at xi (2003); Edward M. Gramlich, *A Guide to Benefit-Cost Analysis* 8 (2d ed. 1998); E.J. Mishan, *Elements of Cost-Benefit Analysis* 15 (1972); Edith Stokey & Richard Zeckhauser, *A Primer for Policy Analysis* 155 (1978).

³ E.g., EPA, *Regulatory Impact Analysis: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters*, at 4-6 (2011), available at http://www.epa.gov/ttn/ecas/regdata/RIAs/boilersriafinal110221_psg.pdf (“A stand-alone analysis of jobs is not included in a standard cost-benefit analysis.”).

account job loss when evaluating regulations, as did the Clinton administration before it.⁴ Agencies have long reported the predicted unemployment effects of regulations and have in some cases declined to choose certain regulatory options because the unemployment effects were too high. But they do not incorporate the unemployment costs into cost-benefit analysis,⁵ which is the standard basis for evaluating regulations, so it is not clear what role unemployment plays in their evaluations of proposed regulations.

Some commentators agree with Congressman Gardner that agencies' failure to take into account employment effects is a defect in cost-benefit analysis. Professor David Driesen, for example, has led a campaign to revive feasibility analysis, a rival to cost-benefit analysis that takes into account the employment effects of a regulation.⁶ Under feasibility analysis, the agency must issue regulations that are as strict as possible up until the point at which factories are shut down and workers are laid off. While vague on where that point is—on how many jobs must be lost before a regulation becomes “infeasible”—feasibility analysis does put the focus on jobs rather than on costs to consumers.

⁴ See Exec. Order No. 13,563, 76 Fed. Reg. 3821, 3821 (Jan. 18, 2011) (directing agencies to “protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation”); see also Exec. Order No. 12,866, 3 C.F.R. 638, 646 (1994), *reprinted in* 5 U.S.C. § 601 (2006) (directing agencies to take into account the costs and benefits of intended regulations, and defining significant regulatory actions as those with a material adverse effect on jobs).

⁵ Government documents that direct agencies to use cost-benefit analysis and describe the procedure do not address employment effects. See, e.g., Office of Mgmt. & Budget, Office of Info. & Reg. Affairs, 2011 Report to Congress on the Benefits and Costs of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities 36–38 (2011), available at http://www.whitehouse.gov/sites/default/files/omb/inforeg/2011_cb/2011_cba_report.pdf (citing academic literature on the relationship between regulation and job growth but not describing the employment effects of regulations discussed in the report); Office of Mgmt. & Budget, Office of Info. & Reg. Affairs, *Economic Analysis of Federal Regulations Under Executive Order 12,866 § III (B)–(C)* (1996), available at http://www.whitehouse.gov/omb/inforeg_riaguide.

⁶ See David M. Driesen, *Distributing the Costs of Environmental, Health, and Safety Protection: The Feasibility Principle, Cost-Benefit Analysis, and Regulatory Reform*, 32 B.C. Envtl. Aff. L. Rev. 1, 35–38, 51 (2005).

We have criticized feasibility analysis in another paper and will not detail those criticisms here.⁷ The obvious problem with feasibility analysis in the present context is that it provides no basis for determining whether the job displacement associated with a regulatory option is socially excessive. Another problem is its reliance on thresholds: a regulation that does not cause massive unemployment may still be socially undesirable because it produces marginal regulatory benefits that are less than the costs of the less-than-massive unemployment that the regulation does cause. Cost-benefit analysis provides a method for comparing the costs and benefits of regulations without relying on artificial thresholds, and so would seem to provide an appropriate procedure for taking into account unemployment costs along with all the other effects of regulations.

Currently, the Office of Management and Budget's Office of Information and Regulatory Affairs ("OIRA")⁸ appears to engage in what we will call "job-loss analysis," even for regulations that are not governed by feasibility analysis.⁹ Under the current approach, agencies must issue both a cost-benefit analysis and a job-loss analysis, and may issue a regulation only if it satisfies both analyses. However, as we will discuss, it is not at all clear what the standard is for job-loss analysis—that is, how many jobs must be lost for a regulation to be impermissible.

Our conclusions can be easily summarized. We speculate (but cannot document) that cost-benefit analysis does not take into account job losses because the economists who developed cost-benefit analysis made classical assumptions that labor markets "clear"—that workers who lose their jobs can quickly obtain new jobs at equal wages.¹⁰ On this view, losses incurred by workers who

⁷ See generally Jonathan S. Masur & Eric A. Posner, *Against Feasibility Analysis*, 77 U. Chi. L. Rev. 657 (2010) (arguing that feasibility analysis has no normative basis and should not be used to evaluate regulatory options).

⁸ The OIRA is responsible for reviewing agency regulations and "ensur[ing] consistency with the goals of the Administration," among other requirements. Nicholas Bagley & Richard L. Revesz, *Centralized Oversight of the Regulatory State*, 106 Colum. L. Rev. 1260, 1264 (2006) (quoting Exec. Order No. 12,498 § 1(d), 3 C.F.R. 323, 323 (1986), *reprinted in* 5 U.S.C. § 601 (1988), *revoked by* Exec. Order No. 12,866) (internal quotation marks omitted); see *id.* at 1263–67 (describing the history and role of the OIRA).

⁹ See Exec. Order No. 12,866, 3 C.F.R. at 646.

¹⁰ Or, alternatively, that even if labor markets do not clear, it is too difficult to factor unemployment costs into the analysis. Cf. Robert Haveman & John Krutilla, *Unem-*

must search for new jobs are rounding errors in cost-benefit analyses that involve costs and benefits in the tens or hundreds of millions of dollars. However, recent literature has made clear that unemployment costs are high and persistent. A senior worker who is laid off will on average experience a long-term reduction in income of as much as twenty percent, probably because the worker loses significant firm- and industry-specific human capital as a result of the layoff.¹¹ We suggest that the cost to workers of unemployment could be as high as \$100,000 per worker. If that figure were used in cost-benefit analyses, many regulations would need to be revised and made less stringent. But the precise level of the figure depends on many factors, such as demographics and industry structure, so it would be premature to use the \$100,000 figure or any other figure in regulatory cost-benefit analyses. Agencies should collect information about the nature of job loss caused by proposed regulations, better estimate these layoffs, and incorporate unemployment costs in cost-benefit analyses of major regulations.¹²

ployment, Excess Capacity, and Benefit-Cost Investment Criteria, 49 *Rev. Econ. & Stat.* 382, 382 (1967) (noting empirical hurdles to accounting for employment effects in the "costs of project construction"). It is also possible that unemployment costs were considered too remote and insufficiently proximate to regulation to justify including in cost-benefit analysis. Cf. William Bishop & John Sutton, Efficiency and Justice in Tort Damages: The Shortcomings of the Pecuniary Loss Rule, 15 *J. Legal Stud.* 347, 359, 364-65 (1986) (discussing a similar problem relating to economic loss in torts); Victor P. Goldberg, Recovery for Pure Economic Loss in Tort: Another Look at *Robins Dry Dock v. Flint*, 20 *J. Legal Stud.* 249, 273-75 (1991) (same). The Haveman & Krutilla Article focuses on government projects which are not cost-justified when full employment exists, but may be when unemployment makes the opportunity cost of labor zero. Our Article looks at the flip side of this question: not whether government projects should be used when unemployment is high but whether government regulation should be reduced when unemployment is high.

¹¹ See *infra* text accompanying notes 117-18.

¹² This Article is related to, but has a different focus from, the "jobs vs. environment" literature. This literature examines whether environmental regulation has caused job loss and generally finds mixed evidence of such an effect, albeit for the limited group of industries that have been studied, and only with respect to environmental regulation rather than other forms of regulation, like occupational safety regulation. See Randy Becker & Vernon Henderson, Effects of Air Quality Regulations on Polluting Industries, 108 *J. Pol. Econ.* 379, 397 (2000) (finding that strict regulation affects plants in polluting industries by reducing the construction of new plants in those industries by 26% to 45% in nonattainment areas); Eli Berman & Linda T.M. Bui, Environmental Regulation and Labor Demand: Evidence from the South Coast Air Basin, 79 *J. Pub. Econ.* 265, 269 (2001) (finding no evidence that local air quality regulation substantially reduced employment); Matthew A. Cole & Rob J. Elliott, Do

There is no obvious ideological valence to incorporating unemployment costs into cost-benefit analysis. Introducing additional costs into the analysis would in many instances militate against more stringent regulation. On the other hand, it would do so in the interests of preserving primarily working-class jobs. There have traditionally been strong political associations between the promotion of stringent regulation and the preservation of working-class jobs; our approach complicates that linkage by suggesting that those two goals often must be traded off against one another. As noted above, this tradeoff is already reflected in feasibility analysis. Our argument is that cost-benefit analysis performs this tradeoff more accurately and completely from the standpoint of social welfare by taking into account all relevant benefits and costs and avoiding reliance on arbitrary thresholds.

Environmental Regulations Cost Jobs? An Industry-Level Analysis of the UK, 7 B.E. J. Econ. Analysis & Pol'y, Iss. 1, Art. 28, at 3 (2007), available at <http://www.degruyter.com/view/j/bejeap.2007.7.1/bejeap.2007.7.1.1668/bejeap.2007.7.1.1668.xml> (finding that "environmental regulation costs do not have a statistically significant effect on employment levels"); Michael Greenstone, The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufactures, 110 J. Pol. Econ. 1175, 1176, 1178 (2002) (finding that between 1972 and 1987, "nonattainment counties" regulated heavily under the Clean Air Act lost approximately 590,000 jobs and \$75 billion of output in pollution-intensive industries more than the less-regulated "attainment counties"); Matthew E. Kahn, Particulate Pollution Trends in the United States, 27 Regional Sci. & Urb. Econ. 87, 105 (1997) (finding county- and plant-level evidence that particulate regulation slightly lowered economic activity); Richard D. Morgenstern et al., Jobs Versus the Environment: An Industry-Level Perspective, 43 J. Envtl. Econ. & Mgmt. 412, 413-14 (2002) (finding that increased environmental spending in response to strict environmental policies generally does not cause a significant change in employment); W. Reed Walker, Environmental Regulation and Labor Reallocation: Evidence from the Clean Air Act, 101 Am. Econ. Rev. (Papers & Proc.) 442, 443 (2011) (finding negative effects on employment from Clean Air Act amendments adopted in 1990). These results can be interpreted in many ways. They might suggest that governments deliberately minimize regulation in order to avoid job loss or that, as a matter of practice, regulations that emerge from the political process have a limited impact on jobs. But the literature does not address how governments should regulate in order to take into account the costs of unemployment. That is the goal of this Article.

I. UNEMPLOYMENT IN THE REGULATORY STATE

A. *The Varying Agency Approaches to Unemployment*

The costs of unemployment have never figured into cost-benefit analyses performed by regulatory agencies. But that is not to say that agencies always ignore employment effects when they regulate. On the contrary, the vast majority of regulations include some assessment of the regulation's effect on employment. In some cases, this assessment is part of the agency's feasibility analysis—its inquiry into whether a regulation is both technologically and economically feasible.¹³ In other cases, a job-loss analysis is conducted in parallel with a cost-benefit analysis.

A wide spectrum of federal regulatory statutes demand that agencies conduct some form of feasibility analysis, which is an inquiry into whether complying with a putative regulation will prove economically feasible for the affected industry.¹⁴ Courts have interpreted this requirement to mean that a regulation must not bankrupt a large proportion of firms in that industry;¹⁵ academic defenders of feasibility analysis have similarly described the requirement as one that prevents regulation that would cause "widespread plant shutdowns."¹⁶ Neither of these requirements necessarily implicates unemployment—workers at firms that close might be hired by the firms that remain open or be absorbed into other industries. Nevertheless, agencies have understood themselves as obligated to analyze the unemployment effects of regulation directly.

As for job-loss analysis, there is no academic literature or public discussion of this approach as far as we are aware. In practice, it amounts to a prediction about the number of jobs that will be lost as a result of a regulation, along with an implicit threshold for the

¹³ Agencies believe that feasibility analysis is mandated by law, a conclusion that we have called into question. See Masur & Posner, *supra* note 7, at 667.

¹⁴ *Id.* at 657.

¹⁵ *United Steelworkers v. Marshall*, 647 F.2d 1189, 1272 (D.C. Cir. 1980) (“[A]s for economic feasibility, OSHA must construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry, even if it does portend disaster for some marginal firms.”).

¹⁶ Driesen, *supra* note 6, at 3; see also Lisa Heinzerling, *Statutory Interpretation in the Era of OIRA*, 33 *Fordham Urb. L.J.* 1097, 1102 n.37 (2006).

level of job loss that is unacceptable. Although feasibility and job-loss analysis are different, they overlap in their treatment of unemployment, and so henceforth we will treat them as the same.

1. Industry-Level Analysis

For the most part, agencies have complied with the mandate to analyze employment by evaluating the effects of regulation on the regulated industry, standing alone. For instance, a 2009 National Highway Traffic Safety Administration (“NHTSA”) regulation setting Corporate Average Fuel Economy (“CAFE”) standards includes an analysis of the regulation’s economic feasibility.¹⁷ This analysis describes the economic effects of regulation on the automobile industry as a whole; the agency understands its statutory mandate as determining whether regulation is “within the financial capability of the [automobile] industry, but not so stringent as to threaten substantial economic hardship for the industry.”¹⁸ But after surveying the automobile industry in general terms, the agency turns with greater specificity to the regulation’s effect on employment.

The NHTSA’s fuel economy standards force automobile manufacturers to develop and install more fuel-efficient engines or find other ways of increasing automobile fuel efficiency. This regulation has a number of potentially offsetting effects on employment. The automotive firms will be forced to expend resources on research and development, possibly including hiring more engineers and scientists to develop more fuel-efficient engines.¹⁹ The new technology might also change the number of workers needed on the production line to install the engines and construct the automobiles.²⁰ However, the agency raises these possibilities just to dismiss

¹⁷ Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011, 74 Fed. Reg. 14,196, 14,377 (Mar. 30, 2009) (to be codified at 49 C.F.R. pts. 523, 531, 533, 534, 536, 537) [hereinafter *Average Fuel Economy*].

¹⁸ *Id.* (quoting *Pub. Citizen v. Nat’l Highway Traffic Safety Admin.*, 848 F.2d 256, 264 (D.C. Cir. 1988)).

¹⁹ *Id.* at 14,378 (“[H]iring of additional engineers by automobile companies and their suppliers to do research and development and testing on new technologies to determine their capabilities, durability, platform introduction, etc.”).

²⁰ *Id.*

them. It treats these two effects as if they will have zero impact,²¹ believing that they will generally be ambiguous and small.

The major employment effect of the regulation lies elsewhere. By requiring new technology, the NHTSA's regulation will raise the cost of producing automobiles. At the same time, it will reduce the cost of owning an automobile by reducing fuel expenses. The increase in production costs is expected to substantially exceed the decrease in operating costs.²² The automobile manufacturers will then have to decide whether to absorb these costs themselves (in the form of lower profits or salaries) or pass them along to consumers. If they pass even some of the costs along to consumers the price of automobiles will rise. Consumers will then purchase fewer automobiles, and firms will lay off excess workers who are no longer needed in the production line.

The first step along this causal chain requires the NHTSA to calculate the expected increase in the price of automobiles under the regulation. First, the NHTSA assumed that automobile manufacturers would be able to pass the entire increased cost of building more fuel-efficient automobiles along to consumers.²³ Next, the NHTSA calculated how much it would actually cost the manufacturer to build the more fuel-efficient cars. It performed this calculation independently for every major automobile manufacturer with sales in the United States. It then translated this additional cost into the additional price that a consumer must pay over the lifetime of the automobile (which the agency assumed to be five years); to the base price, the NHTSA added the cost of higher interest payments (for those consumers who lease the vehicle), higher sales taxes, and higher insurance costs (it costs more to insure a more expensive automobile), while subtracting the benefit of higher resale value.²⁴ The NHTSA estimated that an average consumer would pay 5.5% in sales tax,²⁵ 8.0% of the vehicle's cost in insur-

²¹ Nat'l Highway Traffic Safety Admin. Office of Regulatory Analysis and Evaluation: Nat'l Ctr. for Statistics and Analysis, *Final Regulatory Impact Analysis: Corporate Average Fuel Economy for MY 2011 Passenger Cars and Light Trucks*, at VII-19 (2009), available at http://www.nhtsa.gov/DOT/NHTSA/Rulemaking/Rules/Associated%20Files/CAFE_Final_Rule_MY2011_FRIA.pdf [hereinafter NHTSA].

²² *Id.* at VII-15.

²³ *Id.* at VII-12.

²⁴ *Id.* at VII-13 to -14.

²⁵ *Id.* at VII-13.

ance premiums,²⁶ and 9.5% in loan interest payments.²⁷ The agency also estimated that 27.7% of the car's resale value would remain after five years.²⁸ The agency thus calculated that the consumer would be able to recoup 4.7% ($27.7-9.5-8.0-5.5=4.7$) of the added regulatory cost of the automobile.²⁹ The consumer would, in effect, "only" be paying for 95.3% of the additional cost of complying with the NHTSA's regulations.

The agency then subtracted the reduced cost of operating the automobile that would result from lower fuel costs.³⁰ The resulting figure was the effective automobile cost increase under the regulation.³¹

Next, the NHTSA determined the effect that price increases will have on consumer demand—in other words, the price elasticity of demand for automobiles. According to the agency, economic studies have demonstrated that price elasticity in the demand for automobiles is -1.0, which means that every 1% increase in the cost of automobiles decreases the number of automobiles purchased by 1%.³² Accordingly, the NHTSA calculated the expected price increase in automobiles as a percentage of current costs, which yields the expected percentage drop in consumer demand. The NHTSA then translated that percentage decrease in demand into absolute numbers of automobile sales that would not occur as a result of its regulation. The NHTSA provided an example of this calculation as applied to the Ford Motor Company:

²⁶ *Id.*

²⁷ *Id.* at VII-13 to -14. Interest payments are actually higher, but the NHTSA discounted them by 30% because 30% of consumers do not take out car loans.

²⁸ *Id.* at VII-14.

²⁹ *Id.* The figures reported in the text correspond to a discount rate of 7%. The NHTSA also performed a similar calculation at a discount rate of 3% and estimated that a consumer would recoup 8.2% of the additional value of the vehicle. *Id.*

³⁰ *Id.* at VII-15.

³¹ Average Fuel Economy, 74 Fed. Reg. 14,196, 14,378 (Mar. 30, 2009) (to be codified at 49 C.F.R. pts. 523, 531, 533, 534, 536, 537).

³² NHTSA, *supra* note 21, at VII-12 (citing Robert Bordley, An Overlapping Choice Set Model of Automotive Price Elasticities, 28 *Transp. Res. Pt. B* 401, 401-08 (1994); Andrew N. Kleit, The Effect of Annual Changes in Automobile Fuel Economy Standards, 2 *J. Reg. Econ.* 151, 151-72 (1990); Patrick S. McCarthy, Market Price and Income Elasticities of New Vehicle Demands, 77 *Rev. Econ. & Stat.* 543, 543-47 (1996)).

A sample calculation for Ford passenger cars under the Optimized 7% alternative in MY 2011 is an estimated retail price increase of \$119 which is multiplied by 0.953 to get a residual price increase of \$113. The estimated fuel savings over the 5 years of \$176 at a 7 percent discount rate results in a net benefit to consumers of \$63. Comparing that to the \$25,373 average price is a 0.247 percent price decrease. Ford sales were estimated to be about 1,615,000 passenger cars for MY 2011. With a price elasticity of -1.0, a 0.247 percent decrease in net cost to consumers could result in an estimated increase in sales of 3,997 passenger cars.³³

Though this projection seems quite rosy, the NHTSA immediately noted that “[o]ur projections indicate that CAFE standards will result in sales increases for some manufacturers under some scenarios, but overwhelmingly decreases for the industry total.”³⁴

In total, the NHTSA estimated that heightened CAFE standards would lead to a decline in sales of 10,757 automobiles.³⁵ The agency then calculated that “the average U.S. domestic employee [in the Motor Vehicle and Equipment Manufacturing sector] produces 10.5 vehicles.”³⁶ Dividing 10,757 by 10.5, the NHTSA arrived at an estimate of 1,024 lost jobs.³⁷

The preceding discussion concerns the regulation that the NHTSA eventually adopted, based on a cost-benefit analysis that did not include the costs of unemployment. However, the NHTSA actually considered six different regulatory options of increasing stringency. We reproduce here the agency’s table of estimated job losses under these six options:

³³ Id. at VII-15.

³⁴ Id.

³⁵ Id. at VII-17 tbl.VII-6.

³⁶ Id. at VII-19.

³⁷ Average Fuel Economy, 74 Fed. Reg. 14,196, 14,378, 14,379 tbl.VII-1 (Mar. 30, 2009) (to be codified at 49 C.F.R. pts. 523, 531, 533, 534, 536, 537); NHTSA, *supra* note 21, at VII-19.

Table 1: NHTSA Estimates of CAFE Standard Regulation on Automobile Industry Employment for 2011³⁸

Regulatory Option	Reduction in Automobile Sales	Net Effect on Employment
Option 1	-7,496	-714
Option 2	-10,757	-1,024
Option 3	-32,329	-3,079
Option 4	-48,704	-4,638
Option 5	-86,434	-8,232
Option 6	-585,272	-55,740

As is evident from the preceding discussion, the agency selected Option 2, a level of regulation that would result in the loss of 1,024 jobs in 2011. It chose to regulate at this level because doing so maximized net social benefits—total benefits minus total costs—which the NHTSA had calculated without regard to the costs of unemployment.³⁹ The NHTSA did not explain why it believed that the loss of 1,024 jobs would not impose undue hardship on the automobile industry. Option 6 was the only option the NHTSA explicitly ruled out on the ground that it would result in too many lost jobs.⁴⁰ This may well be a defensible position, but the NHTSA provided no explanation for that conclusion either. Indeed, this perception may be entirely an artifact of the regulatory options the NHTSA considered. Fifty-five thousand lost jobs seems like quite a lot when compared with the 1,024 jobs lost under Option 2, but it may actually be only a relatively small portion of the automotive industry or a small portion of the jobs lost during the automotive bankruptcies. The NHTSA's economic feasibility analysis did not attempt to justify its conclusion.⁴¹

The best interpretation of the agency's approach is that it used cost-benefit analysis subject to a feasibility constraint. Option 2 was the best rule on cost-benefit terms: because the job loss was

³⁸ NHTSA, *supra* note 21, at VII-17 tbl.VII-6, VII-21 tbl.VII-8. Again, we report only the calculations done with a 7% discount rate.

³⁹ Average Fuel Economy, 74 Fed. Reg. at 14,396.

⁴⁰ See *id.* at 14,378, 14,379 tbl.VII-1, 14,395, 14,441.

⁴¹ *Id.* at 14,396 (“The standards thus fulfill NEPA’s objectives and, under EPCA, the need of the nation to conserve energy, while not imposing substantial economic hardship on the industry . . .”).

not too great, it was acceptable. If, by contrast, Option 2 had entailed a job loss of 55,000 it would have been rejected in favor of Option 1 or some other less stringent rule. However, because the agency does not provide a standard for determining economic feasibility—how much job loss is too much—the constraint is meaningless or at best ad hoc. It is arbitrary to assert that 55,000 lost jobs is too much while 8,000 lost jobs is tolerable, and one could imagine many other approaches that are no less arbitrary: for example, looking at job loss as a percentage rather than an absolute number, or looking at the percentage of job loss in particular communities. In any event, one needs a rule to determine the tolerable level of job loss.

Moreover, all lost jobs are not equivalent. A significant unemployment figure (for example, 55,000 jobs lost) could have only a minor effect if all of the workers are quickly rehired by another firm or in another industry. Conversely, significantly fewer numbers of lost jobs could be very harmful if they are concentrated in a one-factory town or if the affected workers have no other skills and few prospects for future employment. One should care not only about the quantity of the jobs lost, but the actual impact on people's well-being, including their ability to obtain replacement jobs and the quality and pay of those replacement jobs.

Finally, the number of lost jobs that an agency is willing to tolerate should depend on the extent of the benefits from regulating. Fifty-five thousand lost jobs might be tolerable for a regulation with truly sweeping effect but intolerable in the course of a much more minor regulation. If agencies incorporated unemployment into cost-benefit analysis, this type of comparison would be possible. But the NHTSA, like other agencies, calculated the costs and benefits of regulation without any reference to unemployment-related costs. The agency's "Economic Impact Analysis" was merely a check on the practicability of the regulatory option the agency had already chosen on other grounds—and a standardless check at that. The result is that unemployment is treated almost as if it were incommensurable with other goods such as consumer welfare or environmental protection, despite the fact that consumer welfare and environmental protection are themselves treated as commensurable, as are nearly all other costs and benefits of regulation.

The NHTSA's fuel economy regulation is just one of the many regulations that take employment into account in this sideways fashion. The EPA engages in a similar analysis across a wide variety of regulations, though its approach differs in important respects. Consider, for instance, the EPA's 2011 regulation of airborne emissions from boilers and process heaters.⁴² Like the NHTSA, the EPA decomposed the employment effects of its regulation into three components.⁴³ First, higher production costs caused by regulation increase prices, reducing demand for the regulated product and thus for labor in the regulated industry. The second and third effects point in the other direction: as production costs increase, it takes more labor to create the same level of output, and regulation may change the technology used in production in a way that makes production more or less labor intensive. For instance, polluters might comply with regulation by using automation or by hiring additional workers.⁴⁴

These are the same effects described by the NHTSA in its fuel economy regulation. But whereas the NHTSA selected the dominant effect (increased production costs) and attempted to calculate it directly, the EPA instead relied on an academic study of employment and environmental regulation that attempts to capture these three effects simultaneously. This paper, by Morgenstern, Pizer, and Shih ("MPS"),⁴⁵ uses a structural model to estimate the effects of environmental regulation on employment across "four heavily polluting industries": pulp and paper, plastics, petroleum refining, and steel.⁴⁶ MPS find that environmental regulations actually *create* jobs in the net at a (statistically insignificant) rate of 1.55 new jobs per \$1 million in cost increases.⁴⁷

The EPA applied the MPS study directly to its boiler regulation. The EPA estimated that the regulation would create approximately \$2.4 billion in compliance costs.⁴⁸ MPS measured costs in

⁴² National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, 76 Fed. Reg. 15,608 (Mar. 21, 2011) (to be codified at 40 C.F.R. pt. 63).

⁴³ EPA, *supra* note 3, at 4-9.

⁴⁴ *Id.*

⁴⁵ Morgenstern et al., *supra* note 12.

⁴⁶ *Id.* at 412.

⁴⁷ *Id.* at 427-28.

⁴⁸ EPA, *supra* note 3, at 4-10 n.6.

1987 dollars, while the EPA's boiler regulation was priced in 2009 dollars, so the EPA applied a .6 multiplier in order to discount the regulatory costs to their 1987 value.⁴⁹ Accordingly, the EPA concluded that its boiler regulation would create approximately 2,200 new jobs.⁵⁰

The obvious problem with the EPA's analysis—one explicitly acknowledged by the agency—is that even if the MPS calculations are correct, what is true in the pulp and paper, plastics, petroleum, and steel industries may not hold true with regard to boilers and process heaters.⁵¹ There is no reason to believe that employment in the boiler industry will be affected by regulation in the same way that those four industries were—in part because those industries were themselves affected differently. MPS found that each \$1 million in additional regulatory costs would create 6.90 jobs in plastics,⁵² 2.17 jobs in petroleum, and 0.53 jobs in steel, but would *eliminate* 1.13 jobs in pulp and paper manufacturing.⁵³ Without knowing where the boiler and process heater industry falls along this spectrum, we cannot estimate the true effect that regulation will have upon employment in that industry. The EPA also ignored studies that, contrary to MPS's, find negative employment effects of environmental regulations for other industries.⁵⁴ The EPA used the MPS study in other regulations, though occasionally it mixed it with other numerical approaches.⁵⁵ It is hard to avoid the inference

⁴⁹ Id. at 4-10 n.5.

⁵⁰ Id. at 4-10. The actual calculation was $\$2.4 \text{ billion} \times .6 \times 1.55 \text{ jobs} / \$1 \text{ million} = 2,200 \text{ jobs}$. See id. at 4-10 n.6.

⁵¹ Id. at 4-12.

⁵² This is not entirely surprising, as the conventional wisdom has long been that plastics is a growth industry. See, e.g., Internet Movie Database, Memorable Quotes for The Graduate, <http://www.imdb.com/title/tt0061722/quotes> (last visited Nov. 29, 2011) (“Mr. McGuire: I just want to say one word to you. Just one word. . .”).

⁵³ Morgenstern et al., *supra* note 12, at 427 tbl.III.

⁵⁴ See, e.g., Walker, *supra* note 12.

⁵⁵ EPA, Regulatory Impact Analysis: Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units, at 3-10 tbl.3-5 (2011), available at http://www.epa.gov/ttnecas1/regdata/RIAs/CISWIRIAfinal110221_psg2.pdf (estimating 300 jobs gained using only Morgenstern et al.'s methodology); EPA, Regulatory Impact Analysis: Amendments to the National Emission Standards for Hazardous Air Pollutants and New Source Performance Standards (NSPS) for the Portland Cement Manufacturing Industry, at 3-17 (2010), available at http://www.notoxicair.org/doc/EPA_RIA_analysis_amendment_cement.pdf (estimating 807 jobs lost using

that the EPA used MPS's irrelevant study, rather than other irrelevant studies that find negative effects, because MPS's results allowed the EPA to ignore the possible negative employment effects of its regulations.

Another example is the EPA's 1998 regulation of pulp and paper mills under the Clean Air and Clean Water Acts.⁵⁶ In parallel with the NHTSA's CAFE standards, the EPA calculated the costs and benefits of regulating without regard to the effects of regulation on employment. Separately from this cost-benefit analysis, the EPA conducted what it described as an "economic impact" analysis of the regulation's likely effects including a consideration of unemployment.⁵⁷ This regulation predated the MPS study, so the EPA instead performed what it describes as a "closure analysis."⁵⁸ Using methodology similar to the NHTSA's, it estimated the number of plants that would be forced to close and the number of firms that might be bankrupted as a result of regulation, and it calculated the number of jobs that would be lost as a result of these closures.⁵⁹

The EPA considered two regulatory options. It found that the first option would likely result in the loss of 5,711 jobs due to rising costs of production and the second in the loss of 9,887.⁶⁰ It then

mixed methodologies). Sometimes, however, the EPA does not use MPS at all, and for no apparent reason. See, e.g., Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category, 74 Fed. Reg. 62,996, 63,029-36 (Dec. 1, 2009) (to be codified at 40 C.F.R. pt. 450) (using an analysis of employment that resembles the NHTSA's).

⁵⁶National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category, 63 Fed. Reg. 18,504, 18,578-87 (Apr. 15, 1998) (to be codified at 7 C.F.R. pts. 63, 261, 430) [hereinafter National Emission Standards for Hazardous Air Pollutants for Source Category].

⁵⁷EPA, Economic Analysis for the National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category—Phase 1, at 1-3 (1997), available at http://water.epa.gov/scitech/wastetech/guide/pulppaper/upload/1997_11_13_guide_pulppaper_jd_pulp.pdf.

⁵⁸Id. at 3-4.

⁵⁹Id. at 3-4, 6-1.

⁶⁰Id. at 6-34 tbl.6-14. The EPA actually considered a third option but did not calculate the job loss that would result from it, so we disregard it here. See *id.* It is possible that the EPA did not bother to calculate the job loss for the third option because it would have been prohibitively great. See National Emission Standards for Hazardous

concluded on the basis of these figures that the first option was "economically achievable," while the second was not.⁶¹ Just as with the NHTSA's fuel economy regulations, the agency did not justify its conclusion that a regulation resulting in 5,711 lost jobs was tolerable while greater numbers of lost jobs would not be.⁶² Nor did it attempt to compare the costs of these lost jobs to the benefits of the regulation.

For the EPA, like the NHTSA, unemployment effectively functions as a regulatory veto point. If the chosen level of regulation will result in too much unemployment, it is unacceptable. Otherwise, the agency may proceed. Again the threshold between acceptable and unacceptable unemployment is not articulated, and so it is impossible to evaluate the EPA's choices. It may be no accident that both the NHTSA and the EPA eventually chose among the least stringent regulatory options. These options might have appeared most palatable to the agency in comparison to the alternatives. Or the agency might have considered a much wider variety of possibilities but only listed these regulatory options (and not other, less stringent ones) in order to make the agency's choice appear all the more reasonable. It is impossible to evaluate the agency's decision with no point of reference.

2. Economy-Wide Treatment of Unemployment

The unemployment calculations we described in the preceding Subsection were industry-specific. In the course of regulating a single industry, an agency calculated the anticipated effects of regula-

Air Pollutants for Source Category, 63 Fed. Reg. at 18,584 (indicating that the jobs lost under this third option for mill closures alone would have been significantly greater than under either of the first two options).

⁶¹ National Emission Standards for Hazardous Air Pollutants for Source Category, 63 Fed. Reg. at 18,584. However, the second option was chosen for new sources. See *id.* at 18,506.

⁶² It is actually not clear whether the EPA based this conclusion on the total number of jobs that would be lost throughout the economy from the regulation, which we report in the text, or purely on the number of lost jobs that would result from mills closing as a direct result of the regulation. See *id.* at 18,584. It would be indefensible for the EPA to decide on the appropriate level of regulation based upon only the "direct" impacts, which exclude the regulation's effects on suppliers and other affiliated industries.

tion on employment in that industry. This is the most common mode of analysis across agencies.⁶³

However, rather than follow this industry-specific methodology, at least one agency instead typically analyzes the effects of regulation on employment in the economy as a whole.⁶⁴ Over the past several years, the Department of Energy ("DOE") has promulgated a suite of energy efficiency regulations, each of which mandates an efficiency standard for some type of machinery or consumer device. Light bulbs and small electric motors were recent subjects of regulation.⁶⁵ Instead of examining the effect of regulation on demand and production in the regulated industry, the DOE offered a broad analysis of the effect of energy efficiency on the economy as a whole. Its reasoning is identical across all energy efficiency regulations: the primary effect of mandating greater energy efficiency is to decrease the amount of money consumers must spend on energy, freeing them to spend that additional wealth on some other activity.⁶⁶ The Bureau of Labor Statistics reports statistics on the number of jobs created per dollar of economic activity in various industries, and the DOE observes that the utility (electricity-generating) sector produces fewer jobs per dollar than most (but not all) other economic sectors.⁶⁷ Based on this observation, the DOE concluded that mandating greater energy efficiency in any product at any time will lead to increases in employment as consumers "shift economic activity from a less labor-intensive sec-

⁶³ See, e.g., Average Fuel Economy, 74 Fed. Reg. 14,196, 14,378 (Mar. 30, 2009) (to be codified at 49 C.F.R. pts. 523, 531, 533, 534, 536, 537); National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants, 75 Fed. Reg. 54,970, 55,025 (Sept. 9, 2010) (to be codified at 40 C.F.R. pts. 60, 63).

⁶⁴ The Department of Energy is the only agency we have identified that employs the methodology we describe below, but it is always possible that there are others.

⁶⁵ See Energy Conservation Program: Energy Conservation Standards for Small Electric Motors, 75 Fed. Reg. 10,874 (Mar. 9, 2010) (to be codified at 10 C.F.R. pt. 431); Energy Conservation Program: Energy Conservation Standards and Test Procedures for General Service Fluorescent Lamps and Incandescent Reflector Lamps, 74 Fed. Reg. 34,080 (July 14, 2009) (to be codified at 10 C.F.R. pt. 430).

⁶⁶ See, e.g., Energy Conservation Program: Energy Conservation Standards for Small Electric Motors, 75 Fed. Reg. at 10,907.

⁶⁷ *Id.*

tor (i.e., the utility sector) to more labor-intensive sectors (e.g., the retail and manufacturing sectors)."⁶⁸

This analysis is rife with problems. First, although the DOE may be correct that consumers will shift dollars previously spent on electricity toward more labor-intensive sectors of the economy, it has not considered the effects of regulation on the product being regulated. Sales of small electric motors will likely decline if they become more expensive due to regulation, and this may result in lost jobs. Or if sales do not decline, higher costs might force consumers to reduce spending in other economic areas, costing jobs elsewhere. Second, even if the DOE is correct that consumers will have more money to spend in other economic sectors, it cannot know exactly where that money will go. The money may be spent in an industry even less labor-intensive than power generation. Consumers may also save the money, which will normally depress employment in the short term. The agency is engaging in a kind of surreptitious industrial policy, funneling money to industries that will supposedly generate more jobs and away from industries that generate few jobs.

B. A Cross-Sectional Snapshot

We offer here a representative snapshot of agency regulations and their unemployment analyses. The table below lists thirteen recent regulations. For each regulation we report the job loss predicted by the agency and the agency's statement regarding why the unemployment would not render the regulation infeasible. In none of these regulations—and in no regulation we could find—did the agency compute the costs of unemployment and weigh them against the benefits.⁶⁹

⁶⁸ Id. at 10,908; see also, e.g., Energy Conservation Standards for General Service Fluorescent Lamps and Incandescent Reflector Lamps, 74 Fed. Reg. 16,920, 16,978 (proposed Apr. 13, 2009). The second cited regulation is a Notice of Proposed Rulemaking, but in its final rule the DOE adopted the employment analysis wholesale. Energy Conservation Program: Energy Conservation Standards and Test Procedures for General Service Fluorescent Lamps and Incandescent Reflector Lamps, 74 Fed. Reg. at 34,130.

⁶⁹ There is one quasi-exception. The Department of Agriculture's Roadless Area Conservation regulation describes unemployment as a "cost" but it does not monetize that cost, and its cost-benefit analysis does not take into account unemployment ef-

Table 2: Selected Regulatory Actions Involving Unemployment Calculations

Regulation	Agency	Citation	Estimated Job Loss	Explanation	Net Benefits
Protection of the Mojave habitat of the desert tortoise	Dep't of the Interior: Fish and Wildlife Service	59 Fed. Reg. 5820 (Feb. 4, 1994)	"no more than 425 jobs" ⁷⁰	Estimated that over 85% of unemployed workers would find new jobs within 2 years ⁷¹	Unquantified ⁷²
Effluent guidelines for pulp and paper manufacturing	EPA	63 Fed. Reg. 18,504 (Apr. 15, 1998)	5,711 ⁷³	Argued that only 1% of jobs in the industry would be lost ⁷⁴	\$159.5 million ⁷⁵
Effluent guidelines for landfills	EPA	65 Fed. Reg. 3008 (Jan. 19, 2000)	69-109 with +79 offsetting ⁷⁶	None, with an admission that job gains and losses may not occur in the same communities ⁷⁷	Partially quantified: only monetized reduced carcinogenic risk, which totals \$2,100-\$11,000 per year ⁷⁸

fects. Special Areas; Roadless Area Conservation, 66 Fed. Reg. 3244, 3267 (Jan. 12, 2001) (to be codified at 36 C.F.R. pt. 294).

⁷⁰ Endangered and Threatened Wildlife and Plants: Determination of Critical Habitat for the Mojave Population of the Desert Tortoise, 59 Fed. Reg. 5820, 5831 (Feb. 8, 1994) (to be codified at 50 C.F.R. pt. 17).

⁷¹ *Id.*

⁷² *Id.* at 5832.

⁷³ EPA, *supra* note 57, at 6-34 tbl.6-14.

⁷⁴ *Id.*

⁷⁵ EPA, *supra* note 57, at 10-4 tbl.10-2. This figure was calculated using the median expected net total benefits at a 3% discount rate. See also *infra* Table 5.

⁷⁶ Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Landfills Point Source Category, 65 Fed. Reg. 3008, 3029 (Jan. 19, 2000) (to be codified at 40 C.F.R. pts. 136, 445).

⁷⁷ *Id.*

⁷⁸ *Id.* at 3031.

Regulation	Agency	Citation	Estimated Job Loss	Explanation	Net Benefits
Emissions standards for aluminum production	EPA	65 Fed. Reg. 15,690 (Mar. 23, 2000)	94 ⁷⁹	None	Unquantified: EPA estimates that implementation of the NESHAP will reduce all pollutants by 14,200 Mg per year (15,600 tpy) ⁸⁰
Conservation of roadless forest land	Dep't of Agriculture: Forest Service	66 Fed. Reg. 3244 (Jan. 12, 2001) ⁸¹	4,014–4,549 ⁸²	Refused to quantify any costs or benefits ⁸³	Unquantified ⁸⁴
Effluent standards for coal mines	EPA	67 Fed. Reg. 3370 (Jan. 23, 2002)	24–29 per year ⁸⁵	Job losses might be offset by job gains in regions with "cleaner" coal ⁸⁶	\$13 million ⁸⁷

⁷⁹ National Emission Standards for Hazardous Air Pollutants for Secondary Aluminum Production, 65 Fed. Reg. 15,690, 15,705 (Mar. 23, 2000) (to be codified at 40 C.F.R. pt. 63).

⁸⁰ *Id.* at 15,704.

⁸¹ This regulation was amended following litigation, but the calculations for job loss were unchanged. Special Areas; Roadless Area Conservation; Applicability to the Tongass National Forest, Alaska, 68 Fed. Reg. 75,136 (Dec. 30, 2003) (to be codified at 36 C.F.R. pt. 294).

⁸² This figure was calculated by adding lost jobs across three economic sectors. The range of expected job losses accounts for some uncertainty in the calculation. Special Areas; Roadless Area Conservation, 66 Fed. Reg. 3244, 3268 (Jan. 12, 2001) (to be codified at 36 C.F.R. pt. 294).

⁸³ *Id.* at 3267.

⁸⁴ *Id.*

⁸⁵ EPA, Economic and Environmental Impact Assessment of Proposed Effluent Limitations Guidelines and Standards for the Coal Mining Industry: Remining and Western Alkaline Subcategories, at 6-3 (2000), available at http://water.epa.gov/scitech/wastetech/guide/coal/upload/2000_04_12_guide_coal_impact.pdf.

⁸⁶ *Id.*

⁸⁷ Coal Mining Point Source Category; Amendments to Effluent Limitations Guidelines and New Source Performance Standards, 67 Fed. Reg. 3370, 3396 (Jan. 23, 2002) (to be codified at 40 C.F.R. pts. 9, 434).

Regulation	Agency	Citation	Estimated Job Loss	Explanation	Net Benefits
Designation of protected habitat for the <i>Astragalus magdalenae</i>	Dep't of the Interior: Fish and Wildlife	69 Fed. Reg. 47,330 (Aug. 4, 2004)	1,207–2,585 ⁸⁸	Believed that job loss was too severe and refused to protect the habitat ⁸⁹	“[V]irtually no additional Federal regulatory benefits” ⁹⁰
Average Fuel Economy Standards Passenger Cars and Light Trucks, Model Year 2011	NHTSA	74 Fed. Reg. 14,196 (Mar. 30, 2009)	1,024 ⁹¹	Claimed that there was no substantial hardship on the industry ⁹²	\$802 million ⁹³
Energy conservation standards for small electric motors	Dep't of Energy	74 Fed. Reg. 61,410 (proposed Nov. 24, 2009) ⁹⁴	0 (likely jobs <i>gained</i>) ⁹⁵	Believed that capital would shift to more labor-intensive industries, creating jobs ⁹⁶	\$1.73 billion ⁹⁷

⁸⁸ Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Astragalus magdalennae* var. *peirsonii* (Peirson's milk-vetch), 69 Fed. Reg. 47,330, 47,344 (Aug. 4, 2004) (to be codified at 50 C.F.R. pt. 17).

⁸⁹ Id. at 47,345.

⁹⁰ Id. at 47,344.

⁹¹ Average Fuel Economy Standards, 74 Fed. Reg. 14,196, 14,378, 14,379 tbl.VII-1 (Mar. 30, 2009) (to be codified at 49 C.F.R. pts. 523, 531, 533, 534, 536, 537).

⁹² Id. at 14,377.

⁹³ Id. at 14,386 tbl.VII-6.

⁹⁴ This is the date of the Notice of Proposed Rulemaking, which considered unemployment specifically. Energy Conservation Program: Energy Conservation Standards for Small Electric Motors, 74 Fed. Reg. 61,410, 61,469, 61,475 (proposed Nov. 24, 2009) (to be codified at 10 C.F.R. pt. 431). The final rule, published on March 9, 2010, adopts the Notice of Proposed Rulemaking's Employment Analysis in its entirety. Energy Conservation Program: Energy Conservation Standards for Small Electric Motors, 75 Fed. Reg. 10,874, 10,908 (to be codified at 10 C.F.R. pt. 431).

⁹⁵ Energy Conservation Program: Energy Conservation Standards for Small Electric Motors, 74 Fed. Reg. at 61,475.

⁹⁶ Id. at 61,446.

⁹⁷ Id. at 61,482 tbl.V.43.

Regulation	Agency	Citation	Estimated Job Loss	Explanation	Net Benefits
Effluent guidelines for the construction and development industries	EPA	74 Fed. Reg. 62,996 (Dec. 1, 2009)	7,257 ⁹⁸	No explicit justification	Net benefits: (negative) \$584 million per year ⁹⁹
Emissions standards for air pollutants from the Portland cement manufacturing industry	EPA	75 Fed. Reg. 54,970 (Sept. 9, 2010)	807 ¹⁰⁰	No explicit justification	\$6.5–\$17 billion ¹⁰¹
Emissions standards for boilers and process heaters	EPA	76 Fed. Reg. 15,608 (Mar. 21, 2011)	2,200 jobs <i>gained</i> ¹⁰²	Believed that environmental regulation creates jobs ¹⁰³	\$20.5–\$52.5 billion ¹⁰⁴

⁹⁸ Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category, 74 Fed. Reg. 62,996, 63,023 (Dec. 1, 2009) (to be codified at 40 C.F.R. pt. 450).

⁹⁹ *Id.* at 62,997–98.

¹⁰⁰ National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants, 75 Fed. Reg. 54,970, 55,025 (Sept. 9, 2010) (to be codified at 40 C.F.R. pts. 60, 63). The Agency performed this estimation using a variety of methodologies and ended up with a range of predictions from 1,500 jobs lost to 1,300 jobs gained. The 807 jobs lost figure represents the Agency's best guess.

¹⁰¹ *Id.* at 55,028. These are the net benefits at a 3% discount rate. The net benefits at a 7% discount rate are \$5.8 to \$16 billion. These figures are reported in 2005 dollars.

¹⁰² EPA, *supra* note 3, at 4-10.

¹⁰³ *Id.*

¹⁰⁴ National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, 76 Fed. Reg. 15,608, 15,611 (Mar. 21, 2011) (to be codified at 40 C.F.R. pt. 63). These are the net benefits at a 3% discount rate. At a 7% discount rate, the benefits are \$18.5 to \$47.5 billion. These figures are reported in 2008 dollars.

Regulation	Agency	Citation	Estimated Job Loss	Explanation	Net Benefits
Emissions standards for commercial and industrial solid waste incineration	EPA	76 Fed. Reg. 15,704 (Mar. 21, 2011)	300 jobs gained ¹⁰⁵	Characterized the number of lost jobs as "small" ¹⁰⁶	\$130-\$770 million ¹⁰⁷

As this table indicates, agencies routinely address the employment effects of regulations. Expected job losses also vary widely, from mere dozens as a result of some regulations to thousands in others. We were able to find only one regulation in which the agency believed that job loss would be so severe that regulation of any type was inappropriate. (There were others in which unemployment ruled out some regulatory options and counseled in favor of more modest regulation.) That was the Department of the Interior's proposed 2004 regulation regarding protection of the *Astragalus magdalenae*, a type of plant native to California. There, the Department of the Interior ("DOI") concluded that expected job losses of 1,207 to 2,585 were too great, and because it did not believe that there was any workable intermediate option it elected not to regulate the habitat at all.¹⁰⁸ We suspect that in other cases agencies simply do not propose regulations in the first place when the expected unemployment effects are too large.

As is obvious from the table above, many agencies have elected to regulate even when doing so would mean many more lost jobs than the DOI expected. The unexplained variation in regulatory

¹⁰⁵ EPA, Regulatory Impact Analysis: Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units, at 3-10 tbl.3-5 (2011), available at http://www.epa.gov/ttn/ecas/regdata/RIAs/CISWIRIAfinal110221_psg2.pdf.

¹⁰⁶ Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units, 76 Fed. Reg. 15,704, 15,744 (Mar. 21, 2011) (to be codified at 40 C.F.R. pt. 60).

¹⁰⁷ *Id.* at 15,713 tbl.3. These are the net benefits at a 3% discount rate. The net benefits at a 7% discount rate are \$90 to \$660 million. These figures are reported in 2008 dollars.

¹⁰⁸ Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Astragalus magdalenae* var. *peirsonii* (Peirson's milk-vetch), 69 Fed. Reg. 47,330, 47,344 (Aug. 4, 2004) (to be codified at 50 C.F.R. pt. 17).

outcomes underscores the arbitrariness of agency decisionmaking under current procedures. Without a standard by which to gauge how much unemployment is too much, agency decisions will be inconsistent and impossible to evaluate. It is possible that agencies are actually engaging in *sub silentio* cost-benefit analysis with unemployment figures included. For instance, agencies might believe that a few thousand lost jobs are acceptable when it comes to regulating fuel economy standards or effluents from the construction industry, but they are intolerable in the context of a regulation of a plant's habitat. If this is in fact taking place, it might be intelligent policy. But if agencies engage in this type of analysis, they should do so systematically and transparently, not on an ad hoc basis. In the Part that follows, we take up the case for including unemployment in cost-benefit analysis.

II. THE ECONOMICS OF UNEMPLOYMENT

A. Cost-Benefit Analysis

Cost-benefit analysis, as the name suggests, involves the comparison of the costs and benefits of regulations. The overall procedure is straightforward, although the details can be tricky. Consider a proposed regulation to limit the use of certain chemicals in the production process of paper mills. Paper mills must replace those chemicals with more expensive chemicals. Let us say that the extra cost is \$100. The firm will attempt to pass on that cost to consumers in the form of higher prices. Depending on the shape of the demand curve for paper, the consumers will pay a large or small proportion of the cost. As a consequence, consumer surplus—the difference between how much consumers would be willing to pay for paper and how much they actually pay—declines. Some consumers will be priced out of the market and their consumer surplus will be reduced to zero. If the firm cannot pass on the full cost to consumers, the shareholders will incur some of the cost, otherwise known as a reduction in producer's surplus. The change in the sum of the consumer's and producer's surpluses is the cost of the regulation.¹⁰⁹

¹⁰⁹ For defenses of cost-benefit analysis, see, e.g., Mathew D. Adler & Eric A. Posner, *New Foundations of Cost-Benefit Analysis* (2006); Kenneth J. Arrow et al., *Benefit-Cost Analysis in Environmental, Health, and Safety Regulation* (1996), available at <http://ideas.repec.org/p/reg/wpaper/615.html>; Richard L. Revesz & Michael A.

The benefit of the regulation will be felt in the form of improved environmental quality: air and water will be cleaner. These benefits can be monetized in various ways. For example, if the pollution that is to be eliminated makes people ill, then medical costs are saved. If bad smells are eliminated, then these benefits are monetized as the amount that people are willing to pay to eliminate the smells. Benefits enjoyed over the future must be reduced to present value by multiplying them by a discount factor. If the benefits exceed the costs, then the proposed regulation passes the cost-benefit analysis.

We have not said anything so far about the effects of the regulation on workers. But if the firms must raise prices, then demand will fall, in which case the firms will produce less paper. With less production, firms will normally need less labor. They will lay off workers who may not have jobs for a period of time. As we noted in the Introduction, economists usually ignore the costs to workers. To understand why, and to understand the problems with ignoring costs to workers, we must discuss the labor market and unemployment. We will do so after we examine why unemployment should be regarded as a cost in the first place.

B. Is Unemployment a Cost?

Unemployment is a cost only if it makes people worse off. It might seem that unemployment is straightforwardly a harm, but the truth is more complex.¹¹⁰ Many people do not want to work and stop working when they get the chance: they retire having accumulated sufficient savings; they quit after marrying a spouse who will support them; they never work in the first place, instead living off an inheritance or adopting a bohemian lifestyle. For many people (possibly most), work is a means to an end—the acquisition of money to finance consumption—and is not a good in itself. Thus, for these people, unemployment is not a cost in itself; rather, it deprives them of the ability to earn money. If *c* is the cost of working

Livermore, *Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment and Our Health* (2008); Cass R. Sunstein, *The Cost-Benefit State: The Future of Regulatory Protection* (2002); Robert W. Hahn, *The Economic Analysis of Regulation: A Response to the Critics*, 71 U. Chi. L. Rev. 1021 (2004).

¹¹⁰ There is a small philosophical literature on the nature of work; recent essays are compiled in *Philosophy and the Problems of Work* (Kory Schaff ed., 2001).

and w is the wage, then the loss from unemployment is simply $w-c$. They would be just as happy with a transfer from the state of $w-c$ as they would be with a regulation that prevents them from becoming unemployed in the first place.

For other people, work has intrinsic value such that they receive $w-c+n$, where n refers to pleasure in the work, status, or dignity from the work, and other forms of nonpecuniary compensation from the work. Even these people may not be significantly harmed from unemployment if they can obtain the nonpecuniary benefits from employment through volunteer work. Then the loss is simply $w-c$, as in the first case. Other people, however, may not be able to obtain all the nonpecuniary benefits from volunteer work that they enjoyed from their job, and of course comparable volunteer work may not be available.

Indeed, a substantial literature indicates that the negative psychological effects of (long-term) unemployment are considerable. Many unemployed people suffer because of the loss of a structured schedule, contacts with other people, and status.¹¹¹ Their unem-

¹¹¹ See David G. Blanchflower & Andrew J. Oswald, Well-Being Over Time in Britain and the USA, 88 *J. Pub. Econ.* 1359, 1373 (2004) (finding similar results for Great Britain and the United States that to compensate men exactly for unemployment would take a rise in income of approximately \$60,000 per year); Andrew E. Clark & Andrew J. Oswald, Unhappiness and Unemployment, 104 *Econ. J.* 648, 650-51 (1994) (showing that unemployment is associated with significantly lower self-reported mental well-being scores); William T. Gallo et al., The Persistence of Depressive Symptoms in Older Workers Who Experience Involuntary Job Loss: Results from the Health and Retirement Survey, 61 *J. Gerontol. B. Psychol. Sci. Soc. Sci.* S221, S221 (2006) (showing that older, lower net-worth workers who lose their jobs are more likely to suffer from depression than those who do not); Knut Gerlach & Gesine Stephan, A Paper on Unhappiness and Unemployment in Germany, 52 *Econ. Letters* 325, 325 (1996) (showing that unemployment reduces life satisfaction beyond what would be expected from the loss of labor income); Marie Jahoda, Economic Recession and Mental Health: Some Conceptual Issues, 44 *J. Soc. Issues*, no. 4, 1988, at 13, 13 (finding that the greatest burden of economic recession falls on the unemployed, and noting that the large majority of the unemployed are psychologically impaired); Marie Jahoda, Work, Employment, and Unemployment: Values, Theories, and Approaches in Social Research, 36 *Am. Psychol.* 184, 188 (1981) (examining non-pecuniary benefits of work including the external imposition of a time structure on the working day, regularly shared experiences and contact with people outside of the family, links to goals and purposes that transcend the individual, the definition of personal status and identity, and the enforcement of activity); Liliana Winkelmann & Rainer Winkelmann, Why Are the Unemployed So Unhappy? Evidence from Panel Data, 65 *Economica* 1, 13 (1998) (showing that unemployment reduces life satisfaction); Alan B. Krueger & Andreas Mueller, The Lot of the Unemployed: A Time Use

ployment also affects other people, including their children, who experience problems at school and in their relationships with others; spouses, who experience higher levels of stress; and even co-workers who remain employed, who suffer from lower levels of job security and possible "survivors' guilt."¹¹² The only possibly offsetting effect is that those who are already unemployed feel less stigma when others lose their jobs.¹¹³

There is a subtle question whether it is appropriate or even possible for government policy to address unemployment in the case of people who obtain self-esteem from work. In a paper criticizing the idea of a right to work, Professor Jon Elster points out that if people obtain self-esteem from doing work that is socially productive, then make-work programs sponsored by the government that produce jobs that would not exist in the private sector will not in fact give people the good that they care about.¹¹⁴ Elster's argument can be generalized as a criticism of any government program that saves jobs. Consider, for example, a regulation that would be socially beneficial but for its unemployment effects. If a polluting plant that produces goods of marginal value is kept open simply to maintain employment, then the workers in that plant will not derive any self-esteem from their government-supported work. It would be better to give them cash transfers. As Elster also notes, however, workers' self-esteem appears to be robust against any such program as long as the nature of the subsidy is partly disguised.¹¹⁵ We suspect, then, that from the perspective of subjective utility maximization, our case for opposing excessively strict regulations that cause unemployment is not vulnerable to Elster's objection. Other normative premises might lead to different results.

Perspective 9 (Institute for the Study of Labor, Discussion Paper No. 3490, 2008) (showing that life satisfaction reports of the unemployed are significantly less than life satisfaction reports of the employed).

¹¹² Andrew Clark et al., *Boon or Bane? Others' Unemployment Well-Being and Job Insecurity*, 17 *Labour Econ.* 52, 53-54 (2010) (examining the impact of aggregate unemployment on workers' subjective well-being, and finding the strength of the regional labor market to be a better predictor of a worker's well-being than the current employment status of that worker).

¹¹³ *Id.* at 54.

¹¹⁴ Jon Elster, *Is There (or Should There Be) a Right to Work?*, in *Philosophy and the Problems of Work*, *supra* note 110, at 283, 294-95.

¹¹⁵ *Id.* at 295.

When a person loses her job, she incurs a loss of $w-c+n$: she loses her wage and the nonpecuniary benefits of the job but she gains leisure. If she chooses to remain unemployed and devotes her free time to consumption based on savings or other resources, then she will continue to incur this loss on a per-period basis. Alternatively, she could try to find a new job. Job-search costs are the costs of sending out inquiries, interviewing, and so forth.¹¹⁶ Job-search costs deprive the person of leisure that she would otherwise enjoy. If she cannot find a comparable job through search, the person may undergo retraining or move to another region where job opportunities are more plentiful. Both retraining and relocation may be expensive as well as time-consuming. Finally, when the person obtains a new job, her new wage may be less than the old wage, and the conditions and benefits of the job may be worse. All of these costs in aggregate are the costs of unemployment for the purpose of this Article.

Why might the new wages be less than the old wages? There are two possible answers.¹¹⁷ The first is that the earlier wage reflected the worker's (and firm's) substantial investment in the worker's firm-specific human capital—or industry-specific human capital if the worker's new position is outside the industry. Firm-specific human capital consists of skills that a worker possesses which earn returns only at the firm at which they were acquired. Understanding of the culture and layout of a particular plant is a form of firm-specific human capital. Industry-specific human capital consists of skills that a worker possesses which earn returns only at a firm within the industry in which those skills were acquired. Understanding how automobile assembly lines work is a form of industry-specific human capital if this knowledge cannot be used in, say, the

¹¹⁶ See Alan B. Krueger & Andreas Mueller, *Job Search and Unemployment Insurance: New Evidence from Time Use Data*, 94 *J. Pub. Econ.* 298, 299 (2010) (reporting job search statistics).

¹¹⁷ See generally Ronald G. Ehrenberg, *Comment, Do Displaced Workers Suffer Losses of Specific Human Capital?*, 33 *Carnegie-Rochester Conf. Series on Pub. Pol'y* 215 (1990); Robert Topel, *Comment, Specific Capital and Unemployment: Measuring the Costs and Consequences of Job Loss*, 33 *Carnegie-Rochester Conf. Series on Pub. Pol'y* 181 (1990). There are other possible explanations, but they seem less plausible and general: for example, that the workers were paid efficiency wages by the first employer but not by the second employer because the second employer uses a different monitoring technology that makes efficiency wages unnecessary.

chemical industry or any other industry outside the automobile industry. When a plant is closed, the worker's plant-specific human capital is destroyed. When an industry shrinks, so that workers must search for jobs outside the industry, then those workers' industry-specific human capital is destroyed. And it is possible that when a person does not work for a period of time, his or her skills erode so that productivity and hence the wage will decline even if that worker remains in the same industry.¹¹⁸ The loss of this human capital will be reflected in lower wages, which are thus appropriately considered real social costs.

The second answer is that workers who lose their jobs earned above-market wages. This is most likely to be true in industries where the labor market is cartelized, which normally takes place through unionization. For example, a worker who moves from a unionized plant to a non-unionized plant will lose the wage premium associated with unionization. While this is a real loss for the worker, it is not a social cost. The reason is that shareholders and consumers will recover the loss in the form of higher profits or lower prices. Transfers of this sort are not included in cost-benefit analysis because they are not social costs. Empirical studies suggest that both answers reflect part of the truth.¹¹⁹

C. The Labor Market and Unemployment

In the standard model of the labor market,¹²⁰ employers hire workers and pay them a wage that reflects the balance of supply and demand. The supply curve reflects the willingness of workers to supply labor in return for a wage. Workers are assumed to gain utility from consumption and leisure. In order to consume, they must work and earn a wage. Accordingly, the more they work the more that they are able to consume. Thus, the supply curve slopes upward: the higher the wage the more that a person will work, all else equal. Any particular individual will experience diminishing returns from work but employers will simply hire more people

¹¹⁸ See Per-Anders Edin & Magnus Gustavsson, *Time Out of Work and Skill Depreciation*, 61 *Indus. & Lab. Rel. Rev.* 163, 163 (2008) (finding that work interruptions caused a decline in literacy).

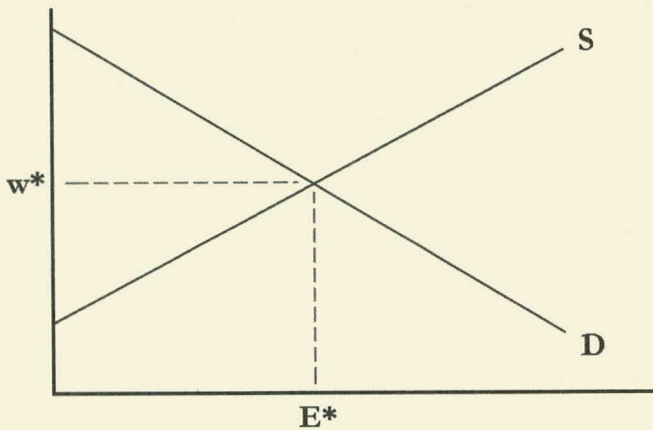
¹¹⁹ See *infra* text accompanying notes 126–31.

¹²⁰ See, e.g., George Borjas, *Labor Economics* (5th ed. 2010).

when any particular individual runs out of hours in the day. The supply curve should be understood as the aggregate supply of work-hours from the relevant pool of workers.

Employers make profits using two inputs: capital and labor. As the relative price of the two inputs changes, employers will substitute one for the other. For example, if wages increase employers will, at the margin, switch to capital (that is, buy machines) and hire fewer people. Thus, the demand curve for labor slopes downward: the higher the wage, the fewer the people whom firms will employ, all else equal. Increased production costs will also reduce demand for their product and, therefore, normally cause them to hire fewer people.

Figure 1: The Labor Market



In equilibrium, where the demand and supply curves intersect, employers pay what economists call the market-clearing wage.¹²¹ All workers who are willing to work at that wage will receive a job and be paid a wage, w^* . Note that the employment level, E^* , is (obviously) not employment of all workers. Workers unwilling to work for a wage less than or equal to w^* will be unemployed. But from an economic perspective, these unemployed workers are not a social (or efficiency) problem: they are simply people who prefer leisure to work at the price at which work is offered.

¹²¹ *Id.* at 148.

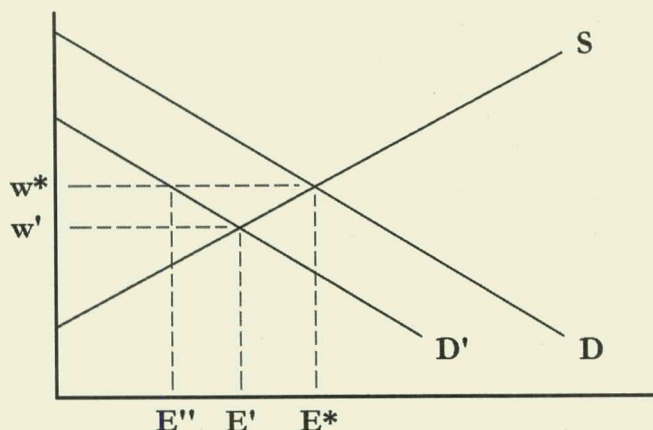
From this standpoint, unemployment is a puzzle for economics. Economics recommends government intervention in order to correct market failures and there is no market failure in the model that we have described. However, the model reflects an idealized unregulated market. We are interested in the real labor market, which is affected by various frictions and by regulation.

A typical regulation will increase the cost of production for an employer. For example, a regulation that requires scrubbers in smokestacks will increase the cost of operating factories. The owner must pass on the cost to consumers by raising the price of the product. As a result of the higher price, demand for the product will decline, and so the factory will manufacture fewer of the products. With less production, fewer workers are needed and so some are laid off.¹²²

On the graph, the demand curve shifts to the left, and in the new equilibrium fewer workers are employed at level $E' < E^*$. All the workers who want to work at the new wage, w' , will work at the new wage.¹²³ Workers who were willing to work for no less than w^* (which is no longer offered) will no longer have jobs. In other words, marginal workers will lose their jobs; inframarginal workers will be paid the lower wage. In Figure 2, the loss is represented by the areas between w' and w^* , and between E' and E^* . The aggregate loss is caused by the regulation.

¹²² Regulations can increase employment as well: the regulated firm might be required to hire compliance workers; compliance with the regulation might require purchasing goods from other industries which are labor-intensive; and consumers who reduce consumption of goods produced by the regulated industry might switch to goods produced by more labor-intensive industries. See Morgenstern et al., *supra* note 12. These benefits should be taken into account as well, but we will ignore them for the purpose of expository clarity. We will return to them in Section II.E, *infra*.

¹²³ However, wages are often thought to be "sticky." See Borjas, *supra* note 120, at 526. If the employer cannot reduce the wages of workers who are retained, then it will lay off additional workers so that the employment level is in equilibrium given the old (higher) wage and the shifted demand curve. In Figure 2, the new employment level is E'' .

Figure 2: Labor Market With Reduced Demand

The actual magnitude of the effect of the regulation depends on the structure of the various markets affected by the regulation. Suppose, for example, that demand in the product market is inelastic and supply in the labor market is elastic. This means that consumers will not reduce consumption in response to higher prices, while workers will quit in response to lower wages. The firm cannot lower wages because if it does, workers will quit; and it has no reason to. Because consumers will not reduce consumption in response to higher prices, the firm will raise prices and, indeed, be entirely unaffected by the regulation, as will its workers.

The assumption of inelastic consumer demand is unrealistic; the important point is that elasticity is a matter of degree. If consumer demand is perfectly elastic, the firm will simply go out of business. If consumer demand is partially inelastic, then the firm will raise prices but lose some customers. Because demand goes down, the firm will reduce production. If the labor market is perfectly elastic, the firm will fire workers but not reduce the wages of the remaining workers. If the labor market is partially elastic, it will fire some workers and reduce the wages of the remaining workers. A similar point can be made about the elasticity of the capital market (which is generally assumed to be high, so the firm can pass on costs to shareholders only in the short term).

In a perfectly competitive labor market, workers would quit and obtain new jobs at the prevailing wage. If workers' skills are indus-

try specific, however, they will not be able to find comparable jobs in other industries. They will need to retrain, and as we discussed earlier, most workers must spend time and effort searching for a new job, even if they stay in the same industry; among other things, they may need to relocate. The aggregate loss from search and retraining will depend on many factors—the industry specificity of the worker's skills, local and national macroeconomic conditions, and so forth. When industries die out, the cost of job loss will be much greater; when the economy is booming, it will be less.

Summarizing, the cost of unemployment is (1) the lost wages during the spell of unemployment minus leisure benefits; (2) any search or retraining costs; and (3) any permanent reduction in wages (due to loss of firm- or industry-specific capital), benefits, and working conditions (including the intrinsic satisfaction of the work) in subsequent employment. It is, of course, possible that the worker enjoys no leisure benefits because he spends all his time in job search or retraining. For the workers who leave the labor market, the cost is the lost wages minus leisure benefits. For example, a worker who is laid off at age 60 and decides to take early retirement rather than search for a job or retrain will enjoy all the leisure benefits of retirement, but these benefits will still be less than what he would have enjoyed if he had continued to work (or otherwise he would have retired voluntarily before being laid off).

There are possible additional social costs from unemployment. If employed members of society feel sympathy for the unemployed, and devote resources to helping them, then that is a social cost. Alternative methods of helping the unemployed—such as unemployment insurance—create well-known moral hazard problems: people who receive unemployment insurance spend more time unemployed.¹²⁴ A cost-benefit analysis that takes account of the costs of unemployment should take these costs into account; however,

¹²⁴ See Patricia M. Anderson & Bruce D. Meyer, *The Effects of the Unemployment Insurance Payroll Tax on Wages, Employment, Claims and Denials*, 78 *J. Pub. Econ.* 81, 102 (2000) (finding that unemployment insurance taxes on employers are largely passed on to workers through lower wages); Kathleen P. Classen, *The Effect of Unemployment Insurance on the Duration of Unemployment and Subsequent Earnings*, 30 *Indus. & Lab. Rel. Rev.* 438, 439–40 (1977) (finding that an increase in benefits leads to an increase in the duration of unemployment). Other alternatives include job training programs, make-work programs, and expansion of the money supply, all of which are costly in different ways.

for simplicity, we will ignore them henceforth and focus on wage loss.

D. Measuring the Cost of Unemployment

The cost of unemployment can be high or low, depending on numerous factors. Economists ignored these costs for a long time, possibly because they assumed that workers quickly obtained replacement jobs at the same wage, but in the last ten years a substantial literature has emerged on the long-term (that is, aggregate) earnings losses that result from job displacement.¹²⁵ The literature is large and complex, but we can use it to obtain a rough estimate of the cost of unemployment for various types of worker, which could be used in cost-benefit analysis of regulations that cause unemployment.

1. Wage Effects

The most recent and comprehensive paper on what we will call “wage effects”—the lost earnings of workers who are laid off—is by von Wachter, Song, and Manchester (“VSM”).¹²⁶ The authors focus on male, middle-aged workers who were stably employed in the late 1970s. The workers are divided into three groups: those who remained employed, those who lost their jobs in mass layoffs (where employment at a firm declined by at least 30%), and those who lost their jobs in non-mass layoffs. We will return to the significance of these distinctions in Subsection 3.

The average worker earned approximately \$50,000 (in year 2000 dollars) in 1979. Not surprisingly, the average wage declines dramatically for workers who are laid off. Those who lose their jobs suffer an immediate wage loss of up to 33% (that is, some are re-hired and obtain comparable or lower wages, while others are not). What is surprising is that although these losses decline, they may

¹²⁵ The seminal work is Louis S. Jacobson et al., *Earnings Losses of Displaced Workers*, 83 *Am. Econ. Rev.* 685 (1993), which resolved methodological problems that hampered earlier work.

¹²⁶ Till von Wachter et al., *Long-Term Earnings Losses due to Mass Layoffs During the 1982 Recession: An Analysis Using U.S. Administrative Data from 1974 to 2004* (Apr. 2009) (unpublished manuscript), available at http://www.columbia.edu/~vw2112/papers/mass_layoffs_1982.pdf.

remain as high as 21% to 27% twenty years after the job loss.¹²⁷ VSM calculate that over twenty years the average loss for a worker in their dataset ranges from \$110,000 to \$140,000.¹²⁸ This range must be considered a lower bound for the cost of unemployment for an individual worker because losses most likely persist beyond twenty years.

Other scholars have found similar results, although no other study we are aware of examines earnings losses over twenty years.¹²⁹ Most studies go no further than six years. The studies find first-year earnings losses from 17% to 66%, with most studies clustering around 30% to 40%. The six-year studies find last-year earnings losses ranging from 0% to 47%, with most around 10% to 20%.

These numbers are high, but it is possible that the actual harm is somewhat less. First, to the extent that workers lose rents (the portion of the wage that is above market), the loss is simply a transfer—those rents will be captured by consumers or shareholders—and not a social cost. For unionized workers, wage losses are more likely to represent the loss of rents rather than the loss of human capital, compared to non-unionized workers. This is because unionized workers are more likely to be earning above-market wages. Consistent with this theory, there is some evidence that wage losses are higher for workers in heavily unionized industries than for other workers, but the losses for non-unionized workers are still substantial.¹³⁰ Moreover, the workers in the VSM study are mostly non-unionized workers and their wage losses are thus more likely to represent true welfare losses.¹³¹ Second, to the extent that firms and workers anticipate layoffs and firms pay workers wage premiums that compensate them for this risk, then the earnings decline will be overstated. At least in recent years, however, unemploy-

¹²⁷ *Id.* at 20.

¹²⁸ *Id.* at 16.

¹²⁹ A useful table with a literature survey can be found in Kenneth A. Couch & Dana W. Placzek, *Earnings Losses of Displaced Workers Revisited*, 100 *Am. Econ. Rev.* 572, 574 tbl.1 (2010).

¹³⁰ See Jacobson et al., *supra* note 125, at 703; Roger White, *Long-run Wage and Earnings Losses of Displaced Workers*, 42 *Applied Econ.* 1845, 1855 (2010) (finding that unionized workers lost \$47,618 and non-unionized workers lost \$32,439 over a period beginning four years before displacement and five years after displacement).

¹³¹ von Wachter et al., *supra* note 126, at 4.

ment insurance has partially displaced compensating differentials; so while the distortion needs to be taken into account, there is reason to believe that it is limited.

2. *Nonpecuniary Effects*

Workers who lose their jobs also incur a range of nonpecuniary costs. We summarize a few of the major effects below.

Mortality. One study of high-seniority male workers in Pennsylvania found that job loss was associated with a 50% to 100% higher rate of mortality in the year of job loss, compared to workers who were not laid off. This difference declined over time but remained high, so that 20 years after job loss the mortality rate is still 10% to 15% percent higher for those who lost their jobs than for those who remained employed. A worker laid off at the age of 40 would lose 1 to 1.5 years of life expectancy compared to a worker who was not laid off.¹³² The authors attribute the higher mortality to loss of earnings. VSM monetize this amount as \$100,000, which should be added to the pecuniary effects of unemployment in order to calculate an overall cost of unemployment per worker.¹³³

Homeownership and health insurance. A study of job loss in California in the 1990s found that the rate of homeownership declined for displaced workers by 4.1% to 8.3%, and the rate of health insurance ownership declined by 4.5% to 9.15%.¹³⁴ The decline in homeownership is probably derivative of the lost earnings (people with less money are more likely to rent), but it is not likely that changes in consumption are driving the effects on private insurance, as higher-paying jobs are also more likely to provide

¹³² Daniel Sullivan & Till von Wachter, *Job Displacement and Mortality: An Analysis Using Administrative Data*, 124 Q.J. Econ. 1265, 1265 (2009).

¹³³ Sullivan and von Wachter calculate this figure by dividing the 1.5 year loss of life expectancy by the average U.S. life expectancy of 77.94 and multiplying by a \$5 million value of a statistical life, though most analysts use a figure of \$6 million or higher. *Id.* at 1290.

¹³⁴ Till von Wachter & Elizabeth Weber Handwerker, *Variation in the Cost of Job Loss by Worker Skill: Evidence Using Matched Data from California, 1991–2000*, at 14–15 (Dec. 30, 2009) (unpublished manuscript), available at http://www.columbia.edu/~vw2112/papers/displskills_vonwahandw_30dec09.pdf.

health insurance. Rather, the study concluded that “the loss in private health insurance adds to the loss in long-term earnings.”¹³⁵

Subjective well-being. A number of studies examine the effect of various events on people’s “subjective well-being,” defined as the score that they give themselves when asked how happy they are by interviewers. These studies show that, for example, divorce and widowhood make people less happy, while wealth (up to a point) makes them more happy. The studies also uniformly show that unemployment reduces people’s happiness, even controlling for lost earnings. One study monetized this loss at \$60,000, which may reflect the loss in status and self-esteem and increased stress and anxiety that an unemployed person suffers independent of lost earnings.¹³⁶ These effects persist to some degree even after the worker has found another job.¹³⁷

3. Variation

Demographics. The cost of unemployment varies according to various characteristics of the worker, including age, sex, region of employment, education, and experience. Older workers lose more than younger workers because it is more difficult for them to relocate and retrain.¹³⁸ Men lose more than women because they start off with higher wages; however, women lose more than men as a percentage of their wages.¹³⁹ Generally, more educated workers lose less than less educated workers because the skills of educated workers are more transferable than the skills of uneducated workers. The least educated workers experience relatively minor losses, however, likely because they work in the least human-capital intensive occupations.¹⁴⁰ More experienced workers lose more than

¹³⁵ *Id.* at 15. There are tax subsidies for health insurance that also must be taken into account in order to avoid double counting.

¹³⁶ Blanchflower & Oswald, *supra* note 111.

¹³⁷ See Richard E. Lucas et al., Unemployment Alters the Set Point for Life Satisfaction, 15 *Psychol. Sci.* 8, 11 (2004) (“People were less satisfied in the years following unemployment than they were before unemployment, and this decline occurred even though individuals eventually regained employment.”).

¹³⁸ White, *supra* note 130.

¹³⁹ Couch & Placzek, *supra* note 129, at 584.

¹⁴⁰ See White, *supra* note 130, at 1855–56; von Wachter & Handwerker, *supra* note 134, at 9.

less experienced workers because firm-specific human capital increases with tenure.¹⁴¹

Layoff type. As noted above, the studies focus on mass layoffs (at least 30% of the workforce) rather than individual layoffs. The reason for this focus is that mass layoffs are more likely to be the result of market factors than individual layoffs, which could reflect an individual worker's abilities. If a firm fires a worker for incompetence, then the worker's wage decline is not a social loss: it suggests instead that the worker was overpaid in the first place and that the layoff will increase consumer or producer surplus. Accordingly, a regulatory agency should ignore such a cost. However, it is also possible that individual layoffs take place as a result of market factors, including government intervention. Suppose an industry-wide regulation causes one hundred firms to lay off two workers each; that regulation might seem as socially harmful as a regulation that causes a single two hundred-worker plant to close. Thus, it would be wrong to direct agencies to include unemployment costs in cost-benefit analyses only for proposed regulations likely to cause mass layoffs but not for regulations that cause individual layoffs scattered among different firms.

A further complication is that even if individual layoffs are costly, they may be less costly than mass layoffs because individually laid-off workers may have less trouble finding jobs than mass laid-off workers do. Indeed, Jacobson, LaLonde, and Sullivan found that workers who lost their jobs in non-mass layoffs had no earnings losses after six years, while those who lost their jobs following mass layoffs still had 25% earnings losses after six years.¹⁴² In addition, first-year earnings losses for workers who lost their jobs in non-mass layoffs were roughly half of earnings losses of workers displaced in mass layoffs.¹⁴³ Couch and Placzek, using a different data set, found first-year earnings losses to be identical for workers who lost their jobs in non-mass layoffs and workers displaced in mass layoffs, but found that workers who lost their jobs in

¹⁴¹ Louis S. Jacobson et al., *Is Retraining Displaced Workers a Good Investment?*, 29 *Econ. Persp.*, no. 2, 2005 at 47, 49 (2005) (finding that longer-tenured workers experience greater earnings losses following displacement); von Wachter et al., *supra* note 126, at 12.

¹⁴² See Jacobson et al., *supra* note 125, at 697, 699.

¹⁴³ *Id.* at 699.

non-mass layoffs experienced earnings losses six years later of 7% to 9% compared to 12% to 15% for workers displaced in mass layoffs.¹⁴⁴

The upshot is that agencies should determine whether the expected unemployment caused by proposed regulations will take the form of mass layoffs or individual layoffs (or both), and use lower figures when estimating earnings losses for individual layoffs than for mass layoffs.

Industry characteristics: declining versus booming. Workers who lose jobs in depressed industries will suffer greater long-term earnings losses than workers who lose jobs in booming industries. The reason is simply that it is easier to find a new job in a booming industry. Nonetheless, unemployment costs even in booming areas turn out to be quite high. A study of California in the 1990s (when the economy was booming) found that workers who lost jobs in mass layoffs suffered an initial earnings loss of 15% to 20%.¹⁴⁵ That loss was still evident four years after the displacement, though the average worker in this data set did not appear to experience permanent effects of displacement.¹⁴⁶

4. Summary

Two lessons emerge from the discussion. First, unemployment costs for workers are far from trivial. A conservative estimate is that an average worker who loses his job in a mass layoff will suffer earnings losses of more than \$100,000 over the rest of his life, plus a host of nonpecuniary costs including increased mortality and unhappiness, which could be valued at as much as another \$160,000.¹⁴⁷ Second, unemployment costs for workers vary with the characteristics of workers, such as age and experience and the industry in which they are employed.

¹⁴⁴ See Couch & Placzek, *supra* note 129 (summarizing these results).

¹⁴⁵ von Wachter & Handwerker, *supra* note 134, at 3, 7.

¹⁴⁶ *Id.* at 7. The study also found that the effects of displacement varied by industry. *Id.* at 11.

¹⁴⁷ We do not take a position on how best to determine this figure. An alternative approach to the one described in this Article is to rely on unemployment insurance, which contains an implicit valuation for a lost job. However, unemployment insurance is typically determined by the government rather than by market conditions, and so it may not accurately reflect the preferences of workers.

E. Cost-Benefit Analysis and Unemployment

The figures from the previous Section are highly aggregated. Actual unemployment costs will vary across industry and region, and also depend on demographic factors such as the age of the worker. Ideally, agencies would use fine-grained detail in their cost-benefit analyses. We would recommend the following procedure.

1. Estimate the number of workers who will lose their jobs as a result of the regulation.

As MPS, the NHTSA, and others point out, regulation can have three effects on the labor market. First, the regulation may increase the cost of production, which the employer must normally pass on in the form of higher prices to consumers. Anticipating lower consumer demand at the higher prices, the employer reduces production and lays off workers no longer needed for production. Second, compliance with the regulation will often require the employment of additional workers, who are needed to (for example) install scrubbers. Third, compliance with the regulation may be more labor-intensive than the production activities that the firm would otherwise undertake.¹⁴⁸

Two further points need to be emphasized. First, the agency must disaggregate these different effects. Because of the existence of firm-specific human capital, laying off an assembly line worker and hiring a new regulatory compliance worker is not necessarily a wash. All else equal, the first worker will lose more than the second worker will gain. Second, the agency must do the analysis for the particular industry that is affected. This should go without saying, but as we noted, the EPA uses the MPS results for regulations that govern industries not included in the MPS study.¹⁴⁹

2. Estimate the costs to those workers.

These costs will depend on industry-, employer-, and worker-specific factors. For example, if the industry is rapidly growing, the worker will be able to find a new job quickly and so the cost will be relatively low. The worker will lose firm-specific human capital but

¹⁴⁸ Morgenstern et al., *supra* note 12, at 416.

¹⁴⁹ See *supra* text accompanying notes 51–53.

not industry-specific human capital. By contrast, if the industry is shrinking, the worker may well lose industry-specific as well as firm-specific human capital. But this depends on what types of workers lose their jobs. For example, factory workers in the (hypothetical) shrinking paper mill industry will have trouble finding new jobs. They will incur large costs in search and retraining. By contrast, information technology workers in a paper mill will likely be able to find a similar job in a different industry with relative ease. Older workers may find it harder to retrain. Geographically isolated workers may find it harder to travel to another location or find a new job in the original location.

As noted above, the agency must distinguish “firing” and “hiring” effects. A regulation that destroys one job but creates another one will have a net negative effect if the first job involved firm-specific human capital.

3. *Coordinate with other regulators.*

Agencies need to be aware of what other regulators are doing. Unemployment is a social cost, but it is not obvious what is the best tool (or combination of tools) for combating it. We have discussed one tool: regulatory agencies could weaken regulations so as to cause less short-term unemployment. Another tool is unemployment insurance, which does not prevent unemployment (and even may extend it), but reduces the cost of unemployment for workers. A third tool is macroeconomic policy, which is administered by the Federal Reserve (“Fed”). The Fed can, for example, inflate the money supply, which, at least in the short term, can bring down unemployment (albeit with the long-term cost of possible inflation). A fourth tool is fiscal policy, where the government borrows and spends money on projects that require work.

These tools are currently used by different regulators. Regulatory agencies decide whether regulations should be weakened in order to reduce unemployment. The Fed controls macroeconomic policy. Congress (and state legislatures) determine the level of unemployment insurance; they also control fiscal policy.¹⁵⁰

¹⁵⁰ For an overview, see Cong. Budget Office, *Unemployment Insurance Benefits and Family Income of the Unemployed 3–6* (2010), available at <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/119xx/doc11960/11-17-unemploymentinsurance.pdf>.

A significant danger is that regulators use these tools in an uncoordinated way. Regulatory agencies, for example, might overestimate the cost of unemployment if they do not realize that the Fed has implemented macroeconomic policies which will increase the demand for labor. There is a substantial role for the OIRA or some other centralized agency to play in coordinating policy.

F. Compensating Differentials and Unemployment Insurance

Economists hypothesize that employers pay a wage premium to workers that compensate them for the risk of layoff.¹⁵¹ Thus, all else equal, workers in industries prone to layoffs should have higher wages than workers in industries that are not prone to layoffs. This “compensating differential” is, in effect, an insurance payout. The evidence suggests the existence of a compensating differential,¹⁵² although it is not clear whether it fully compensates workers for the risk of layoff or only partially compensates them. Whether it does or not, the compensating differential does not play a role in the cost-benefit analysis or affect our argument in any way.

One might argue that if workers are compensated *ex ante* against unemployment, the government should not take their unemployment into account in cost-benefit analysis. Unemployment is a harm, however, regardless of whether the worker is insured against it. If, to use an extreme example, the government could eliminate unemployment, that would be a good thing. The compensating differential would fall to zero, which would save the employer money without harming the worker. Consider an analogy. Suppose that an employer hires agricultural workers to work in a floodplain that is subject to dangerous floods. The employers pay a premium on the wage to compensate workers for the risk. If the government could eliminate flooding by cheaply building levees,

¹⁵¹ Borjas, *supra* note 120, at 224.

¹⁵² See James Adams, Permanent Differences in Unemployment and Permanent Wage Differentials, 100 Q.J. Econ. 29, 52 (1985) (finding that wage premiums arise for long-run unemployment differences, and that labor contracts accommodate long-term anticipated unemployment, while short-run unemployment risks are shared by the employer and the employee); Enrico Moretti, Do Wages Compensate for Risk of Unemployment? Parametric and Semiparametric Evidence from Seasonal Jobs, 20 J. Risk & Uncertainty 45, 63 (2000) (finding a positive compensating differential of 9.36% to 11.90% of the average wage, corresponding to an implicit replacement rate significantly larger than the typical unemployment benefit).

then the employer would stop paying the wage premium while the workers would be made no worse off. If the cost of the levee is less than the expected harm from the flooding, the government should build the levee.¹⁵³ The fact that workers might be "insured" against risk by the wage premium does not mean that there is no social harm if a flood occurs.

At the same time, agencies will have to take into account the possible existence of compensating differentials when calculating the welfare loss from unemployment. If a worker loses a high-paying job and endures a period of unemployment, a portion of the wage loss might represent the fact that the worker was being paid a compensating differential at the old job to compensate for the risk of unemployment. The worker's wage loss represents not only the loss of firm- or industry-specific capital, but also the loss of this compensating differential. The latter is not a social loss. Accordingly, agencies must adjust downward their calculations of the welfare loss from unemployment when firms are paying compensating differentials. Nonetheless, the compensating differential does not itself eliminate or even mitigate that social loss.

A related question concerns the relationship between unemployment insurance and the incorporation of unemployment into cost-benefit analysis. Currently, most workers benefit from unemployment insurance. Unemployment insurance, like the compensating differential, compensates workers who become unemployed, with the difference that unemployment insurance provides a payout *ex post* in the case of unemployment that must be paid for ahead of time in the form of insurance premiums, while the compensating differential increases the worker's *ex ante* wage, which the worker can choose (or not) to save in order to provide self-insurance against unemployment.

If the government incorporated unemployment costs into cost-benefit analysis, then fewer or less stringent regulations would be issued, with the result that unemployment would decline. As a result, the government's unemployment insurance payouts would decline and unemployment insurance would be cheaper. As in the

¹⁵³ In theory, compensating differentials could be used to calculate the *ex post* cost of unemployment. However, the unemployment insurance system has largely crowded out compensating differentials, so this information is probably lost.

levee analogy, the government should invest in the “project” of reducing unemployment when the benefits exceed the costs, which is exactly the effect that incorporating unemployment costs into cost-benefit analysis would have. Thus, unemployment insurance payouts are not additional costs that should be included in cost-benefit analysis. Moreover, the existence of unemployment benefits does not make it unnecessary to include unemployment costs in cost-benefit analysis.

G. Objections

Some commentators might argue that if agencies should take into account unemployment effects, then why stop there? Every regulation produces effects that reverberate through the economy. For example, an environmental regulation might cause a firm not only to lay off workers, but also to buy fewer capital inputs (such as machinery), which will harm shareholders and workers of the sellers. And the sellers might themselves lay off workers, buy less from other suppliers, and so on. And meanwhile it is possible that people who stop purchasing from the firm might buy goods from firms in more labor-intensive industries, which will increase employment, offsetting at least partly the employment loss. Or it could be the case that if the EPA regulated asthma-causing pollution more stringently, for example, fewer workers would develop asthma and be laid off because they could no longer perform their work. Should not these costs and benefits be included in the cost-benefit analysis as well?

The answer is yes in theory, but maybe not in practice.¹⁵⁴ In theory, agencies should take into account all the effects of regulation; in practice, agencies rightly treat the effects as zero when they cannot be determined. Agency reports already reveal that regulations cost jobs; the only question is how to monetize these costs and incorporate them into cost-benefit analyses. Scholars and government officials should also take into account the second-order costs (and benefits) of regulations to the extent they can, but there are no doubt diminishing returns as the effects of the regulation travel further throughout the economy.

¹⁵⁴ Indeed, the NHTSA, MPS, and others have estimated some of these second-order effects. See *supra* Subsection I.A.1.

A second objection concerns the *ex ante* effects of cost-benefit analysis that incorporates unemployment costs. If agencies are known to reduce the level of regulation because of unemployment costs, various market actors will anticipate this outcome and act strategically. For example, workers may overinvest in human capital because they expect the plants in which they work will be kept open even if they cause environmental harm, or firms may overinvest in workers in order to ensure that an agency that might regulate the firms will be unable to do so because of the unemployment costs. In general, one might argue that unemployment is merely a transitional cost which should be ignored lest market actors overinvest in the status quo.¹⁵⁵

The objection points out a general problem with cost-benefit analysis, which is an *ex post* procedure: generally speaking, agencies do not take into account the *ex ante* effects of regulation or the *ex ante* effects of using cost-benefit analysis as a decision procedure. Perhaps they should, but that is a topic for another paper. However, in the present setting we suspect that the costs of ignoring the *ex ante* effects of taking unemployment into account are low. This is because firms will run significant risks if they attempt to behave strategically. We do not propose keeping factories open regardless of the amount of pollution that they produce. If the benefits of shutting the factories down exceed the costs, then they should be shut down. Thus, factory owners and workers know that they face the risk of shutdown (and indeed they do, irrespective of regulation, because of the risk of a market downturn in the relevant industry). Taking into account these risks, factory owners and workers will limit their investment in firm-specific capital. To be sure, they would limit their investment even more if regulators did not take into account unemployment costs, but the additional effect of this is likely marginal. Investing heavily in firm-specific capital might decrease the chances of regulation slightly, but it will raise the costs of regulation to the regulated firm in the event that regulation does occur.

¹⁵⁵ See Louis Kaplow, *An Economic Analysis of Legal Transitions*, 99 *Harv. L. Rev.* 509, 529-31 (1986) (arguing that government should not compensate victims of takings so that they do not overinvest).

In addition, any firm that attempted to shield itself from regulation by overinvesting in workers or firm-specific capital would run into a collective action problem. Agencies choose to regulate or not regulate entire industries, not individual firms.¹⁵⁶ Thus, any firm that attempted to make itself appear an unattractive target for regulation would be benefiting the entire industry while imposing costs only on itself. Firms are unlikely to be so generous. In fact, any firm that takes these steps might find itself outcompeted by more efficient firms in the short term and disappear before regulation ever becomes an issue.¹⁵⁷ It would thus appear quite difficult for any firm to strategically game the decision procedures we advocate here.

Our proposal is modest, not radical, and in fact resembles other government programs to address unemployment. For example, economists generally agree that, in theory, the government can help unemployed workers during times of high unemployment by investing in projects like construction of bridges and highways. Because of the high rate of unemployment, the opportunity cost of labor is zero; thus, the project should be undertaken as long as the public values the improved infrastructure more than the cost in taxes. It follows that the government should regulate less during periods of high unemployment than during periods of low unemployment. Regulating less is, in effect, a tax on the public (which receives lower environmental and other regulatory benefits) that benefits workers who would otherwise become unemployed and incur significant unemployment costs.

A third objection stems from the theory of efficiency wages, which holds that firms will pay workers a wage greater than the competitive wage in order to encourage employees to work hard because they will lose this surplus if they are fired.¹⁵⁸ Because the wage is higher than the competitive wage, the number of workers hired by the firm will be less than the number of workers who seek the job, leading to unemployment. In this scenario, firms that lay off workers confer a positive externality on other firms by reducing the outside opportunities of employees of those other firms. In

¹⁵⁶ See *supra* Part I; see also Masur & Posner, *supra* note 7, at 688–89.

¹⁵⁷ Concerted effort by the industry would be targeted by antitrust authorities.

¹⁵⁸ See Carl Shapiro & Joseph E. Stiglitz, *Equilibrium Unemployment as a Worker Discipline Device*, 74 *Am. Econ. Rev.* 433, 433 (1984).

theory, regulations that cause job loss could produce the same—that is, positive—effect, and so job loss should not be considered a reason for opposing a regulation.

This argument may or may not be correct; we are not sure. But even if correct, it would apply only during periods where unemployment is caused by efficiency wages and related effects (when the “natural” rate of unemployment exists) and not during periods where adverse macroeconomic conditions cause unemployment. Therefore, if the argument were accepted, it would suggest that unemployment costs should be folded into cost-benefit analysis only during periods of recession.

III. UNEMPLOYMENT INTEGRATED WITH COST-BENEFIT ANALYSIS

What effect would unemployment costs have on regulatory cost-benefit analysis? In order to get a sense of the magnitude of the effects we have described, we offer here a back-of-the-envelope recalculation of the cost-benefit analysis in the EPA’s pulp and paper regulation. Our goal is not to provide an independent assessment of this regulation, but to use it as a vehicle for showing how agencies should modify cost-benefit analysis to take into account unemployment costs, and also for showing that the unemployment costs involved are large enough to alter regulatory decisions.

In Part I, we mentioned that the EPA considered two regulatory options for limiting emissions from pulp and paper plants. In fact, the EPA also had the choice of regulating under the Clean Water Act (“CWA”) alone, or under the CWA and Clean Air Act (“CAA”) in combination. Regulation under the CWA would limit only waterborne pollution from pulp and paper factories; regulation under both the CWA and CAA would limit both waterborne and airborne pollution. The emissions standards become increasingly stringent across regulatory options. Thus, CWA regulations under Option 2 are more stringent than CWA regulations under Option 1, and CAA regulations under Option 2 are more stringent than CAA regulations under Option 1. Under any given option, the CWA rule is the same irrespective of whether CAA regulation is included. It is more accurate, then, to say that the agency had four options in total: two regulatory options using only the CWA, and those same two choices with the CAA added. In Table 3 below, we summarize the EPA’s estimates of the benefits (net of

costs) under each of these options, the median expected net benefits, and the unemployment that each regulation would create.

Table 3: Pulp and Paper Regulation: Annual Costs and Benefits of Options and Unemployment¹⁵⁹

	Rules			
	Option 1 <i>Final Rule</i>		Option 2 <i>Alternate Rule #1</i>	
	Individually	w/CAA Rule	Individually	w/CAA Rule
Annual Net Benefits (millions)	(\$250.9)– (\$205.7)	(\$1,090)– \$1,144	(\$312.0)– (266.1)	(\$1,181)– \$1,054
Annual Median Net Benefits (millions)	(\$228.3)	\$27	(\$289)	(\$63.5)
Total Job Losses <i>Baseline:</i> <i>90,840</i>	3,094	5,711	5,711 ¹⁶⁰	9,877

The EPA chose Option 1 with the CAA rule included, which appears to produce the greatest benefits net of costs.¹⁶¹ Now, consider how the cost-benefit analysis would change if unemployment costs were included. We price unemployment at two different values: \$35,000 per worker, which represents a low estimate of overall costs, and \$100,000 per worker. These prices represent the total

¹⁵⁹ This table is compiled from data in the EPA's pulp and paper regulatory impact analysis. See EPA, *supra* note 57, at 2-3, 2-29, 3-2, 4-23, 5-25 tbl.5-16, 5-28 tbl.5-18, 6-4 to 6-6, 6-15 tbl.6-4, 6-17 tbl.6-5, 6-34 tbl.6-14, 6-35 tbl.6-15, 6-44 tbl.6-19, 8-26 tbl.8-12, 8-27 tbl.8-13, 8-46 tbl.8-21.

¹⁶⁰ This is not a typographical error, and it seems to be pure coincidence that the job loss for Option 1 with the CAA rule is the same as the job loss for Option 2 without the CAA rule. See *id.* at 6-34 tbl.6-14, 6-35 tbl.6-15.

¹⁶¹ However, the EPA did not explicitly choose the rule for that reason. It did so, instead, because it considered the other options infeasible. See National Emission Standards for Hazardous Air Pollutants for Source Category, 63 Fed. Reg. 18,504, 18,550-51 (Apr. 15, 1998) (to be codified at 7 C.F.R. pts. 63, 261, 430).

lifetime costs of one worker becoming unemployed. However, the figures we presented in Table 3 are the EPA's calculations of yearly costs and benefits. The EPA annualized the costs of the regulation over a thirty-year period.¹⁶² Accordingly, we divide the lifetime costs of unemployment by thirty in order to obtain the annual costs over that same thirty-year period. The results are reported in Table 4:

Table 4: Pulp and Paper Regulation: Annual Costs and Benefits With Unemployment¹⁶³

	Rules			
	Option 1 <i>Final Rule</i>		Option 2 <i>Alternate Rule #1</i>	
	Individually	w/CAA Rule	Individually	w/CAA Rule
Annual Median Net Benefits (millions)	(\$228.3)	\$27	(\$289)	(\$63.5)
Total Job Losses <i>Baseline: 90,840</i>	3,094	5,711	5,711	9,877
Annual Median Net Benefits with Unemployment at \$35,000/worker (millions)	(231.9)	20.3	(295.7)	(75.0)
Annual Median Net Benefits with Unemployment at \$100,000/worker (millions)	(238.6)	8.0	(308.0)	(96.4)

¹⁶² EPA, *supra* note 57, at 4-23.

¹⁶³ This table is compiled from data in the EPA's pulp and paper regulatory impact analysis. See *id.* at 2-3, 2-29, 3-2, 4-23, 5-25 tbl.5-16, 5-28 tbl.5-18, 6-4 to 6-6, 6-15 tbl.6-4, 6-17 tbl.6-5, 6-44 tbl.6-19, 8-26 tbl.8-12, 8-27 tbl.8-13, 8-46 tbl.8-21.

Even with unemployment costs included, Option 1 plus the Clean Air Act rule still seems to be cost-benefit justified, though only barely. If unemployment is priced at \$100,000 per worker, the net benefits are cut by more than two-thirds. Yet this calculation of annual benefits is not the entire picture. The costs of the EPA's regulation are likely to be felt in the relatively near term, as companies are forced to switch to more expensive chemicals and processes. The benefits, on the other hand, will be slower to accrue. For instance, the cases of cancer that will not occur because of the EPA's regulation would only have arisen years into the future. As a result, the total costs and benefits of the regulation, discounted to present value, are not merely the annual costs and benefits multiplied by some number of years.

The EPA reports total costs and benefits only for Option 1 with the CAA Rule—the regulatory option the agency selected. The agency calculated the net present value of those benefits using both a 3% discount rate and a 7% discount rate. In Table 5, we present the EPA's calculations of total costs and benefits, which excluded unemployment costs, and the true total costs and benefits with the costs of unemployment included.

Table 5: Pulp and Paper Regulation: Total Net Costs and Benefits of Option 1 With the CAA Rule at 7% and 3% Discount Rates in Millions of 1995 Dollars¹⁶⁴

	7% Discount Rate	3% Discount Rate
Median benefits	5,067	7,722.5
Median costs	(5,348)	(7,563)
Benefits net of costs (excluding unemployment)	(281)	159.5
Benefits net of costs with Unemployment at \$35,000/worker ¹⁶⁵	(480.9)	(40.4)
Benefits net of costs with Unemployment at \$100,000/worker	(852.1)	(411.6)

¹⁶⁴ This table is compiled from data in the EPA's pulp and paper regulatory impact analysis. See *id.* at 10-4 tbl.10-2.

¹⁶⁵ The total lifetime costs of unemployment have already been discounted to present value and need not be discounted again.

This analysis of total costs and benefits reveals that Option 1 with the CAA Rule is no longer cost-benefit justified once even the lower unemployment costs are figured into the equation. It appears even less justified if unemployment is priced at the higher \$100,000 figure. This does not mean that the EPA should not have regulated at all, but it does suggest that it should have considered a weaker regulation, one where the unemployment effects would not have swamped the net benefits. After all, the EPA is not bound to consider only a fixed set of alternatives. Regulatory options exist along a continuum: the agency can always select a standard that is *slightly* tougher or *slightly* more lenient than one it has considered and rejected. There could very well be a regulatory option, more lenient than Option 1, that would result in less unemployment and thus benefits that exceed costs. But because the EPA did not price the costs of unemployment into its cost-benefit analysis, it may not have realized that such an option was worth investigating.

Of course, as we have noted, not all job losses are equivalent. If workers live in areas with many employment options, or if they have easily marketable skills, they may be able to find new jobs quickly and at minimal cost. On the other hand, if unemployed workers have highly industry-specific skills and no prospects of being hired by other firms within the industry, unemployment may persist, at high social cost. The EPA does not provide direct information on the types of workers it believes will be laid off or their geographic locations.¹⁶⁶ However, as part of its feasibility analysis the EPA does report the number of plants that will be forced to close and the number of firms that will be bankrupted under each regulatory alternative. It also reports the number of workers in the pulp and paper industries who will be laid off as a direct result of these plant closures and bankruptcies. (This is distinct from the total numbers of workers who will lose their jobs due to the direct

¹⁶⁶In fact, there is some evidence that the EPA was restricted in the information it could report by confidentiality concerns related to the industries being regulated. See, e.g., National Emission Standards for Hazardous Air Pollutants for Source Category, 63 Fed. Reg. at 18,580 ("Estimates of job losses are not presented in order to protect confidential business information."). Nonetheless, the EPA provides at least a hint that it is aware that regulation may affect different localities differently. See EPA, *supra* note 57, at 6-23, 6-24 tbl.6-8, 6-25 tbl.6-9 (describing county-by-county unemployment effects). However, the EPA does not follow through on this analysis and does not attempt to calculate effects by location.

and indirect effects of the regulation, which are the figures we employ above.) Table 6 reports those figures. For firm bankruptcies, the EPA only reported whether it believed there would be zero bankruptcies in the industry or one or more bankruptcies. It did so because it had already come to the conclusion that any regulation that caused even one bankruptcy was economically infeasible.¹⁶⁷ We list the number of expected bankruptcies under those regulatory options as “1+” for lack of an exact figure.

Table 6: Pulp and Paper Regulation: Costs and Benefits, Unemployment, Plant Closures and Firm Bankruptcies¹⁶⁸

	Rules			
	Option 1 <i>Final Rule</i>		Option 2 <i>Alternate Rule #1</i>	
	Individually	w/CAA Rule	Individually	w/CAA Rule
Direct Job Losses from Plant Closures <i>Baseline: 90,840</i>	400	900	900	4,800
Plant Closures/Firm Bankruptcies	1/0	2/0	2/1+	4/1+
Median Net Annual Benefits with Unemployment at \$35,000/worker (millions)	(231.9)	20.3	(295.7)	(75.0)
Median Net Annual Benefits with Unemployment at \$100,000/worker (millions)	(238.6)	8.0	(308.0)	(96.4)

Plant closures and firm bankruptcies are only proxies for the true variable of interest, which is how costly it will be for an unem-

¹⁶⁷ Masur & Posner, *supra* note 7, at 685–86.

¹⁶⁸ This table is compiled from data in the EPA’s pulp and paper regulatory impact analysis. See EPA, *supra* note 57, at 2-3, 2-29, 3-2, 4-23, 5-25 tbl.5-16, 5-28 tbl.5-18, 6-4 to 6-6, 6-15 tbl.6-4, 6-17 tbl.6-5, 6-44 tbl.6-19, 8-26 tbl.8-12, 8-27 tbl.8-13, 8-46 tbl.8-21.

ployed worker to find new employment. But we can draw some useful inferences from even this limited information. First, if an entire plant closes, it will likely mean that workers with industry-specific skills have been fired.¹⁶⁹ Workers with industry-specific skills will then have more difficulty finding work in another field. Second, it is of course possible that layoffs will occur in a "one-factory town" even if no plant actually closes. But plant closures make this possibility more likely as well. Third, any given geographic region has some limited ability to absorb unemployed workers into its labor force. That ability will vary based on the population of the region and the economic diversity of the industries present in it. The greater the number of job losses concentrated in one region, the more costly it will be for those workers to find new employment.¹⁷⁰ Higher numbers of plant closures and firm bankruptcies suggest more highly concentrated layoffs, though again the correlation is not perfect.

What does this say about the regulatory options the EPA considered? Option 1 (involving the CWA alone) again looks somewhat better in comparison to the combined CWA and CAA rule. The CWA regulation alone would lead to only one plant closure; the combined CWA and CAA rule would cause two plants to close. On the other hand, the Option 2 combined CWA and CAA rule improves somewhat in comparison to the Option 2 CWA rule alone. The CWA rule would lead directly to 900 lost jobs and two plant closures; the combined rule more than quintuples the number of lost jobs (to 4,800) but only doubles the number of plant closures. This suggests that these additional 3,900 lost jobs may not be as costly as the first 900. They might be spread more widely or be distributed among employees with diverse skills, who will thus more easily be reabsorbed into the workforce.

The important point is that the EPA and other agencies should evaluate the cost of job loss directly by determining the options available to particular workers who lose their jobs. The closure of a plant in one region may be more costly than the closure of a plant in another region. The loss of assembly line jobs may be more

¹⁶⁹ Scattered layoffs could more easily come from human resources or IT departments, where skills translate across industries.

¹⁷⁰ This rationale played a role in the Obama administration's response to the Detroit automobile bankruptcies.

costly than the loss of IT jobs. The EPA's failure to collect this information makes it impossible to evaluate the regulation, and the cost of job loss could, in many normal cases, be substantial enough to affect the choice among regulatory options.

CONCLUSION: THE TRADEOFF BETWEEN EMPLOYMENT AND OTHER GOODS

We make three main points. First, agencies' existing approaches for addressing the unemployment effects of proposed regulations are ad hoc and incoherent. Second, rather than use feasibility analysis, job-loss analysis, or any other ad hoc procedure, agencies should use cost-benefit analysis to account for the unemployment effects of regulations. Third, contrary to conventional wisdom in the cost-benefit literature, unemployment costs are significant and cannot be ignored as rounding errors. Agencies should attempt to quantify these costs as precisely as possible, including taking into account how easily an industry can absorb regulatory costs, which types of workers will be laid off, and whether they will be able to find other jobs within the same industry. This includes the minor point that would be too trivial to mention if it were not the case that some agencies do not seem to understand it: when agencies estimate the effects of regulations on employment, they should take into account the actual industry affected by the regulations and not rely on the MPS study for industries to which it does not apply.

A comparison between feasibility analysis and cost-benefit analysis may be instructive. Feasibility analysis directs an agency not to issue a regulation if the unemployment effect exceeds a (largely unarticulated) threshold. This procedure results in regulatory outcomes that differ in two ways from the regulatory outcomes directed by cost-benefit analysis that accounts for unemployment. First, consider a Regulation *A*, which produces large net benefits but also causes unemployment above the threshold. Under feasibility analysis, Regulation *A* is barred; under cost-benefit analysis, Regulation *A* is permitted as long as the large net benefits exceed the unemployment costs. Second, consider a Regulation *B*, which produces small net benefits while causing unemployment below the threshold. Under feasibility analysis, Regulation *B* is permitted; under cost-benefit analysis, Regulation *B* is barred if the small net benefits are less than the unemployment costs. We can

think of no reason for believing that feasibility analysis produces better results than cost-benefit analysis. By relying on artificial thresholds, feasibility introduces a senseless discontinuity to regulation.

At this stage, it is not clear whether agencies would, in aggregate, regulate significantly less if they took account of unemployment effects in cost-benefit analysis. If agencies already refuse to regulate when unemployment effects are likely to be high,¹⁷¹ regardless of what a cost-benefit analysis implies, then our proposal would improve decision making but not, in the aggregate, reduce regulation. Indeed, if agencies already attach too much weight to unemployment costs (perhaps because of job-loss or feasibility analysis), our proposal would result in greater regulation.

¹⁷¹ This is a possible interpretation of Morgenstern et al., *supra* note 12, at 429–30 (finding that environmental regulations created jobs, albeit at a statistically insignificant level).

Copyright of Virginia Law Review is the property of Virginia Law Review Association and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.