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THE 'TOXICS RULE' AND JOBS

The job-creation potential of the EPA's new rule on toxic power-plant emissions

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On December 16, 2011, the Environmental Protection Agency finalized national standards for mercury, arsenic, and other toxic air pollutants emitted by power plants. Known as the "toxics rule," this ruling is a significant expansion of the Clean Air Act and will, according to nearly all expert opinion, lead to enormous benefits in terms of lower mortality and improved health outcomes for Americans.[1] Judged as it should be—by balancing benefits to health against costs of compliance—the toxics rule is a clear win for Americans. Unfortunately, the debate over regulation more generally has strangely become fixated on jobs.

This is unfortunate because standard economics clearly demonstrates that regulatory changes will generally have only trivial effects on job growth. But since jobs have become a focus of the debate over the toxics rule, this issue brief updates earlier work (Bivens 2011) that analyzed the likely job impacts of the version of the toxics rule the EPA proposed in March 2011. Taking into account the new data from the regulatory impact analysis (RIA) of the *final* rule (EPA 2011b), this issue brief finds that the conclusions of the earlier report, based on the RIA of the *proposed* rule (EPA 2011a), largely stand: The toxics rule will lead to modest job growth in the near term and have no measurable job impact in the longer term.

This brief also notes that the methodology used in the earlier report was likely too pessimistic in its assumptions. While we follow the methodology to provide a good lower-bound estimate of the rule's impact, we also account for more-realistic assumptions and find that the actual effect of the toxics rule on job growth is likely 30–40 percent larger than would be indicated by strict adherence to the earlier paper's methodology. To be clear, this means that the job growth spurred by the final toxics rule

will still be modest. However, it reinforces a key finding in this debate: The current job-market slump is *not* a reason to delay the implementation of the toxics rule; in fact, the economy's current troubles create a good independent reason to ensure that implementation (and compliance investment) happens quickly.

The major findings of this piece are:

- Using the methodology of the previous paper, and focusing on the central estimate, the final toxics rule is forecast to have a modest, positive net impact on overall employment—likely leading to the creation of 84,500 jobs between now and 2015.
- The net 84,500 jobs created by the toxics rule are the result of "cross-cutting" effects. More specifically:
  - 8,000 jobs would be gained in the utility industry itself.
  - 80,500 jobs would be created from pollution abatement and control investments.
  - 32,000 jobs would be displaced due to higher energy costs leading to price increases in energy-using sectors, thereby reducing demand for their output.
  - 28,000 jobs would be created due to "re-spending multipliers."
- Applying less-pessimistic and more-realistic assumptions reduces the jobs displaced by higher energy costs by roughly 40–100 percent. Taking the approximate midpoint of this range, only 10,600 jobs would be displaced due to higher energy costs[2]—raising the number of jobs created by the toxics rule to 117,000. This is the preferred single estimate of the job effects of the final toxics rule.

A forthcoming companion piece to this issue brief (Bivens 2012) explains these more-realistic assumptions in detail. The intuition, however, is fairly simple: The previous report did not fully take into account how such rules would affect an economy that is characterized by an extremely large gap between actual and potential gross domestic product that has persisted for years even in the face of historically low interest rates. In the jargon, the previous report did not fully take into account how regulatory changes that induce firms to make costly investments would affect an economy stuck in a "liquidity trap."

Given this consideration, the methodology used in Bivens (2011) likely understated the job-creating impacts of the toxics rule in the short run by roughly 30–40 percent.

However, even the larger number of jobs (117,000) estimated to be created by the new toxics rule should be put in context: It is barely above the number of jobs that need to be created each month to keep the unemployment rate from increasing. In short, the toxics rule is not a jobs program commensurate to the scale of today's unemployment crisis. Rather, it is a hugely valuable program for protecting human life and health that also happens to have modest positive job impacts.

How the toxics rule will create jobs

Bivens (2011) provides a much more comprehensive accounting of the job impacts of the toxics rule, and the forthcoming companion paper to this piece (Bivens 2012) provides supporting evidence that these impacts are likely just a lower bound. This issue brief will sketch out the channels and magnitudes of the job-creating and job-depressing impacts of the rule and will provide a new estimate based on the RIA released with the final rule.

The EPA's RIA examines in some detail two particular channels through which the rule can affect jobs:

1. Changes in employment in the directly regulated industry (utilities)
2. Increased demand for labor stemming from the construction and installation of pollution abatement and control (PAC) equipment

As with our earlier analysis of the proposed rule, this brief looks at the two channels above as well as two additional channels—largely absent in the RIA—through which the rule can create jobs:

> 3. Changes in demand for labor in energy-using industries due to rising energy costs
> 4. The "re-spending effect" of net job creation or destruction stemming from all other channels. (Since the U.S. economy is currently operating far below potential, anything that spurs, or depresses, output and employment will be amplified through multiplier effects.)

In the sections that follow, an estimate of the jobs effect provided by each of these channels is derived. The effects stemming from each of these channels are then aggregated to form an overall estimate.

Channel 1. The impact on directly regulated utilities

The clearest channel through which the proposed toxics rule could affect employment is its impacts on the industry it directly regulates—utilities. In the toxics rule RIA, the EPA relies on the methodology of Morgenstern, Pizer, and Shih (2002) to provide estimates of employment impacts on the utility sector.

Morgenstern, Pizer, and Shih (2002) describe three avenues through which direct regulations can affect an industry: (a) the cost effect, (b) the factor-shift effect, and (c) the output effect.

a) The ***cost effect*** identifies what happens to industry employment when a regulation makes production more expensive, holding all else (including industry output) constant. Morgenstern, Pizer, and Shih (2002) point out that rising input costs in the case of environmental regulations could include the need to hire more staff to undertake environmental monitoring and compliance, as well as to use new materials to change production processes to make them cleaner. This need to hire a larger bundle of inputs to produce a given unit of output (i.e., the definition of rising input costs) has the potential to increase employment in an industry, all else equal.

b) The ***factor-shift effect*** identifies the impact of changing the *composition* of industry inputs on employment. In the utility industry, environmental activities may be more labor-intensive than conventional production; if so, emphasizing environmental activities will require more labor, thereby boosting industry employment.

It is important to keep in mind that the cost and factor-shift effects refer exclusively to environmental activities that may be undertaken *within the utility sector itself*. It may well be the case, and is forecasted to be, that much economic activity aimed at reducing pollutants happens *outside* the utility sector, in parts of the economy that are increasingly recognized as the environmental protection sector. For example, the construction and installation of scrubbers and filtration systems that capture pollutants are economic activities that generate output and employment outside the utility sector—and hence are not included in the cost and factor-shift effects.

c) The ***output effect*** measures the reduced demand for overall utility output stemming from increased utility costs. These costs may be pushed upward by the need to bring electrical power production into compliance with the new standards. This is probably the most intuitive effect; as utility prices rise, customers purchase less output from them, and the utilities' demand for labor subsequently falls. This output effect includes reallocations between facilities within the utility sector—some power plants may be retired while others may expand output.

The toxics rule RIA essentially uses the overall averages from conclusions of Morgenstern, Pizer, and Shih (2002) about four regulated industries to estimate the likely impact on employment in the utilities sector. While none of the four industries studied by Morgenstern, Pizer, and Shih are utilities, there is still a strong case to be made that the study results can provide a useful benchmark and,

if anything, actually paint a too-pessimistic picture in regards to the likely impact of regulations on job trends in the utility sector. This report accepts the estimates of the EPA RIA that 8,000 jobs are likely to be created in the utilities sector because of the rule. For an extended discussion of why this estimate is likely too pessimistic, see the relevant section in Bivens (2011).

Channel 2. Jobs created through PAC investments

While investments made by firms as a result of tougher environmental standards are often considered simply "compliance costs," it is important to realize that these are *not* foregone economic activity, but instead are largely a re-orientation of this activity.[3] In short, spending on goods and services that are needed to reduce pollution is an activity every bit as capable of creating jobs as spending on anything else.

The RIA forecasts that the final rule will entail $8.9 billion in annualized compliance costs in 2015. The RIA accompanying the *proposed* rule estimated that 80 percent of these compliance costs would take the form of construction and installation of PAC equipment between now and 2015. The final RIA does not have that breakdown, but assuming the ratio of total compliance costs to PAC construction and installation persists, $7.1 billion will be spent on PAC installation and control.

Bivens (2011) provides a full accounting of how the EPA's analysis of the number of jobs generated by the toxics rule almost surely undercounts the employment generated by these PAC investments. This paper simply replicates what that report identified as the most straightforward method to estimate the number of jobs (including both direct and supplier jobs) that are supported by spending on PAC construction and installation: using the employment requirements matrix of the Bureau of Labor Statistics to translate forecasted PAC investment into jobs created.

This approach indicates that 80,500 (49,500 direct and 31,000 indirect) are created through the $7.1 billion in PAC spending by 2015. Bivens (2011) also provides evidence that using this methodology provides estimates that are clearly in line with other data sources that translate industry spending into employment.

Channel 3. Impact on energy-using industries

The RIA for the final toxics rule estimates that the new air toxics standards would raise the price of electricity by 3.1 percent. Bivens (2011) explores how these increased prices may reduce demand for the output of industries that are users of energy, if higher energy costs are translated one-for-one into higher prices in these energy-using sectors. Its central estimate of the jobs displaced by a 3.7 percent rise in electricity prices (the estimated price increase from the proposed rule) was 38,300. Given that the final RIA forecasts price increases of only 3.1 percent, this translates into 32,000 jobs displaced if higher electricity prices translate one-for-one into higher industry prices, *and* if these higher industry prices serve simply to reduce demand for these industries' output.

However, (a) it is unlikely that higher energy costs will actually translate one-for-one into higher industry prices, and (b) even if this one-for-one translation occurs, it is unlikely to simply reduce demand for the industry's output. The reason for this is that the United States currently is—in the jargon of economists—in a "liquidity trap," which, as our analysis of the proposed rule explained, means that the Federal Reserve would not act to offset any direct, first-round gains to net employment that are spurred by these regulatory changes.

However, our previous analysis did not explore the other ramifications of regulatory changes undertaken while the economy is in a liquidity trap. Besides constraining the Federal Reserve's reactions, the liquidity trap also makes it much more likely that these direct, first-round gains to employment spurred by the toxics rule are positive *in themselves*. This is mostly because the potential employment-depressing effects of the toxics rule are high-

"Broken window fallacy" does not apply to job gains stemming from compliance costs

Often in regulatory debates, one side will argue that job-growth estimates that count jobs gained through business spending to meet new regulatory standards err due to the "broken window fallacy." This alleged fallacy is the notion that replacing a shopkeeper's window that has been broken by a stray baseball generates net new productive employment because the money is spent to replace the broken window. According to some, that notion is a fallacy because the money spent to replace the window would have been spent more productively elsewhere absent the break, and the foregone spending destroys jobs as surely as replacing the broken window creates them.

While the "broken window fallacy" is a useful reminder that each use of resources has opportunity costs that must be considered when making cost-benefit analyses, that does not mean that the jobs gained through investments made to meet regulatory standards never constitute net new additions to overall employment. There are essentially two ways that capital compliance costs can spur net new job growth.

First—and most relevant to today's debate—is if these compliance costs mobilize currently idle financial savings into productive investment flows. This seems extremely likely in today's economy. For one, U.S. corporations sit on massive amounts of liquid cash-holdings that are not being mobilized to finance job-creating investments. For another, the economic channel that is supposed to spur investment of these cash holdings is declining interest rates. But interest rates are already at historic lows and unlikely to be lowered through regulatory inaction that spurs noncompliance investments. In the jargon, the U.S. economy is in a liquidity trap that keeps savings from being channeled into job-creating investments. Regulatory changes that mobilize these financial savings would indeed create jobs in this economic situation.

Second, it is far from clear that the investments undertaken to meet new regulatory standards cannot add to total employment *even in a well-functioning economy and even if the financial resources that financed them would have been spent elsewhere.* For example, if the construction and installation of PAC equipment is significantly more labor intensive than other economic activities spurred by the same amount of spending, then even just switching from these other activities to PAC investments would increase labor demand. This scenario also seems quite likely, especially given likely alternative uses of these investment dollars.

Remember, the economic mechanism that channels financial savings into productive investments is interest rate changes. In a well-functioning economy, the $7.1 billion that utilities save by not spending on PAC construction and installation flows into alternative job-creating investments through the lowering of interest rates. This means that the alternative job-creating investments will take place in *interest-sensitive* industries, which are essentially construction (such as PAC investments) or durable goods manufacturing. Thus it is far from obvious that investing this $7.1 billion in non-PAC construction, or durable goods (some of the least

labor-intensive production in the entire economy) would lead to more jobs than investing in the typically labor-intensive PAC industry.

Given the large amounts of excess capacity and the failure of interest rates to mediate the savings and investments relationships in the U.S. economy today, it seems very likely that the investments mobilized through the need to meet the new proposed standards would represent a nearly pure net new addition to economy-wide employment. And even if these investments happened in an already well-functioning economy, there is still little reason to believe that they would be anything but a plus for job creation.

It should be noted that this macroeconomic reasoning carries through to the utilities sector as well. Even if the utilities sector had concrete plans to spend the $7.1 billion on some other investment project, today's historically low interest rates mean that it is free to do both at minimal cost. Furthermore, it is hard to imagine that the utilities sector—which due to its significant infrastructure needs, tends to carry a high debt load and benefit greatly from low interest rates—is currently more cash-constrained than the overall corporate sector today.

Adapted from Bivens (2011)

er energy costs that drive price increases in energy-using industries. However, the probability that energy-using industries have the market power to raise prices in the face of prolonged large output gaps (PLOGs, in the literature) is quite low. Further, very high profit margins in the corporate sector suggest that these margins could serve as a buffer against price increases that are driven by higher energy costs. Finally, when nominal interest rates are at the zero-bound, supply-side developments that increase expected price changes can actually *boost* aggregate demand by lowering real (inflation-adjusted) real interest rates.

Therefore, because the U.S. economy is now mired in a liquidity trap, it is necessary to apply less-pessimistic and more-realistic assumptions about the jobs impact of higher energy costs. Doing so reduces the number of jobs displaced due to higher energy prices by roughly 40–100 percent. Taking the approximate midpoint of that range, this issue brief estimates 10,600 jobs lost from a simple one-to-one translation of higher energy costs into higher prices that depress final demand.[4] (The true ramifications of the liquidity trap are explored further in Bivens 2012, forthcoming.)

Channel 4. Impact stemming from re-spending effects of net job impacts from other channels

In the short-run in an economy characterized by excess capacity, if the previous channels all sum to a net job *gain* stemming from the implementation of the proposed toxics rule, then these extra jobs should be multiplied by the "re-spending" effects of newly employed workers to get a total jobs impact.

The intuition underlying this point is simply that construction workers newly hired to install PAC equipment and manufacturing workers newly hired to produce the intermediate inputs for this construction will have extra income, a portion of which they will spend. This additional spending in the economy will support production (and jobs) in sectors of the economy wholly unrelated to the activities associated with conforming to the toxics

TABLE 1

Table 1: Employment effects of final 'toxics rule,' from each channel

Replication of Bivens (2011) methodology with final RIA parameters

Channel	High	Low	Average
1. Directly regulated utility effect[a]	30,000	-15,000	8,000
2. Effect of $7.1 billion in PAC investments, direct + supplier jobs[b]	89,000	71,000	80,500
3. Effect of 3.1% increase in electricity costs passed through to energy-using sectors[c]	-26,000	-38,200	-32,000
Subtotals	93,000	17,800	55,500
4. Re-spending effects[d] *Re-spending multiplier = .5*	46,500	9,000	28,000
Totals, replicating Bivens (2011) methodology *Re-spending multiplier = .5*	139,500	26,500	**84,500**

Using more-realistic assumptions of Bivens (2012, forthcoming)

Channel	High	Low	Average
3. Effect of 3.1% increase in electricity costs passed through to energy-using sectors *(Factoring in price impacts in a "liquidity trap"*[e]*)*			
Price increases buffered by PLOGs and profit margins	-15,600	-22,920	-19,200
Price increases that lower real interest rates	-1,625	-2,388	-2,000
Average of alternative effects	-8,613	-12,654	-10,600
Totals including alternative price impacts *Re-spending multiplier = .5*	165,500	65,000	**117,000**

Notes:
a. Range of effects estimated by EPA, following the methodology of Morgenstern, Pizer, and Shih (2002)
b. See Bivens (2011) for explanation of range of effects—stems from slight difference in estimates of labor intensity of construction effort
c. See Bivens (2011) for explanation of range of effects—stems from estimates of substitutability between electricity and other energy sources
d. See Bivens (2011) for explanation of range of effects—stems for different estimates of respending
e. Stems from differing estimates as to how much firms will be able to pass on higher energy costs via higher prices and how much higher prices will translate into lower demand. Bivens (2012, forthcoming) explains these estimates in detail.

Source: Author's calculations, as explained in text and in Bivens (2011) and Bivens (2012, forthcoming), using data from the EPA; Bureau of Labor Statistics employment requirements matrix; and Ho, Morgenstern, and Shih (2008)

rule. For example, waitstaff will be hired by diners that are serving more lunches bought by the newly hired construction workers, and clerks will be hired by retail clothing stores that will sell more clothes to newly hired manufacturing workers.

Total effect on job creation

Table 1 sums the effects from the four previously mentioned channels, being careful to not double-count any effects. It then applies the re-spending multiplier of 0.5 (the preferred value used in the Bivens 2011 report on

the toxics rule) to the results to arrive at a final number for job creation stemming from the proposed toxics rule. Depending on whether the identical methodology from Bivens (2011) is used or the more-realistic assumptions described in Bivens (2012, forthcoming) are employed instead, the central estimate of jobs gained because of the effects of the toxics rule is either 84,500 or 117,000.

Conclusion

The EPA RIA on the final toxics rule makes a compelling case that the rule passes any reasonable cost-benefit analysis with flying colors—the monetized benefits of longer lives, better health, and greater productivity dwarf the projected costs of compliance. Perhaps most important, some of the greatest benefits of the rule were not "monetized."

In particular, the EPA RIA indicates that each year, the rule is likely to lead to:

- 4,200–11,000 lives saved (which the EPA describes as "avoiding premature mortality")
- 4,700 fewer non-fatal heart attacks
- 5,700 fewer hospital and emergency room visits
- 140,000 fewer cases of respiratory symptoms
- 540,000 fewer days of work lost to sickness

However, the political debate over regulations tends to ignore the overall benefits and focus too narrowly on the jobs impact. Even here, the impacts are unambiguously positive; claims that this regulation destroys jobs are simply wrong. The jobs impact of the rule will be modest, but it will be *positive*.

Endnotes

1. See the regulatory impact analysis for a complete accounting of the costs and benefits of the rule. The bottom line is that monetized benefits exceed compliance costs by roughly $24 to $80 billion, and many of the key health benefits of the rule could not be "monetized" but are deemed clearly significant by a preponderance of scientific opinion.

2. To be conservative, the calculation reduced the number of jobs displaced due to higher energy costs by 66 percent.

3. While there are portions of the social costs identified in the RIA that are indeed purely foregone economic activity, costs dedicated to purchase of PAC equipment are not part of them.

4. To be conservative, the calculation reduced the number of jobs displaced due to higher energy costs by 66 percent.

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