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DAYDREAMS OF DISASTER

An evaluation of the Varshney-Tootelian critiques of AB 32 and other regulations

Report to the California Attorney General 2009

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Executive Summary

Sanjay Varshney and Dennis Tootelian have authored two recent reports on the economic impact of implementing California's greenhouse gas law, AB 32, and on the cost of state regulation on California small businesses. Their studies predict that AB 32 will result in losses as large as 10 percent of California output (gross state product), and that the losses from state regulation overall are responsible for a loss of one-third of California's output.

Both studies are unsound and unreliable economic analysis. The losses they project would be serious economic impacts – if they were real. They are, however, entirely unreal; they should be viewed merely as daydreams of disaster.

The report on the economic impacts of AB 32 is deeply flawed in numerous ways:

- The authors count only the costs of AB 32's energy efficiency, conservation, and clean energy measures, not the savings. In the strange world of their scenarios, money spent on fuel-efficient cars, better insulation, and energy-saving new appliances will not conserve a single gallon of gasoline, save a single kilowatt-hour of electricity, or create a single job. This one-sided calculation hopelessly skews the results.

- The authors assert without any proof that the carefully researched estimates of AB 32's costs prepared by the California Air Resources Board must be far too low. Their own estimates of AB 32's costs are highly exaggerated, based on unsubstantiated guesses and back-of-the-envelope calculations. Among their mistakes:

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- They assume no savings in energy use from expenditures to build a zero net energy home, even though by definition a household's energy bills would go to zero;

- They incorrectly assign the savings resulting from new, more fuel efficient cars as a cost imposed on older cars;

- Their estimate of increases in food costs is rife with speculation and overlooks the extensive literature on the energy and transportation requirements for food;

- Their estimate of increases in the costs to small businesses is based on double counting of small business receipts and arbitrary assumptions about the costs and cost increases businesses face.

- Overall, their estimate of losses from AB 32 is more than an order of magnitude greater than comparable estimates from serious, well-documented studies of the economic impact of climate policies.

The study about the impacts of regulations in general on economic output in California is also a deeply flawed and shoddy economic analysis:

- The report is based on a large, elementary, mistake. The authors use rankings of state business climates from a Forbes magazine article to "explain" the difference in output among states. But amazingly, they ignore the obvious fact that bigger states with larger populations have bigger economies. Instead, they attempt to explain *all* the variation in the size of state economies on the basis of small differences in business climates as perceived by Forbes. Their conclusion that California's regulatory climate imposes great economic losses thus has no support, based on nothing but exaggerated, misplaced extrapolation from the Forbes article.

- The methodology used in the report implies the absurd result that at least one state could achieve a five-fold increase in incomes, producing more than $200,000 per person, simply by changing its regulatory climate. No research has ever suggested a conclusion remotely close to this assertion.

- A correct analysis would compare the impact of state regulation and other factors on the *per capita output* of states, rather than absolute output. When corrected in this manner, the analysis carried out by the authors show that the regulatory environment of California or any other state has no correlation with the state's per capita economic output. The Forbes rankings of business climate explain nothing about the differences among states in output per capita.

- The authors also ignore the substantial peer-reviewed literature on the economics of regulation. These studies show little evidence that companies move to locations with looser environmental regulations; the costs of regulation are frequently exaggerated in popular

accounts. Peer-reviewed research has found no evidence of economic harm from the South Coast's air quality regulations and in fact slightly positive effects on employment and industries.

In short, there is no substance to the outsized claims by Varshney and Tootelian. Their reports contain elementary errors, arbitrary assumptions, and enormous guesswork. Their anti-regulatory bias clearly skews their results toward finding large, unsupported costs.

Discussion

At the request of the California Attorney General's Office, I reviewed two reports prepared for the California Small Business Roundtable by Sanjay Varshney and Dennis Tootelian: "Cost of AB 32 on California Small Businesses -- Summary Report of Findings" (June 2009), and "Costs of State Regulations on California Small Businesses Study"(September 2009).[1] The first report projected economic losses from AB 32 as large as $182 billion annually, or 10 percent of California output (gross state product, the state-level equivalent of Gross Domestic Product). The second report estimated losses from California state regulation in general at one-third of California's output. My review of the reports follows.

I. Cost of AB 32 on California Small Businesses -- Summary Report of Findings (June 2009)

A. Background -- the AB 32 Scoping Plan and ARB's Economic Analysis

AB 32, formally known as the California Global Warming Solutions Act of 2006, calls for reducing the state's greenhouse gas emissions to 1990 levels by 2020. ARB, the agency charged with implementing the legislation, was required to develop a plan for reaching the 2020 emissions target, and an analysis of the impacts of that plan on the California economy. In late 2008, ARB released its scoping plan for implementing AB 32, along with an economic analysis of that plan.

The ARB economic analysis found that by 2020, adoption of all the recommendations in the scoping plan would raise the projected gross state product by $7 billion (or 0.3 percent), raise per capita incomes by $200 a year (0.4 percent), and create 120,000 new jobs (almost 0.7 percent increase in employment).[2] The measures included in the scoping plan are projected to have a total annual cost of almost $25 billion in 2020, and to create annual savings of more than $40 billion. Most of the savings – more than $28 billion – consist of reduced expenditures on energy. Annual emissions are reduced by 140 million metric tons of CO_2-equivalent (CO_2e).[3]

Many different energy efficiency, conservation, and clean energy measures are included in the ARB plan. The leading categories which account for the majority of the costs, benefits, and

[1] Available at http://www.sbaction.org/get_resource.php?table=resource_kmqap4_18z4ys&id=kmqaq1_1ed1wo and http://www.sba.ca.gov/Cost%20of%20Regulation%20Study%20-%20Final.pdf.
[2] Scoping Plan, Appendix G, Table G-1, page G-11.
[3] Scoping Plan, Appendix G, Table G-I-2, pages G-I-6 – G-I-8; Table G-4, page G-12.

greenhouse gas reductions are shown in Table 1. Notice that ARB was able to identify substantial savings from each category, in contrast to the analysis by Varshney and Tootelian.

Table 1: Principal measures included in ARB scoping plan for AB32

Measures	Reductions (MMT CO2e in 2020)	Million dollars Costs	Million dollars Savings
Pavley I and II light-duty vehicle GHG standards	31.7	1,966	13,024
Low carbon fuel standard	15.0	11,000	11,000
Heavy-duty vehicle GHG reduction	6.4	1,616	2,137
Building and appliances electricity reduction	15.2	3,402	5,065
Building and appliances natural gas reduction	4.3	963	1,433
Renewable portfolio standard (33%)	21.3	3,672	1,889
All other measures	46.1	2,259	5,869
Total	**140**	**24,878**	**40,417**

Source: Scoping Plan, Appendix G, Table G-I-2, pages G-I-6 - G-I-8

B. The Report's Overall Cost Estimates Far Exceed Those of Other Analyses

Varshney and Tootelian (V&T) assert without documentation that there are enormous hidden costs excluded from the ARB analysis. For example,

> Initial estimates suggest that billions of dollars of costs will result from the implementation of AB 32. In addition to the costs suggested by ARB, others include infrastructure and capital investment costs upward of $60 billion, $5 billion for new home construction, $36 billion for more fuel-efficient cars, and billions in higher food costs due to higher transportation costs and change in land use. In summary, the implementation costs of AB 32 could easily exceed $100 billion upfront (page 6).

No evidence is ever presented supporting these estimates, and even V&T do not use an estimate of $100 billion for the costs of AB 32. Instead, they offer three scenarios. In their "minimum impact" scenario, they accept the ARB estimate of about $24.9 billion in costs, but estimate the resulting savings at zero. The failure to project any savings is supported only by the statement

> … the savings identified by ARB are considered too speculative to consider at this time, in part because the outcomes are uncertain and the savings require major investments by businesses and/or consumers that might not be possible (page 7).

The second scenario, described as "expected impact to consumers," retains the estimate of zero savings, but makes guesses at the impacts of AB 32 on five areas of consumer spending, totaling $52.2 billion per year. The third scenario, "expected economic impact to small businesses," continues the assumption of zero savings, but presents even more casual speculation about the costs for small businesses, totaling $63.9 billion per year.

Each scenario's cost estimate is then used as an input to the IMPLAN model, which calculates the indirect and induced changes resulting from a change in direct spending. The total effect on the California economy, combining direct, indirect, and induced changes, is about 2.85 times the direct spending in each case. The IMPLAN calculation for the "small business scenario" shows that direct, indirect, and induced changes reach an estimated $182.6 billion. This figure, referred to as "the total AB 32 cost" (page 9), is 10 percent of California's gross state product in 2008.

The estimate of 10 percent of output is far outside the range of published estimates for the cost impact of climate policies, including policies with much more ambitious goals than AB 32. The Stern Review, a massively researched study sponsored by the British government, found that 90 percent of climate damages worldwide could be avoided by spending 1 percent of world output.[4] A recent study of the costs of meeting a demanding 350 ppm target for atmospheric CO_2 concentration, co-authored by eight economists (I was the lead author), found that several major research groups project the cost of meeting this target at 3 percent of world output or less.[5]

The cost estimates of V & T also are far higher than the estimates of the costs of proposed federal climate legislation prepared by government agencies and major research institutions. U.S. EPA, for example, projects that both the Waxman-Markey climate bill adopted by the House in June, 2009 and the similar proposals being considered in the Senate would reduce household consumption by a fraction of 1 percent – that is to say, it would lead to very slightly slower growth in a steadily growing economy.[6] The Congressional Budget Office estimated that the Waxman-Markey bill would cause a 0.2 to 0.7 percent reduction in GDP by 2020, and a 1.1 to 3.4 percent reduction in GDP by 2050 – in the context of a growing economy, which will more than double in size before 2050.[7] The Congressional Research Service emphasized that the differences in assumptions between models often caused larger changes than the projected impacts of climate change; among the estimates they reviewed, the expected cost of the Waxman-Markey bill in 2020 was between $69 and $262 per household in government and academic studies, and up to $1,262 per household in studies by business lobbyists and conservative think tanks.[8] Thus the V&T estimate for the cost of AB 32 to households is more than 10 times the cost estimate of the Waxman-Markey bill forecast by government and

[4] Nicholas Stern, *The Economics of Climate Change: The Stern Review*, Cambridge University Press, 2007.
[5] Frank Ackerman et al., "The Economics of 350: The Benefits and Costs of Climate Stabilization," 2009, http://www.e3network.org/papers/Economics_of_350.pdf .
[6] U.S. EPA, Office of Atmospheric Programs, "Economic Impacts of S. 1733: The Clean Energy Jobs and American Power Act of 2009," October 23, 2009; see also Ackerman et al., "The Economics of 350" for a discussion of earlier estimates.
[7] Congressional Budget Office, "The Economic Effects of Legislation to Reduce Greenhouse-Gas Emissions," September 2009.
[8] Larry Parker and Brent D. Yacobucci, "Climate Change: Costs and Benefits of the Cap-and-Trade Provisions of H.R. 254," Congressional Research Service, September 14, 2009, Table 18.

academic studies, and more than 3 times the estimated cost of Waxman-Markey *even according to business and conservative studies.*

C. The Report's Estimates of Consumer Costs Are Exaggerated and Unsubstantiated

The five areas of consumer impacts included in the second scenario are housing, transportation, food, and the costs of electricity and natural gas. The V&T calculations for these areas are summarized in Table 2.

For energy costs, V&T project price increases (8 percent for gas, 11 percent for electricity), and no reduction in energy use. Although it is clearly wrong to anticipate no change in energy use when prices go up and huge amounts are spent on energy efficiency, these categories account for only a small fraction of the V&T consumer impacts. Almost all of the V&T consumer impacts consist of increased costs for housing, transportation, and food, with housing alone accounting for more than half of the total.

Table 2: Varshney-Tootelian estimates - household consumer impacts of AB 32

Cost Category	Cost per household	Savings	Jobs Created	Rationale for costs
Housing	$2,048	$0	0	AB 32 assumed to add 14.9% to cost of new housing; percentage applied to all housing costs except mortgage and rent
Transportation	$756	$0	0	ARB estimate of $30/month fuel savings on new cars misinterpreted as a cost to all households, applied to average of 2.1 cars
Food	$895	$0	0	Percentage increase in food costs assumed to be half as large as in transportation
Natural gas	$35	$0	0	Assumed price increase of 7.8%, no change in volume
Electricity	$124	$0	0	Assumed price increase of 11.1%, no change in volume
Total	**$3,857**	**$0**	**0**	

Source: Varshney and Tootelian, AB 32 report, pages 32-33.

For housing, V&T begin with an estimate that AB 32 will add $50,000, or about 15 percent, to the cost of a new home; they assume that spending by all consumers for dwellings, exclusive of

mortgage payments and rent, will increase by the same percentage, yielding an annual cost increase of $2,048 per household.

The $50,000 cost increase for a new house due to AB 32 is attributed (without a specific citation) to the AB 32 Implementation Group, a business lobby. The website of AB 32 Implementation Group does not appear to provide this data, or any estimate of impacts on housing costs; my e-mail inquiry to the group asking for any information they had on the subject did not receive an answer. According to UCLA economist Matthew Kahn, the $50,000 cost is from a study by the US Department of Energy's National Renewable Energy Laboratory, estimating the incremental cost of building a zero net energy house.[9] If half the households in the state invested $50,000 in upgrading to zero net energy homes, financing the upgrades with 30 year loans at 7 percent, the average annual cost per household would be roughly equal to the V&T estimate of $2,048.

The payoff for the increased costs of a zero net energy house, of course, would be that the household's energy bills would go to zero; V&T assume a comparable level of expenditure, but no savings on energy use.

For transportation costs, V&T break their own rule about ignoring the "speculative" benefits of AB 32 identified by ARB. They note ARB's calculation that buyers of new, higher miles-per-gallon cars will enjoy fuel savings of $30 per month – and treat this as a cost imposed on owners of older cars. Since the average household has 2.1 cars, they calculate a "cost" of $756 per household per year.

This calculation is wrong in two fundamental respects. First, the fuel savings achieved by new cars do not impose costs on old cars. If the fuel price is unchanged, the cost of driving an existing car is unchanged as well. The cost to owners of old cars is only the increase in fuel prices caused by AB 32, not the entire cost of fuel. Second, in a projection of transportation costs ten years into the future, it is mistaken to assume that everyone will still own an old car. Since automobile lifetimes are less than 20 years, more than half of the cars on the road will be replaced between now and 2020.[10] As Matthew Kahn has shown, it is quite possible that average household costs for transportation will go down, not up, due to AB 32.[11] In Kahn's calculations, big fuel savings by the households who have bought new cars outweigh the *slightly* increased fuel costs for those who have not bought a car since the change in regulations. Over time, as more cars are replaced, more and more households save money thanks to lower fuel needs.

For food, V&T observe that food costs depend on transportation and energy costs, and simply offer the unsupported guess that food costs could experience half the percentage increase which they estimated in gasoline and vehicle maintenance costs. Since they project a 23.4 percent increase in transportation fuel and maintenance costs, they guess that there will be an 11.7 percent increase in food costs due to AB 32. They make no attempt to cite any of the extensive

[9] Matthew E. Kahn, "A Review of Cost of AB 32 on California Small Businesses—Summary Report of Findings, by Varshney & Associates," 2009, http://www.arb.ca.gov/cc/scopingplan/economics-sp/matthew_kahn.pdf, p.3.
[10] In 2004 ARB calculated, based on the Department of Motor Vehicles registration database, that the average lifetime is 16.1 years for passenger cars and 18.6 years for light trucks. See http://www.arb.ca.gov/regact/grnhsgas/vmt.pdf
[11] Kahn, pp.6-7.

literature on the energy and transportation requirements for food production.[12] They offer no explanation for their implicit guess that food production is half as energy-intensive as automobile use. And in any case, they have hitched their estimate of food cost impacts to an illogical estimate of transportation impacts, as discussed above.

D. The Report's Estimate of Small Business Impacts are Based on Double Counting and Arbitrary Guesses

For the small business impacts scenario, the one with the largest estimated costs, V&T offer just one back-of-the-envelope calculation. In 2002, small businesses – those with less than 500 employees – accounted for $1.145 trillion of the $2.695 trillion of business receipts in California. Assuming 37.8 percent growth of the state economy from 2002 to 2009, small business receipts would reach $1.578 trillion by 2009. Based solely on assertions of general knowledge about small businesses and vague, undocumented references to two business information services (BizStats and American Fact Finder), V&T announce that (all quotes from their page 34):

a) "…on average small businesses earn a 10% net profit margin, with the balance 90% being absorbed by expenses and cost structure."

b) regarding the five cost categories included in the consumer impacts scenario – transportation, housing, food, fuels, and utilities – "…the cost structure for all industries has an exposure to the five areas that ranges from 10% of their cost structure to 80% of their cost structure. Therefore, it is reasonable to assume that the average cost structure exposure for small businesses to the five areas is approximately 45%."

c) "While the cost increases [due to AB 32] for each of the five areas is likely to vary, and given estimates provided by several other research studies, it is reasonable to assume that small businesses will likely see at least an average 10% increase in its cost structure that has an exposure to these five costs."

As a result, the impact of AB 32 on small businesses is declared to be 10 percent of 45 percent of 90 percent of $1.578 trillion, or $63.9 billion.

This calculation multiplies one real economic statistic, small business sales receipts, by three arbitrary guesses. No real support is offered for these three guesses; only the first of the three is a standard accounting category for which comprehensive data would be likely to be available, and even in that case, V&T have not cited any source for their estimate.

Even the choice of the original statistic reflects an elementary mistake: an economy-wide total of business receipts is sure to include a lot of double-counting. When a farmer sells food to a wholesaler, who sells it to a retailer, who sells it to a consumer, the sum of all three sales receipts will count the farmer's income three times and the wholesaler's income twice. Gross state product, or gross domestic product, avoids this problem by only counting the value added at each

[12] For example, Christopher L. Weber and H. Scott Matthews, "Food-Miles and the Relative Climate Impacts of Food Choices in the United States," *Environmental Science and Technology*, 2008, vol. 42 no. 10, pp. 3508-3513.

stage of production: the farmer's income plus the markup above farm costs added by the wholesaler, plus the markup above wholesale costs added by the retailer.

In 2002, the year for which V&T report $2.695 trillion of business sales receipts in California, gross state product was $1.340 trillion.[13] This is half as large as business receipts, implying that on average, each dollar of value added by businesses was counted twice in the receipts total. Even if one chose to believe V&T's three unsupported guesses about percentages, the small business impact should be half of their estimate.

E. Summary of AB 32 Study

The ARB study of the economic impacts of AB 32 may not be the last word on the subject; details of the analysis may need revision, as suggested by some of the peer reviewers. Yet the ARB study, finding benefits roughly equal to costs, is well within the range of serious economic analysis of regulations – unlike the flawed and idiosyncratic work of Varshney and Tootelian.

V&T's analysis of AB 32 is remarkably thin in documentation, primarily citing documents on websites, press releases, newspaper stories, letters, and a few standard government data sources. Only one article in an economics journal is cited, a 1990 analysis of the costs of federal regulations which were in place as of 1982.[14] That article says, in its concluding paragraph,

> Although perhaps obvious, one final point deserves mention. Our attention has focused on costs associated with environmental quality regulations. Any normative judgment about the desirability of the regulations depends on comparing appropriately measured costs with corresponding benefits.

Estimates of benefits, however, are absent from all of the V&T scenarios for AB 32.

Varshney and Tootelian do not always dismiss the benefits of public policies. In a recent study of the potential impact on Chicago of hosting the 2016 Olympics, they used the same software, and much of the same language, as in their study of AB 32.[15] For the Chicago analysis, however, they estimated enormous job creation benefits, and adopted what might be called "speculative" estimates of hugely increased visitor spending in the metropolitan area that would result from hosting the Olympics. The Chicago Olympics study is almost the mirror image of the AB 32 report: the former is unreservedly slanted in favor of its subject, just as the latter is slanted in opposition. Economists, like anyone else, are free to express support for building Olympic stadiums and opposition to climate policies; but letting those political opinions dominate and distort the quantitative analysis is just bad economics.

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[13] Downloaded from the Commerce Department's Bureau of Economic Analysis, Regional Economic Accounts, http://www.bea.gov/regional/gsp/

[14] Michael Hazilla and Raymond J. Kopp, "Social cost of environmental quality regulations: a general equilibrium analysis," *Journal of Political Economy* 98 (1990), pp. 853-873; quote is from p. 871.

[15] Dennis Tootelian and Sanjay Varshney, "Chicago 2016 Economic Impact Analysis: The Expected Incremental Economic Impact of Chicago Hosting the 2016 Olympic and Paralympic Games," 2009, http://www.chicago2016.org/Portals/0/Press_Releases/Chicago%202016%20Economic%20Impact%20Analysis.pdf

II. Cost of State Regulations on California Small Businesses Study (Sept. 2009)

A. The Report Is A Unique— And Unsound— Approach to Evaluating State Regulations

In their study on the overall costs of state regulations on California, (abbreviated below as *State Regulations*), V&T apply an even more far-fetched and less rigorous methodology on a broader scale. They attempt to estimate the cost of all state regulations to the California economy (despite the study's title, its findings are not restricted to small business impacts).

To estimate the direct cost of all state regulations, V&T employ what they call "an original and unique approach" (*State Regulations,* 5) to a comparison of the economies of the 50 states. Described as a "general equilibrium analysis" that controls for "all… known factors" that influence a state's gross product (*State Regulations,* 8), the analysis consists of just one equation: gross state product is correlated with six state rankings from Forbes magazine, scoring states from 1 to 50 on business costs, labor, regulatory environment, economic climate, growth prospects, and quality of life. Data on economic output, and on the six rankings, for each state from 2006 and 2007, are combined, yielding 100 observations.

The results of their analysis are reproduced in the Appendix to this report (see column A of Table A1). They found that one of the six Forbes rankings, economic climate, is not significantly related to gross state product. Two of the rankings, business costs and labor, are significant, but with the "wrong sign" – a worse ranking from Forbes is associated with higher state output. Three of the rankings are significant (regulatory environment, growth prospects, and quality of life), with the expected sign: worse rankings are, all else being equal, associated with lower state output. For the regulatory environment, an increase (worsening) of one point in the Forbes ranking is associated with a decrease of $4.424 billion in state output.

V&T then assume that each state's losses due to regulations are equal to $4.424 billion per point in the Forbes ranking. Even Virginia, said to have the best regulatory environment in the country, loses $4.424 billion (*State Regulations,* 13) – because it is ranked number 1. To avoid all losses in the V&T calculations, a state would have to be ranked 0, which was not an option in the Forbes lists. California's average ranking for 2006-2007 was 40, so the state's losses are estimated at 40 time $4.424 billion, or $177 billion. This number is treated as the direct cost of regulation, and is then used as the input to the IMPLAN model, resulting in even larger estimates of combined direct and indirect losses.

This is indeed an original and unique approach, and there are good reasons why no one else has approached economic data in this way—it is far out of the mainstream of sound economic analysis. The Forbes rankings, which are the only source of explanatory data for V&T, are documented only by repeated general assertions of their outstanding merits and reputation – for instance,

> The Forbes rankings based on 30 different metrics are the most comprehensive available. Therefore, this study relies exclusively on the Forbes rankings that have already considered all the various metrics that influence businesses and in turn productivity and gross state product (*State Regulations,* 13).

The most glaring error in the V&T analysis, and one that renders its entire conclusion meaningless, is the failure to consider the size of the different states. They compare each state's gross state product – total, not per capita – to the Forbes rankings. That is, their statistical analysis seeks to explain the difference in *total* output between, for example, California and Rhode Island solely by using rankings of the states' business climates. In other words, they posit that Rhode Island has a lower economic output than California because of differences in the two states' Forbes rankings for government regulation and other aspects of business climate. But the main reason why California has a larger economy than Rhode Island is not its business climate. The obvious explanation which V&T have overlooked is that there are more than 30 times as many people in California as in Rhode Island. Their failure to account for this rudimentary difference is egregiously bad economics.

V&T find that the six Forbes rankings together explain 36 percent of the variation in gross output among states.[16] However, as shown in the appendix to this report, population alone explains 98 percent of the variation in gross output among states. Big states have big economies, small states have small economies. Once that obvious factor is recognized, the Forbes rankings add nothing to our understanding of the size of state economies, as explained below. Metaphorically speaking, V&T have ignored the elephant in the middle of the room, but attributed its huge weight to the mice they see in the corners.

The absurdity of the V&T methodology is muted when applied to a state as large as California, because their mistaken adjustments are still only a fraction of the state's huge economic output. The error of focusing on total state output, rather than output per capita, may be easier to see in the case of a small state. Recall that their assumed loss of state output per point in the regulatory environment ranking, $4.424 billion, applies equally to states large and small. Rhode Island was ranked 49 in regulatory environment in 2007, so V&T would estimate its losses at 49 times $4.424 billion, or $216.8 billion – which is more than four times the state's entire output in 2007. If only Rhode Island could match the regulatory environment of top-ranked Virginia, according to the V&T methodology, the state's income would be more than five times as high as it is at present. Per capita output in Rhode Island would average well over $200,000, as soon as the state throws off its regulatory shackles. And that is only adjusting for the V&T estimate of direct losses to Rhode Island; including their calculation of indirect losses would drive the state's hypothetical, deregulated output even higher. Needless to say, no one else has identified opportunities for simple policy changes to cause a five-fold increase in incomes throughout Rhode Island, or any other state.

B. The Analysis Done Properly Shows No Adverse Economic Impact from Regulations

What if V&T had controlled for population by comparing state output *per capita* to the Forbes rankings, as sound economic analysis would dictate? Using their framework, I ran a regression of state output per capita on the six rankings for 2007; the result, shown in the appendix, is that none of the rankings comparing states are significant, even at the 90 percent level (a looser

[16] That is, the adjusted r-squared is 0.36 in their regression; see the appendix for more discussion.

standard than the traditional 95 percent cutoff for statistical significance). The regulatory environment ranking, in particular, is literally uncorrelated with output per capita.

In other words, while V & T claim that regulation, as measured by Forbes, imposes dramatic costs on California and causes it to lose a great deal of business compared to other states, a corrected analysis of their thesis demonstrates that the Forbes measure of regulation has *no discernible* impact on the size of California, or any other state's economy. The differences that the authors report among states are entirely, and much more successfully, explained by differences in the populations of states. In short, California is a big state, much bigger than Rhode Island. Once this fact is included in the analysis, the V&T estimate of overall regulatory costs dissolves into thin air.

C. The Report Ignores Peer-Reviewed Literature on the Real Economics of Regulation

Neither Varshney nor Tootelian has published any academic work on the economics of energy, climate change, or environmental regulation, or on the California economy. or the problems of state economic growth.[17] Nor do they show any awareness of existing work in these fields. There is a substantial body of serious economic analysis of regulations; a common finding is that the effect of environmental regulation on economic growth and prosperity is often too small to measure. Studies searching for evidence of the trade-off between jobs and the environment have concluded that it is confined to a handful of extractive industries such as mining and logging.[18] Regulatory costs are generally too small to be decisive in corporate decisions about where and what to produce; European economies, with much stricter regulations than ours, are as prosperous as the United States.[19]

Many economists have examined the "pollution haven hypothesis" – the claim that industry will move to locations where environmental regulations are looser. A few studies have found weak evidence for the hypothesis, but the most common finding is that there is no evidence for the existence of pollution havens.[20] Germany, a country with higher labor costs and stricter regulations than the United States, has remained successful in manufacturing, and routinely has a large trade surplus based on its exports of manufactured goods. If environmental regulations drove business away, Germany's economic success would not be possible.

California has some of the strongest air pollution regulations in the United States, particularly in the South Coast Air Quality Management District. Rigorous economic studies have found that local air quality regulations introduced during 1979-92 probably caused a slight increase in

[17] A search of the American Economics Association's Econlit database of professional publications shows that Varshney's publications have been exclusively on technical questions in finance, and Tootelian's publications have been exclusively on the marketing of pharmaceuticals and health care.
[18] Eban Goodstein, *The Trade-Off Myth: Fact and Fiction About Jobs and the Environment* (Island Press, 1999).
[19] For discussion of this and related issues, see Frank Ackerman, "The Unbearable Lightness of Regulatory Costs," *Fordham Urban Law Journal* 2006, vol. 33 no.4, pp.1071-1096.
[20] For a recent literature review, see Brian R. Copeland, "The pollution haven hypothesis," pp. 60-70, in Kevin Gallagher, editor, *Handbook on Trade and the Environment* (Edwin Elgar, 2009).

employment in the Los Angeles area,[21] and led to increases in productivity in the area's oil refineries, compared to refineries in Texas and Louisiana.[22] Likewise, South Coast regulations were not detrimental to growth and employment in the area's metal finishing industry, compared to the same industry in Chicago and Detroit.[23] In another sector of the state economy, a study found that state-level regulation has not hindered the growth of the California dairy industry relative to other leading dairy states.[24]

D. Summary of Costs of Regulations on California Small Businesses Study

The study of the costs of regulation on California's economy is based on a fundamentally mistaken assumption that infects the entire analysis. The analysis, properly carried out, demonstrates literally no effect from regulations on California's economy.

About the author:

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Appendix: Statistical analysis of state output – do the Forbes rankings explain anything?

This appendix explores the statistical issues raised by the Varshney and Tootelian (V&T) approach to the impacts of state regulation, and supports the criticisms of the V&T calculations presented in this report.

Table A1 presents the results of five linear regressions. Column A is the V&T estimate, which forms the basis of their calculation of the impacts of regulation. The remaining columns are my calculations, as explained below.

Table A1: Regression results - state output, Forbes rankings, and population

	A		**B**		**C**		**D**		**E**	
Independent variable -->	State output, pooled 2006-2007 data		State output, 2007		State output, 2007		State output per capita, 2007		State output per capita, 2007	
	coefficient	P	coefficient	P	coefficient	P	coefficient	P	coefficient	P
Explanatory variable:										
Constant	**240,566**	*(0.022)*	**237,861**	*(0.136)*	**-20922**	*(0.021)*	**50,253**	*(0.000)*	**43096**	*(0.000)*
Regulatory Environment	**-4,424**	*(0.038)*	-5,217	*(0.096)*			147	*(0.118)*	63	*(0.457)*
Business Cost	**12,726**	*(0.000)*	**13,769**	*(0.000)*			-43	*(0.658)*		
Labor	**10,713**	*(0.000)*	**12,266**	*(0.006)*			-108	*(0.405)*		
Economic Climate	-3,105	*(0.154)*	-4,685	*(0.150)*			95	*(0.330)*		
Growth Prospects	**-10,803**	*(0.000)*	**-10,839**	*(0.008)*			-152	*(0.206)*		
Quality of Life	**-4,113**	*(0.047)*	-4,007	*(0.236)*			-157	*(0.126)*		
Population					**0.049**	*(0.000)*				
r-squared	0.400		0.411		0.981		0.209		0.012	
adjusted r-squared	0.361		0.329		0.980		0.099		-0.009	

Source: A is the Varshney-Tootelian result; B-E are my calculations from Forbes and standard government data (where output = state GDP)

How to read this table: The explanatory variables listed in Table A1, from "regulatory environment" through "quality of life," are the six Forbes rankings of state business climates, i.e. the variables used by V&T. The numbers in parentheses after the estimated coefficients are p values, showing the probability that a relationship this strong could be achieved by chance alone. For instance, near the top of column A, each increase of one point in the Forbes "regulatory environment" ranking is associated with a decrease of $4.424 billion in state output in 2006-2007, and there is only a 3.8 percent probability that two series of random numbers would be as closely related as state output is to this ranking. Estimates for which $p < .05$, a standard criterion for statistical significance (often referred to as demonstrating "significance at the 95% level"), are shown in bold.

The two statistics shown at the bottom of the table are measures of the overall success of each regression in matching the variation in the independent variable. The most common measure, "r-squared" is shown, as well as an adjusted version which corrects for the number of variables and data points in the regression. For instance, the adjusted measure, which is the more appropriate one, shows that column A, the V&T regression, explains 36 percent of the variation in output among states in 2006-2007.

Column A is based on 100 observations, one for each state in 2006 and in 2007. The other columns are based on 50 observations, one for each state in 2007.

Interpretation: As explained in the text of this report, V&T rely heavily on the Forbes rankings, and on the regression in column A; in particular, their estimate of losses due to regulation rests on the coefficient of -4,424 for the regulatory environment ranking. In a regression which is not shown here, I was able to reproduce the results in column A almost exactly.[25]

Column B applies the same model to the data for 2007 alone, for comparability with the remaining regressions. The single-year version of the V&T analysis is quite similar to the two-year version they used, although in the 2007 version (column B), the regulatory environment and quality of life rankings are no longer statistically significant. That is, both have $p > .05$ in column B, although they had $p < .05$ in column A. As shown by the adjusted r-squared values, the Forbes rankings explain about 33 percent of the variation in state output on the single-year basis in column B, compared to 36 percent on the two-year basis in column A.

Column C uses only one explanatory variable, state population; this explains 98 percent of the variation in state output. Since output is measured in millions of dollars, the coefficient of 0.049 means that as of 2007, state output tended to increase by $49,000 per person added to the state population. In fact, column C can be read as saying that state output in 2007 can be quite closely approximated by the formula

$$\text{Output} = \$49{,}000 * \text{Population} - \$20.9 \text{ billion}$$

[25] There were small differences in coefficient estimates, probably because V&T relied on gross state product data as published in Forbes, which is slightly different from the official data published by the Commerce Department's Bureau of Economic Analysis. In all but one case, my coefficients were within 0.5 percent of the V&T coefficients; the signs and significance of coefficients were unchanged in all cases.

Column D applies the V&T model, as seen in columns A and B, to state output *per capita* in 2007. Every one of the six Forbes rankings has $p > .10$ in column D; none of them are close to being statistically significant. Note that the regulatory environment ranking now has the wrong sign: a worse regulatory environment, according to Forbes, is associated with a tiny (though statistically insignificant) *increase* in income per capita.

Column E examines the relationship between state output per capita in 2007 and a single variable, the Forbes regulatory environment ranking. The p value of close to 0.5, and the r-squared and adjusted r-squared of close to zero, imply that these two variables have about as much relationship to each other as two series of random numbers.

The absence of significant relationships between the Forbes rankings and state output *per capita*, seen in columns D and E, demonstrates that V&T analysis explains nothing about the strength or prosperity of state economies.