

Comments on Modeling of Economic Impacts of AB32

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Topics

- Issues with particular models
- Issues with models generally
- The empirical evidence from past experience

Issues with particular models

- The central issues are (1) the existence of types of market failure, (2) the scope for price & regulation induced substitution, and (3) the scope for price & regulation induced shifts in technology and behavior.
- Models make different assumptions. CRA rules out (1) & (3). Tanton rules out (1), (2) & (3). ARB models try to account for all three.
- The conclusions are driven by the assumptions.
- In my view, ARB models come closer to the truth.

- CRA model also overstates costs of emission reduction by
 - Having excessively few production sectors
 - Having unfettered trade and movement of inputs among regions
- The use of an old-fashioned input output model, as in Tanton Report, is singularly inappropriate.

Issues with models generally

- Economic models are typically calibrated to data on *levels*: $y = f(x)$.
- However, they are typically employed to predict the effects of *interventions*, $\Delta y/\Delta x$.
- If the model is correctly specified and correctly estimated, there should be no discrepancy between what the model is used for and how it was calibrated. That is wishful thinking.
- One can't assess the model's credibility in predicting the effects of some change, Δx , unless and until practices are changed to incorporate calibration of $\Delta y/\Delta x$.

- Specifically, the touchstone should be whether the model can replicate the actual experience in California with regard to the economic impact of interventions such as major past CARB regulatory actions.
- I do not believe the CRA or Tanton models would pass that test.
- The ARB models would come closer to passing it.

- The CGE models are *equilibrium* models.
- They do not address the transition from one equilibrium to another, including *costs* and *speed* of adjustment.
- In many cases, the speed of adjustment is closely related to the turnover of capital stocks. Models do not track the turnover in capital stock in a realistic manner.
- This would call for some special supplementary analysis, if CARB had more economic staff.

Models ignore benefits

- Existing models ignore benefits, in terms of reduced emissions of certain criteria pollutants as well as of GHGs.
- Incorporating climate & environmental impacts would have two effects
 - Lower net cost of regulation in amount of increased benefit.
 - Change economic cost itself. Existing models assume separability between the market economy and impacts such as drought, heat waves, ozone episodes, etc. There is no basis for the assumption of separability. Smith and Carbone (2010) show that non-separability can significantly affect estimates of market cost impact.

The Empirical Evidence

- If one looks at the empirical evidence on what actually happened with cap-and-trade for SO₂, NO_x, and lead, the actual outcome was different from what CGE models predicted (Hanemann 2008, 2009).
- The models predicted a price driven response given demand and supply curves.
- The actual response was an unanticipated reduction in abatement costs as technology shifted. The model structure shifted. That turned out to be the most important component of the response, and it made the cost of emission reduction lower than expected.

Conclusions

- The past does not predict the future. GHGs are different than SO₂ and NO_x.
- But one needs to take model projections of costs with a grain of salt.
- The ARB models are well within the parameters of good model practice.
- In a number of ways the ARB models go further than other models towards a realistic representation of economic outcomes in California.