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## **Number 1. Improving the Accuracy of UK Regulatory Cost Estimates**

*Corresponding Author:*

Michael MacLeod  
Land Economy Research Group  
Research Division  
SAC Edinburgh  
EH9 3JG

Tel: 0131-535-4387  
E-Mail: [michael.macleod@sac.ac.uk](mailto:michael.macleod@sac.ac.uk)



## *Improving the Accuracy of UK Regulatory Cost Estimates*

Michael MacLeod<sup>a</sup>, Dominic Moran<sup>a</sup>, Winston Harrington<sup>b</sup>, Manuel Lago Aresti<sup>a</sup> and Richard D. Morgenstern<sup>b</sup>

<sup>a</sup>Land Economy Group, SAC

Edinburgh EH9 3JG

*e-mail: michael.macleod@sac.ac.uk*

*Phone: 0131-535-4387*

<sup>b</sup>Resources for the Future

Washington, DC 20036

### *Abstract*

UK Government departments are required to undertake a Regulatory Impact Assessment (RIA) when introducing any policy change that places a burden on businesses, charities, the voluntary sector or individuals<sup>1</sup>. Part of this assessment involves the appraisal of the costs (and benefits) associated with complying with all the available options, as well as the wider economic costs. Recent evidence has suggested that the compliance costs, when assessed *ex post*, tend to be lower than the *ex ante* assessment made beforehand (see e.g. Harrington *et al* 1999). Accurate cost estimates are important as errors can lead to under or over regulation. This, in turn, can result in growth and innovation being hindered or, in the case of under regulation, growth being achieved at the expense of the natural resource base (including human health and well being).

In order to shed more light on the validity of RIA cost estimates and identify ways of improving their accuracy, Defra decided to commission a study comparing the *ex ante* and *ex post* costs of complying with regulatory changes. A total of eight case studies were carried out for this study, covering a range of recent environmental, agricultural and food-related regulations in the UK. Preliminary findings of this study indicate that while *ex ante* costs are often overestimated, there can also be significant underestimates. Reasons for errors in cost estimation are discussed and strategies for improving their accuracy suggested.

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<sup>1</sup> (see: <http://www.cabinetoffice.gov.uk/regulation/ria-guidance/content/ria-process/index.asp>)

## *Background*

When introducing any policy change that places a burden on businesses, charities, the voluntary sector or individuals, UK Government departments are required to undertake a Regulatory Impact Assessment (RIA). Part of this assessment involves the appraisal of the costs (and benefits) associated with complying with all the available options as well as the wider economic costs.

Evidence from a recent policy evaluation commissioned by Defra (Watkiss *et al* 2004) suggested that in one case the compliance costs, when assessed *ex post*, were lower than the *ex ante* assessment made beforehand. It is unclear whether this outcome is unusual or typical for regulatory changes introduced across Defra's policy areas. In order to shed more light on the validity of RIA cost estimates and identify ways of improving their accuracy, Defra decided to commission this study comparing the *ex ante* and *ex post* costs of complying with regulatory changes.

## *Approach*

The literature review examined 27 recent *ex post* evaluations from the USA and Europe. Overall, most of the studies reported *ex ante* costs to be overestimated relative to *ex post* costs. However, the temptation to conclude that *ex ante* evaluations are inevitably overestimated, as some have suggested (e.g. International Chemical Secretariat ICS (2004), Wilkes (2004)) should be resisted as there are notable exceptions to this trend. In order to compare *ex ante* and *ex post* cost estimates in the UK, a series of case studies were undertaken. These were based upon a combination of existing *ex post* studies and selected data gathering. The findings are summarised in Table i.

## Results

Table i. Case study results: summary of whether the *ex ante* costs are overestimated (+), accurate (0) or underestimated (-) compared to the *ex post* costs.

Case Study		<i>Ex ante</i> costs compared to <i>ex post</i> costs	Summary of Findings
1. Chemicals Hazard Information Packaging for Supply Regulations (CHIP3)		0+	<i>Ex ante</i> estimates may represent a worst-case scenario – estimating maxima rather than means.
2. The Groundwater Regulations 1998		+	Overestimated due to compliance issues and post-implementation changes in the regulation.
3. Air Quality Strategy	a. Road transport	+	Industry tends to overestimate costs and underestimate innovation. Regulators also tend to overestimate, but to a lesser extent.
	b. Electricity generation	+	The Air Quality Strategy Evaluation indicates overestimates, however the case appears overstated.
4. Control of Major Accident Hazards (COMAH) Regulations 1999		-	Baseline and compliance issues. Asymmetric correction of ( <i>ex post</i> ) errors.
5. The Food Safety (General Food Hygiene) (Butchers' Shops) Amendment Regulations		-	Errors due to incorrect <i>ex ante</i> assumptions.
6. The Welfare of Farmed Animals (England) (Amendment) Regulations 2003		+	<i>Ex ante</i> likely to be higher than turnout due to a combination of baseline errors, and under-compliance* /“innovation”.
7. The Meat (Hazard Analysis and Critical Control Points) (Scotland)/(England) Regulations 2002		?	There is likely to be a compliance cost disparity due to the extent to which the seven HACCP principles are already being implemented as standard practice.

\*Note that a distinction is made between (a) non-compliance (i.e. not meeting the legal/technical requirements of a regulation) and (b) under-compliance (i.e. satisfying the legal/technical requirements of a regulation in a way that is unlikely to satisfy the spirit of the regulation and achieve its objectives).

The *ex ante* estimates were categorised using the same criterion as Harrington *et al* (1999), i.e. they were defined as inaccurate if they differed from the *ex post* estimate by more than 25%. Using this criterion, just over half of the case studies came to the conclusion, albeit with varying degrees of confidence, that the *ex ante* costs had been overestimated compared to the *ex post* estimates. However, there were two cases where it was concluded, with a high degree of confidence, that the *ex ante* costs had been significantly underestimated, and one case where the costs were thought likely to be accurate. These results are similar to the findings of Harrington *et al* (1999) who examined 25 (mainly US) regulations, and IVM (2005). While the results of the studies are not identical, they do exhibit the following important similarities:

- *Ex ante* costs (unit and total) were overestimated for around half the regulations studied;
- While *ex ante* costs are most often overestimated they are also frequently underestimated or occasionally accurate.

A summary of the reasons for *ex ante/ex post* discrepancies is given in Table ii.

Table ii. Case study results

Reason for <i>ex ante/ ex post</i> discrepancy		Case Study							Systematic or random error	
		1	2	3a	3b	4	5	6		7
Ex ante overestimated	Lower than predicted compliance rates (noncompliance or undercompliance)		*					*		S
	Baseline errors		*		*			*		R
	Static assumptions leading to the underestimation of innovation/adaptation		*	*				*		S
	Post estimate changes in the regulation		*							R
	Asymmetric correction of errors									
	Strategic behaviour by regulatees, e.g. lobbying, overestimating costs leading to estimates of maxima rather than means	*		*						S
	Uncertainty/lack of information/incorrect assumptions									
Ex ante underestimated	Strategic behaviour by regulators									
	Cost turbulence and selection bias									
	Uncertainty/lack of information/incorrect assumptions (e.g. significant costs not identified)					*	*			R
	Overcompliance <sup>a</sup>					*				S
	Asymmetric correction of errors <sup>a</sup>					*				?
	Baseline errors <sup>a</sup>					*				R

<sup>a</sup>Not identified in the literature review.

The most common reason for overestimating the *ex ante* costs was the adoption of static assumptions and the consequent underestimation of innovation /adaptation. Baseline errors, compliance issues, strategic behaviour by regulatees, and post-estimate changes in the regulation were also cited. Interestingly, a recent EC study (IVM 2005, p7) identified similar reasons for *ex ante* overestimation, including:

- differences between the assumptions made in the *ex ante* analysis and the *ex post* reality
- incomplete implementation
- information asymmetry on compliance costs
- biases introduced by stakeholder groups
- underestimation of innovation potential; and complexities regarding the construction of the “counterfactual”:

For *ex ante* underestimation, uncertainty/lack of information/incorrect assumptions was cited twice. Baseline errors, compliance issues and asymmetric correction of errors were all cited once. Both of the case studies where *ex ante* underestimation occurred were characterised by mistaken *ex ante* assumptions. One of these, the COMAH case study, was unusual in that the *ex post* data gathered was also going to be used for future regulatory appraisal and was in some respects, *ex ante*.

The results in Table ii suggest that there may be systematic bias in favour of overestimating *ex ante* costs. This is because three of the sources of overestimation are the result of systematic errors, i.e. they can only result in overestimation, whereas the case studies only highlighted one systematic error leading to underestimation (overcompliance). The remaining reasons for *ex ante/ex post* discrepancies are random and could therefore result in either over or underestimation.

Although most of the case studies identified discrepancies between the *ex ante* and *ex post* cost estimates, not all of these discrepancies was the result of avoidable shortcomings in the *ex ante* estimates. For example, post-estimate changes in the regulations, or unforeseeable events affecting the baseline could render the most rigorous *ex ante* estimate inaccurate. Also innovation, by its very nature, is hard to predict with any certainty. Despite these caveats, a series of practical recommendations for improving the accuracy of *ex ante* cost estimates can be made based on the findings of the case studies. These are summarised in Table iii.

Table iii Recommendations for improving accuracy of *ex ante* estimates

Recommendation	Case Study							
	1	2	3a	3b	4	5	6	7
1. Examine validity of data provided by groups with vested interests in the regulation	*				*			
2. Examine baseline trends, particularly when (a) attempting to forecast for a rapidly changing sector, and (b) there is a significant time gap between the <i>ex ante</i> estimate and implementation.		*		?	*		*	
3. Examine the potential for innovation and adopt dynamic assumptions where appropriate		*	*				*	
4. Make pragmatic assumptions about compliance, particularly where regulatees have a strong incentive to adopt cost-minimising strategies, or where overcompliance is likely.		*			*		*	
5. The Small Firms Impact Test results should be treated with caution, particularly when based on small samples providing non-anonymous responses on sensitive issues.		*						
6. Distinguish between expenditures and costs and try to include all major cost elements, including those often overlooked e.g. time.			*		*	*		
7. Analyse total costs <i>and</i> unit costs.			*					
8. For <i>ex ante</i> pilot studies/surveys: obtain an adequate sample and design them with the possibility of follow-up work in mind.								*

### Discussion

Eliminating bias arising from the strategic behaviour of interest groups is difficult given the asymmetry of knowledge: regulators often have to rely on those they are regulating for much of their data. Where there is reason to believe that data is being manipulated, then it should ideally be checked by an independent expert in the field. Another approach is to carry out some form of pilot study (as was done by the FSA for The Meat (Hazard Analysis and Critical Control Points) (Scotland)/(England) Regulations 2002). Although they will not always be practical or appropriate, pilot studies are a potentially rich source of data.

Most of the *ex ante* estimates could have been improved through the examination of trends and adoption of dynamic assumptions. It is therefore recommended that anyone undertaking an *ex ante* analysis should ask the following questions: (a) does the regulation apply to a rapidly changing sector? (b) is there likely to be a significant time gap between the *ex ante* estimate and implementation? If the answer to these questions is yes then historic trends should be examined and forecasts made of variables that will affect the costs. Particular challenges are posed by sectors that, while not appearing dynamic *ex ante*, undergo

significant change in response to the regulation. Such changes, often involving innovation and cost reduction, are difficult to predict with any degree of certainty.

One often asked question is whether the *ex ante* cost estimates developed by regulated industries are so predictably biased that one could apply some generalized correction factor. The answer is that neither the nature nor the extent of the bias are so predictable, as innovation can involve a variety of responses, including: economic restructuring; shifts in production; the introduction of end of pipe technologies and/or process changes; and cosmetic changes. The only plausible approach to dealing with such estimates is to examine them on a case by case basis. In that regard, analysts should demand full transparency of the data and assumptions used and then scrutinize them carefully to assess their overall quality. It may worthwhile undertaking a study of historical evidence of innovation in response to regulation in order to identify the types of sectors and regulations that are most likely to reduce costs through innovation. While quantifying the likely effect of innovation would still be very difficult, such an analysis would enable regulators to provide a qualitative assessment (e.g. low, medium, or high) of the likelihood of cost reduction through innovation.

Compliance levels can have profound effects on the accuracy of *ex ante* costs, particularly total costs. It is therefore important that pragmatic assumptions about compliance are adopted, particularly where regulatees have a strong incentive to adopt cost-minimising strategies, or where overcompliance is likely. When regulations are identified where compliance (under or over) is likely to be an issue, it is recommended that some form of sensitivity testing is carried out for the costs under different levels of compliance. The identification of regulations where compliance may be an issue would be aided by a wider study that investigated historic levels of compliance in terms of sector, unit cost (as a proportion of margin), type of measure, type of monitoring and enforcement etc.

A related question to whether *ex ante* cost estimates reflect *ex post* estimates is: to what extent do cost estimates, whether *ex ante* or *ex post*, reflect the actual cost of a policy? Estimates depend on where the system boundaries are drawn (e.g. farm/sector/economy), how costs are defined (i.e. partial equilibrium/full equilibrium/social COBA) and which costs are included. Time is often difficult to quantify and can easily be overlooked, even when it is a major cost. Cost estimation is complicated by the difficulties involved in precisely identifying the additional actions, and hence costs, arising as a result of a regulation. To what

extent are measures required by a regulation measures that the regulatees would have undertaken anyway, either voluntarily or in response to other legislation? Colatore and Caswell (reported in Romano et al 2005) distinguish between three types of compliance cost: (a) total cost of the actual HACCP system adopted; (b) minimum HACCP costs required to comply with the regulations; (c) incremental cost of HACCP (the minimum cost net of voluntary adoption of HACCP, i.e. the additional cost of the regulation). It could be argued that the incremental cost is the best measure as it reflects the additional cost of a regulation and avoids double counting. In practice, quantifying the voluntary adoption presents practical difficulties.

Finally, this study has highlighted the lack of comparable *ex ante* and *ex post* data sets. This is primarily due to the fact that few *ex post* analyses are carried out, despite official guidance recommending periodic reviews of regulations (Regulatory Impact Unit 2003, p29). The dearth of rigorous *ex post* analyses is not surprising: undertaking a detailed (and potentially costly and time-consuming) analysis of an implemented regulation is unlikely to seem an attractive proposition as new legislative priorities arise. It may therefore be worth considering the needs of any *ex post* analysis at an early stage and integrating them into the RIA process. This could include actions such as keeping a detailed record of all the key assumptions made during the RIA, or establishing a Quality Assurance procedure to record information in a standard format. Anything that can be done to simplify the implementation of *ex post* analyses should be encouraged in order to increase the number of *ex ante/ex post* comparisons undertaken and, in so doing, improve the accuracy of *ex ante* estimates.

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