

"ASSESSING THE COSTS AND BENEFITS OF REGULATION"
A CEPS – ECONOMISTI ASSOCIATI STUDY FOR THE EUROPEAN COMMISSION

The Commission aims to design regulation that efficiently delivers on its public policy objectives while respecting the principles of subsidiarity and proportionality. For this purpose it has put in place an evaluation and impact assessment system to prepare evidence for political decision-making and to provide transparency on the benefits and costs of policy.

The Commission Impact Assessment Guidelines of 2009 require quantification of all significant costs and benefits where this is feasible, applying the principle of proportionate analysis to avoid committing excessive resources to the estimation of relatively minor impacts. The Commission Guidelines set out the general principles to follow in an IA and provide a tool box of analytical instruments to use, depending on each case. They should allow Commission services to identify the most significant costs and benefits and to select the most appropriate assessment methodology, in line with the principle of proportionate analysis.

Since 2009, more than 350 impact assessments have been carried out. New methods for the estimation of costs and benefits have also been developed and tested at the EU and national level. To build upon this experience, the Commission has committed to further improve the ex ante assessment of costs and benefits and to review and update its Impact Assessment Guidelines in 2014, following a public consultation ([COM\(2012\)746](#))

In 2013, the Commission tendered a study to review different methods for estimating costs and benefits within its integrated approach to impact assessment. The study was intended to define various types of costs and benefits, identify different methods of estimation and provide an overview of their strengths and weaknesses.

The resulting study on "Assessing the Costs and Benefits of Regulation" was prepared by the Centre for European Policy Studies and Economisti Associati. The study will provide an input to the upcoming revision of the European Commission Impact Assessment Guidelines but neither prefigures their content nor commits the European Commission.

The study is structured as follows. Section 1 provides a taxonomy of costs and benefits based on existing literature and guidance documents, adapted to the EU context. Section 2 illustrates the most common methods being used at national level to assess the costs and benefits of regulation. It provides an evaluation of their strengths and weaknesses, as well as guidance on when, how, and with what data they can be most usefully employed in impact assessments. In Section 3, the authors build on the previous sections to translate their findings into suggested guidance on when and how to perform cost-benefit analysis of EU policy proposals. Section 4 concludes by summarizing the peculiar aspects and limitation associated with the assessment of costs and benefits at the EU level.

ASSESSING THE COSTS AND BENEFITS OF REGULATION

Study for the European Commission, Secretariat General

FINAL REPORT

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Table of Contents

Introduction	7
1 The costs and benefits of regulation	10
1.1 A rule's life	10
1.1.1 <i>The life of a EU rule</i>	12
1.2 Mapping regulatory impacts	15
1.2.1 <i>Costs, benefits, or just impacts?</i>	19
1.3 Types of regulatory costs	22
1.3.1 <i>Types of direct costs</i>	24
1.3.2 <i>Indirect costs</i>	27
1.3.3 <i>Enforcement costs</i>	30
1.4 The benefits of regulation	31
1.4.1 <i>Direct benefits</i>	33
1.4.2 <i>Indirect benefits</i>	37
1.5 Distinguishing impacts based on affected groups	40
1.5.1 <i>Transfers v. net losses</i>	44
1.5.2 <i>Focus: the distributional dimension of costs</i>	45
2 Assessing costs and benefits: a survey of methods used by governments in the EU and beyond	49
2.1 Partial v. General equilibrium analysis	51
2.1.1 <i>Partial equilibrium analysis</i>	51
2.1.2 <i>General equilibrium analysis: mapping cumulative and cascading impacts</i>	55
2.2 Selected cost assessment methods	56
2.2.1 <i>Assessing compliance costs</i>	56
2.2.2 <i>Assessing administrative burdens: the Standard Cost Model</i>	57
2.2.3 <i>The Dutch Compliance Cost tool</i>	70
2.2.4 <i>The German regulatory cost model for citizens</i>	78
2.2.5 <i>Other models for compliance cost assessment</i>	85

2.3	Benefit assessment	89
2.3.1	<i>Willingness to pay and willingness to accept: a theoretical introduction</i>	89
2.3.2	<i>Revealed preference models</i>	92
2.3.3	<i>Stated preference models</i>	117
2.3.4	<i>Valuing major benefit items</i>	131
2.4	Other assessment methods	142
2.4.1	<i>The “Benefit transfer” approach</i>	142
2.4.2	<i>The life satisfaction approach</i>	144
2.4.3	<i>Other methods and models</i>	148
2.5	Conclusion and summary tables	153
3	Why, how, and when: Guidance on cost-benefit analysis	156
	Step 0 – when should you opt for cost-benefit analysis	157
	Step 1: define alternative policy options	160
	Step 2. Identify costs and benefits to be measured	161
	Step 3: Partial or general equilibrium analysis?	165
	Step 4. Monetize direct costs, for all alternatives	167
	Step 5. Monetize direct benefits, for all alternatives	176
	Step 6. Assess indirect impacts	187
	Step 7: Locate impacts along the life of the proposal, and discount monetized impacts	191
	Step 8: Present impacts and compare options	193
	Step 9. How robust are the results?	197
	Step 10. Consider distributional and cumulative impacts (optional)	201
4	Conclusion: opportunities and challenges of using cost-benefit analysis at the EU level	202
	Glossary of terms and concepts	205
	Selected references	209

LIST OF FIGURES

Figure 1 – A rule’s life.....	11
Figure 2 – EU rules, policy process and likely content of appraisal documents	14
Figure 3 – A map of regulatory costs and benefits	21
Figure 4 – Cumulative regulatory costs on farmers of new DEFRA regulations in the UK	48
Figure 5 – DEFRA’s estimated increase in average farm costs over time by farm type as a result of future regulatory costs.....	48
Figure 6 – Partial equilibrium analysis	52
Figure 7 – contractual guarantees and demand curves.....	54
Figure 8 – Quantifying the impact of direct charges.....	57
Figure 9 – Information obligation, data requirements, activities.....	58
Figure 10 – Overview of the identification of compliance costs.....	78
Figure 11 – WTA/WTP Ratios.....	91
Figure 12 – The social cost of obesity	113
Figure 13 – Families of stated preference models	118
Figure 14 – Values of working and non-working time in the UK.....	121
Figure 15 – Recommended values of travel time savings, US DOT	122
Figure 16 – An example on the use of QALYs.....	138
Figure 17 - Official monetary valuation of a road accident fatality in selected countries. Euro in 2002-prices.	140
Figure 18 – Flow chart for the choice of the most appropriate model to track effects of reforms.....	152
Figure 19 – steps of a cost benefit analysis	156
Figure 20 – Cost-benefit analysis within the Impact Assessment process	159
Figure 21 – Net benefits from enhanced market efficiency.....	180
Figure 22 – net benefits of retail and wholesale capping.....	180

LIST OF TABLES

Table 1 – Types of costs and regulatory options: an example	17
Table 2 – impact of regulatory costs on stakeholders	41
Table 3 – Impact of regulatory benefits on stakeholders	44
Table 4 – Empirical methods used in the UK baseline measurement	62
Table 5 – Extrapolation related to large exposure reporting	67
Table 6 – Overall assessment of the Standard Cost Model	70
Table 7 – Overall assessment of Dutch Compliance Cost assessment model used in the Dutch Business Impact Assessment	77
Table 8 – Overall assessment of the German model on regulatory costs for businesses, citizens and public administrations	85
Table 9 – Overall assessment of the travel cost method	97
Table 10 - Comparison of mean WTP-values per person per year for noise abatement, all estimated by the hedonic pricing method	104
Table 11 – Benefits and costs of noise reduction, option 4.....	106
Table 12 – Overall assessment of the hedonic pricing method	106
Table 13 – Overall assessment of averting behaviour models.....	110
Table 14 – Costs included in COI studies	111
Table 15 – Overall assessment of COI models	117
Table 16 – Common elicitation formats in contingent valuation models	120
Table 17 – Overall assessment of contingent valuation models	126
Table 18 – Overall assessment of choice modelling	131
Table 19 – OECD Adjustment factors to transfer VSL values	135
Table 20 – Monetary valuation of impacts of road transport projects in Norway.....	139
Table 21 – Benefit categories and associated methodologies.....	141
Table 22 – Surveys that capture life satisfaction or happiness	146
Table 23 – Summary table of our scorecard analysis	153
Table 24 – What costs can be measured according to the approach	154
Table 25 – What benefits can be measured according to the approach	155
Table 26 – Types of alternatives, types of recurrent costs	162
Table 27 – Identifying costs and benefits and affected stakeholders	164

Table 28 – benefit assessment methods.....	185
Table 29 – Net Present Value – individual option	192
Table 30 – Template for presentation of preliminary results	194
Table 31 – Excluding options via a scorecard analysis.....	196

ASSESSING THE COSTS AND BENEFITS OF REGULATION

INTRODUCTION

Since 1 January 2003, the European Commission has given itself an obligation to carry out Impact Assessments (IAs) analysing economic, social and environmental impacts in one integrated framework. This commitment built upon previous efforts to analyse specific impacts separately. The obligation for integrated IAs originally applied to major policy initiatives, which broadly correspond to the proposals included in the Commission's yearly legislative and work programme. It was later extended to all initiatives with significant expected impacts. Such activity must be performed based on the Impact Assessment Guidelines that the Commission Secretariat General has drafted and circulated to its own DGs since 2002, and were revised twice in 2005 and 2009. Since the very outset, the Commission has based its IA system on the use of cost-benefit analysis, which would entail, where possible, a quantification and monetization of costs and benefits. Against this background, Commission officials in charge of drafting IAs have been confronted with the challenge of identifying the costs and benefits to be considered in the analysis, as well quantifying them: the latter is an exercise that can prove reasonably easy in some cases, and prohibitively difficult in others. In addition, it must be recalled that the Commission's reliance on benefit-cost analysis was referred to an IA system that applies to narrow, technical policy measures, but also to cross-cutting policy initiatives with very far-reaching expected economic, social and environmental impacts, the quantification of which is often much more complex. Compared to the US RIA system, which applies only to federal regulation (*i.e.* secondary legislation, mostly of technical nature), the EU IA system is thus more comprehensive, and also more challenging for those that have to perform the *ex ante* policy appraisal: problems that are likely to be more evident in the EU system include the comparable data availability, quantification and monetization of certain categories of costs and benefits, uncertainty surrounding implementation choices and enforcement activities falling under Member State responsibility but also the assessment of cumulative effects, distributional effects, indirect impacts, internal market impacts, and many others.

During the decade in which the European Commission's IA system has been in place, also some individual EU Member States (besides the UK, which started

already in the 1990s) have started to experiment with IA methods. These have often taken the form of more narrow tools dedicated to specific impacts. One well-known example is the Dutch Standard Cost Model (SCM) for the measurement and reduction of administrative burdens, which inspired the development of a EU Standard Cost Model by the European Commission, and is attached to the IA guidelines since March 2006 as Annex 10. Most Member States to date have adopted the SCM to measure administrative burdens; meanwhile, countries like Germany and the Netherlands have gone beyond the rather narrow concept of administrative burdens to encompass in their analysis other categories of cost, *i.e.* compliance costs or more generally “regulatory costs”. Other countries, such as the United Kingdom, are currently trying to refine also the way they look at the benefits of regulation, by introducing new approaches such as the Life Satisfaction approach, which departs from the more traditional techniques such as revealed preferences and stated preferences models¹. In the past two years the European Commission has adopted additional guidance for specific areas, from impacts on micro-enterprises to impacts on sectoral competitiveness, social impacts, territorial impacts and impacts on fundamental rights². However, in its Communication on EU Regulatory Fitness³, the Commission decided to “further improve the ex ante assessment of costs and benefits” and “to review and update its IA guidelines by 2014” including in view of the new approaches developed since the issue of the 2009 guidelines.

This Study on the costs and benefits of regulation was prepared by the Centre for European Policy Studies and Economisti Associati for the Secretariat General of the European Commission, and looks specifically at current methods used to assess the costs and benefits of regulation. The report is expected to provide an input to the upcoming revision of the IA guidelines of the European Commission by providing insights on how to strengthen the identification and quantification of costs and benefits in impact assessment.

The document is structured as follows. Section 1 below provides a taxonomy of costs and benefits of regulation, based on existing literature and guidance documents published by governments and institutions in many countries, and adapting them to the EU context. Section 2 illustrates the most common methods that are currently used at national level to assess the costs and benefits of regulation, and provides an evaluation of their strengths and weaknesses, as well as guidance on when, how, and with what data they can be most usefully employed in impact assessments. As specified in the terms of references for this

¹ See below, Section 2 for a more accurate description of these models.

² Additional guidance documents are available at http://ec.europa.eu/governance/impact/key_docs/key_docs_en.htm.

³ COM(2012)746 of 12/12/2012.

Study, given the objective of providing practical input for the revision of the IA guidelines of the European Commission our analysis focusses on tested methods that are already being applied by the European Commission Directorate Generals, Member States (Germany, The Netherlands, the UK) and non-EU countries (US, Canada, Australia). Section 3 builds on the previous sections to translate our findings into suggested guidance on when and how to perform cost-benefit analysis of EU policy proposals. Finally, Section 4 concludes by summarizing the peculiar aspects and limitation associated with the assessment of costs and benefits at the EU level. A glossary of most recurrent terms is attached at the end of this report, together with a list of bibliographic references.

1 THE COSTS AND BENEFITS OF REGULATION

Legislative acts and policy initiatives most often produce costs and benefits for society as a whole. While benefits typically coincide with the reason why governments take action (*i.e.* the main goals of the policy action at hand), a sound analysis of new legislative measures also requires a careful assessment of costs. In addition, especially for broad, cross-cutting policy initiatives, understanding what benefits and costs will be generated by a given regulatory option, and who is going to be affected both positively or negatively by it (so-called “distributional impacts”) is an essential activity for a policymaker. This is why cost-benefit analysis has become so central in government activity today, and it certainly is for the European Commission through its IA system.

Below, we guide the reader through a number of categories of costs and benefits of regulation. Section 1.1 explains the main phases of the policy process: we will use this scheme to identify which costs and benefits can emerge, and at which stage. Section 1.2 provides a map of regulatory costs and benefits by dividing them into macro areas for ease of understanding by the reader and desk officer. Section 1.3 contains a taxonomy of costs, whereas Section 1.4 introduces main categories of benefits. Section 1.5 contains an indication of the types of costs and benefits that affect various categories of stakeholders (consumers, businesses, public administrations, etc.).

1.1 A rule’s life

A key issue in the *ex ante* appraisal of legislation is to take constantly into account the various phases that compose the life of a legal rule. Below, we use this framework in combination with the concept of “policy cycle” as illustrated by the European Commission in the 2010 Communication on Smart Regulation⁴. The types of policy appraisal procedures that can be carried out in the phases of a rule’s life vary significantly, and include *ex ante* assessment of both legislation and implementation measures, *interim* monitoring and evaluation of enforcement and compliance, and *ex post* evaluation. In this study, we focus on the *ex ante* IA phase, but we claim that the costs and benefits that are likely to emerge in the subsequent phases should always be taken into

⁴ See Commission communication “Smart Regulation in the European Union” - COM(2010)543 (8 October 2010). Similar concepts have been developed also in some Member States: for example, the UK uses the so-called “ROAMEF” framework, which is composed of “Rationale, Appraisal, Monitoring, Evaluation and Feedback”.

due account when performing *ex ante* analysis: this, as will be explained in more detail in Section 3 below, can be problematic especially for what concerns enforcement and compliance costs, but is a necessary step for a thorough analysis of policy options.

Figure 1 below graphically shows the relationship between the phases of the regulatory process (preparation, adoption, implementation and application) and the smart regulation tools used (impact assessment, monitoring and evaluation), always supported by stakeholder consultation..

Figure 1 – A rule's life



Source: European Commission

When *ex ante* impact assessment is performed, often policymakers downplay or ignore costs that might emerge after the rule has been implemented: these include one-off adaptation costs, as well as enforcement and compliance costs. Likewise, compliance with legislation might prove more or less difficult depending on the choices made by the policymakers during the *ex ante* impact assessment: this is why failing to account for compliance and enforcement costs might turn into a very serious mistake during the impact assessment of a proposal for new legislation. Overall, a policy option can be considered less costly (and thus, potentially more cost-effective and efficient) than any alternative only if the sum of *all* costs that emerge at all phases of the rule's life is smaller than occurs for alternative policy options.

1.1.1 The life of a EU rule

The life of a legal rule described above can be further refined and detailed, by looking at some specific features of the EU policy cycle. Often, entry into force of a new binding rule, be that through a Directive, a Regulation or Decision, is preceded by the adoption of non-binding documents such as Green Papers, White Papers and Communications or Recommendations. These documents (with the exception of Green Papers) undergo *ex ante* Impact Assessment when they are likely to have significant impacts. Needless to say, those desk officers that carry out an impact assessment of one of this “early” documents know very well that some of the issues that they face will have to be assessed again, and in more detail, when the binding proposal will be subject to impact assessment. Also, they know that the rule, once implemented, will be subject to *ex post* evaluation after a number of years. This changes the type of questions that should be addressed, as well as the depth of answers that should be given by officers when handling these proposals.

More in detail, the life of a EU rule often contemplates a number of steps, such as the following⁵:

- Green Paper⁶;
- White Paper/Communication;
- Legislative proposal and other types of acts;
- Co-decision;
- Transposition/implementation;
- Monitoring and enforcement;
- Compliance.
- *Ex post* evaluation.

Is it worth reflecting on the phase of the life of a EU legal rule in which assessment of costs and benefits is more important and timely. For example compliance costs are unlikely to be always measurable when an impact assessment is performed on a White Paper or a Communication, unless the White Paper already contains precise policy measures that are susceptible to a first assessment of the compliance costs that would be borne by the targeted stakeholders. However, it remains clear that, when the White Paper will lead to the adoption of a legislative initiative, the policy alternative to be chosen will

⁵ Of course, these are not mandatory steps, especially when it comes to the first three bullet points..

⁶ Green papers are not subject to Impact Assessment.

depend, *i.a.*, on its expected compliance cost, also with respect to available alternatives. This is very important in the application of the so-called “principle of proportionate analysis” illustrated in the Commission Impact Assessment guidelines: for any given stage of the policy process, the right questions have to be asked, at the right time and in the right sequence, otherwise there will be a problem of inefficient resource allocation in the impact assessment process⁷.

Figure 2 below provides examples of the content that is likely to be included at each stage of the policy process. As shown in the picture, after the adoption of a Green Paper, and in view of the drafting of a White Paper, policy options are still analysed in the form of broad scenarios, which will have to be further elaborated should the White Paper lead to a subsequent legislative act such as a Directive or a Regulation. This means that the Impact Assessment of a White Paper normally contains an in-depth analysis of the policy problem, the need to act and the right to act at the EU level; detailed estimation of the specific cost and benefit of the alternative scenarios under consideration (rather than more detailed options) is unlikely to be possible (exactly because the details of the rule are not known yet) although the use of general equilibrium models might be possible and justified. To the contrary, impact assessments of more specific proposals (be they legislative or not) may include – when appropriate, and following the principle of proportionate analysis – a more detailed cost-benefit analysis and also an *ex ante* consideration of possible modes of implementation of the alternative policy options at hand: as a consequence, this is also the stage at which compliance costs and enforcement costs can be more accurately quantified and monetized, should this be appropriate and proportionate depending on the options at hand and the likely emergence and extent of those costs (and subject to the *caveats* that will be put forward below, in Sections 3 and 4).

For what concerns subsequent phases in Figure 2, the present Report does not directly apply to them as it is conceived as an input to the revision of the IA guidelines of the European Commission, which do not bind other institutions. That said, we have decided to include some comments on these phases in order to describe what in our opinion should happen in a more evidence-based, coordinated, inter-institutional and multi-level approach to policy appraisal in the EU. In particular, during the co-decision procedure, the European Parliament and the Council of the European Union should refine the impact assessment as they amend the Commission’s proposal; during this phase compliance and enforcement costs could be refined if national parliaments contribute their national implementation plans, which in principle should clarify the modes of enforcement selected at national level, and also plans for possible over-implementation of the EU rule (for example, increases in the

⁷ See Section 3.2 of the current Impact Assessment Guidelines.

frequency of reporting imposed at national level). During the transposition and implementation phase at national level, these aspects of the legislative initiative become more visible: this means that, when appropriate and proportionate, the monitoring of the impacts generated by the EU rule at national level can count on a more accurate data set.

Figure 2 – EU rules, policy process and likely content of appraisal documents



This, of course, does not mean that when officers carry out an impact assessment of a non-legislative policy document, they should disregard costs and benefits that are likely to be measurable more precisely only when the proposal will be more concretely translated into legal provisions: the difficulty of the impact assessment task in the early phases of the policy process is that officers should always keep in mind feasibility and the likely compliance and enforcement problems of a given legal rule, anticipating major problems already at the White Paper or Communication phase. Then, when the impact assessment will be performed on the legislative initiative, they will have to assess in detail whether benefits can be maximized and costs minimized by carefully selecting and appraising policy alternatives.

Another major issue in Impact Assessment, which will be analyzed in the following sections, is how to account for behavioural responses of individuals, businesses and public administrations when drafting an *ex ante* impact assessment. As a matter of fact, policy analysts know well that often regulatory alternatives appear equally effective *in theory*, as what really matters in practice is the way in which they are enforced, and whether they are easy to comply with, or difficult to deviate from⁸. The task of exploring compliance and enforcement

⁸ In economics, this is often associated with the Coase theorem, which states that, when markets feature no imperfections (and namely, there are no transaction costs), all legal rules (and even no rule at all) will lead to the efficiency frontier; however, when transaction costs and other imperfections (including behavioural biases) exist, then legal rules do matter for efficiency. See Parisi, F. (2007), Coase Theorem. New Palgrave Dictionary Of Economics, 2nd ed., L. Blume and S. Durlauf, eds., Macmillan Ltd., 2007; Minnesota

modes is particularly difficult at the EU level, and even more for the European Commission, since the policy alternatives that are discussed and compared in European Commission proposals may be amended during co-decision, and will ultimately be transposed and enforced, in most cases, by national governments in Member States. This poses the crucial question of how to anticipate enforcement and compliance patterns that will be adopted after the Commission proposal has been released.

1.2 *Mapping regulatory impacts*

Figure 3 below shows a general map of the impacts generated by legal rules. This map is intended for ease of visualization of the full landscape of regulatory impacts: as such, it should be taken as a tentative exercise, not as an attempt to establish once and for all the categories of costs and benefits that can emerge from regulation (as a matter of fact, guidance documents on impact assessment and cost-benefit analysis from all over the world show different taxonomies and typologies of costs and benefits)⁹.

As shown in the figure, legislation normally produces both direct and indirect impacts, which in turn can generate second-order effects (“ultimate impacts”). More in detail, Figure 3 highlights six main areas of regulatory impacts. For what concerns costs:

- ***Area 1 includes direct costs from regulation***, such as direct compliance costs and hassle/irritation burdens.
 - *Direct compliance costs* include:
 - *Regulatory charges*, which include fees, levies, taxes, etc.
 - *Substantive compliance costs*, which encompass those investments and expenses that are faced by businesses and citizens in order to comply with substantive obligations or requirements contained in a legal rule; and
 - *Administrative burdens* are those costs borne by businesses, citizens, civil society organizations and public authorities as a result of administrative activities performed to comply with information obligations included in legal rules.
 - *Hassle costs* are often associated with businesses, but they apply equally well to consumers: they include costs associated with waiting time and delays, redundant legal provisions, corruption etc.

Legal Studies Research Paper No. 07-12. Available at SSRN:
<http://ssrn.com/abstract=981282>

⁹ See the dedicated section in the references at the end of this Study.

- **Area 2 refers to enforcement costs.** These costs are often downplayed in *ex ante* impact assessments, and not only at the EU level. They refer to key phases of a rule's life such as monitoring, enforcement and adjudication. As explained above, these costs might vary significantly, especially in the case of the EU, since enforcers and courts (or other adjudicators) display different levels of effectiveness and timeliness in the Member States and even across regions. As a result, methodologies to measure enforcement costs and possible enforcement alternatives are less developed and less commonly used than methodologies to measure and attempt to reduce "area 1" costs.
- **Area 3 encompasses indirect regulatory costs,** which refer to costs incurred in related markets or experienced by consumers, government agencies or other stakeholders that are not under the direct scope of the regulation. These costs are usually transmitted through changes in the prices and/or availability and /or quality of the goods or services produced in the regulated sector. Changes in these prices then ripple through the rest of the economy, causing prices in other sectors to rise or fall and ultimately affecting the welfare of consumers¹⁰. We have included in this costs so-called "indirect compliance costs" (*i.e.* cost related to the fact that other stakeholders have to comply with legislation) and costs related to substitution (e.g. reliance on alternative sources of supply), transaction costs and negative impacts on market functioning such as reduced competition or market access, or reduced innovation or investment.

Box 1: why all costs should be considered in an impact assessment

Performing an *ex ante* impact assessment requires constant awareness of the fact that total costs arising from a given regulation are given by the following sum.

$$\text{Total cost of a regulation : DC + IC + EC}$$

Any assessment that partly or fully, intentionally or inadvertently omits the analysis of one or more of these categories of costs is likely to provide an incomplete, and thus inaccurate account of the costs generated by a legal rule. The reason is easily explained: imagine that in the assessment of proposal x, option A features a direct cost of €500, indirect costs of €2,500 and

¹⁰ For example, if a given regulation increases the cost of energy production, this will be reflected in the cost structure of a number of industries, which might then pass-on part of this additional cost downstream along the value chain and eventually to end consumers. Similarly, if a certain regulation on the safety of chemical substances entails the withdrawal of certain products, downstream users will have to face replacement costs.

enforcement costs of €4,000, whereas option B has a direct cost of €750, indirect costs of €1,500 and enforcement costs of €6,000. This is typically the case whenever one option (in this case, A) is more demanding on businesses to produce information, whereas the other tasks public authorities with more fact-finding. Assume, further, that the level of benefits reached by the two options is the same. In this case, as shown in Table 1 below, if one looks only at direct costs the preferred option would be A. However, if one considers direct and indirect costs, but not enforcement costs, then the preferred option would be B. And if one looks at the full picture, the preferred option would be again A. In addition, it must be noted that, should direct and indirect costs fall on different stakeholders, say consumers (direct costs) and industry (indirect costs), the choice of option A or B would matter also in terms of distributional impacts: the former affects consumers less than the latter, and industry more than the latter.

Table 1 – Types of costs and regulatory options: an example

	Direct Costs	Indirect Costs	Enforcement costs	Total cost
Option A	0.5	2.5	4	7
Option B	0.75	1.5	6	8.25

On the other hand, for what concerns benefits, our analysis of international guidance documents and handbooks on cost-benefit analysis and impact assessment revealed that there is no real taxonomy of benefit that is subject to widespread agreement: this is probably due to a number of factors, including: (i) the fact that benefits are normally equated with the stated goal and underlying motivation of the legislative initiatives at hand; (ii) the fact that economists in charge of cost-benefit analysis normally equate benefits with the achievement of an “efficiency frontier”, i.e. the optimal allocation of resources in a given societal context, which however cannot be easily translated in more concrete categories of benefits, nor can be considered as the only goal of public policy; (iii) the fact that different governments and different societies might perceive certain impacts, such as distributional justice or fairness, as more important than others¹¹; and (iv) the fact that some governments might consider benefits only those impacts that lead to an improvement of the individuals’ subjective well-being, whereas others believe that an impact might be a benefit even if it is not immediately perceived as such or spontaneously pursued by

¹¹ Efficiency and fairness often diverge in public policy: for example, standard cost-benefit analysis would consider as “efficient” a change in public policy, as a result of which the richer part of the population gains 100 and the poorer part loses 90. However, this change would not be considered as “fair” by many commentators. See Renda (2011) for a more detailed explanation.

citizens or businesses¹². Given the above, we suggest the following categorization:

- **Area 4 includes direct regulatory benefits.** Here, we distinguish between the following categories of benefits:
 - The improvement of the well-being of individuals, which in turn encompasses health, environmental and safety improvements; and
 - Efficiency improvements, which include, notably, cost savings but also information availability and enhanced product and service variety for end consumers.
- **Area 5 includes indirect regulatory benefits**, which encompass:
 - Spillover effects related to third-party compliance with legal rules (so-called “*indirect compliance benefits*”);
 - *Wider macroeconomic benefits*, including GDP improvements, productivity enhancements, greater employment rates, etc.; and
 - *Other non-monetizable benefits*, such as protection of fundamental rights, social cohesion, international and national stability, etc.
- **Area 6 contains a list of “ultimate impacts” of regulation**, which overlap with the ultimate goals of regulatory intervention: even if some regulations directly aim at achieving these benefits (in which case, we would include them in Area 4), normally all regulations aim, as an ultimate impact at achieving some advancement in social welfare, which can be described in terms of efficiency or in others terms: these ultimate impacts encompass well-being, happiness and life satisfaction, environmental quality, and more economic goals such as GDP growth and employment. This area lies at the intersection between regulatory impacts and regulatory goals: in our opinion, it is important to highlight it in a visual representation of regulatory impacts for at least two main reasons. First, while the first applications of cost-benefit analysis to legal rules (as in the US RIA system) chiefly looked at efficiency and thus at the calculation of net benefits for the justification of action in regulation, many governments today adopt a wider variety of regulatory goals when regulating, which leads to the measurement of distributional effects and, more generally, at more subjective outcomes such as life satisfaction (see below, Section 2.4.2). Second, in Section 2 of this report we will explain more in detail that a number of methods are being developed to track directly the ultimate impact of a given future state of the

¹² For example, if citizens do not express a clear preference (or willingness to pay) to achieve a long-term benefit such as, say, the preservation of biodiversity by 2050, normally in mainstream cost-benefit analysis this effect will not be counted as a social benefit, and will thus not justify any cost in public policy; however, some governments believe that those benefits should be factored into their decisions even if currently citizens do not feature any specific willingness to pay to achieve them.

world (e.g. life satisfaction), rather than developing the analysis from the comparison of costs and benefits. These approaches (often termed “measurement of subjective well-being”, or “happiness metrics”) try to avoid some of the methodological shortcomings of neoclassical cost-benefit analysis to measure: among others, an important feature of these methods is that instead of relying on income as a proxy of happiness, they try to measure the latter directly¹³.

Needless to say, there are complementarities and interrelations between the different areas highlighted in Figure 3. In particular, the impact of regulations on “area 1” costs must be carefully appraised in light of possible impacts on “area 2” and “area 3”. For example, a regulation that reduces businesses reporting obligations on health and safety measures at the workplace might be seen with favour if one considers only business costs in an *ex ante* appraisal: however, less reporting by businesses might lead to increased monitoring costs by public authorities in charge of ensuring the safety of workers; absent such additional efforts, this might lead to reduced safety levels overall, thus leaving on average employees worse-off, and businesses better-off. Similarly, reducing costs might in many cases also mean reducing benefits: favouring a reduction in enforcement costs (area 3) might lead to looser compliance (area 1), which in turn could lead to lower indirect compliance benefits (area 5). Accordingly, only a comprehensive assessment of costs and benefits for all groups directly and indirectly affected by a regulation can lead to a well-informed judgment on the net social impact of that regulation.

1.2.1 Costs, benefits, or just impacts?

Many, if not all, impact assessment guidance documents available on a worldwide basis refer to costs and benefits as two different concepts. In our opinion, it is more correct to refer generically to “impacts”, and to define costs as negative impacts, and benefits as positive ones¹⁴. In practice, differentiating taxonomies and typologies of costs and benefits can be seen as a way to facilitate the analysis of the impact of a given regulation, rather than a way to differentiate these two concepts based on their diverse nature. The existing differentiation between costs and benefits is also the reflection of another practical issue: for most regulations, costs are normally more evident, measurable, concentrated on one group and immediate (in term of time)

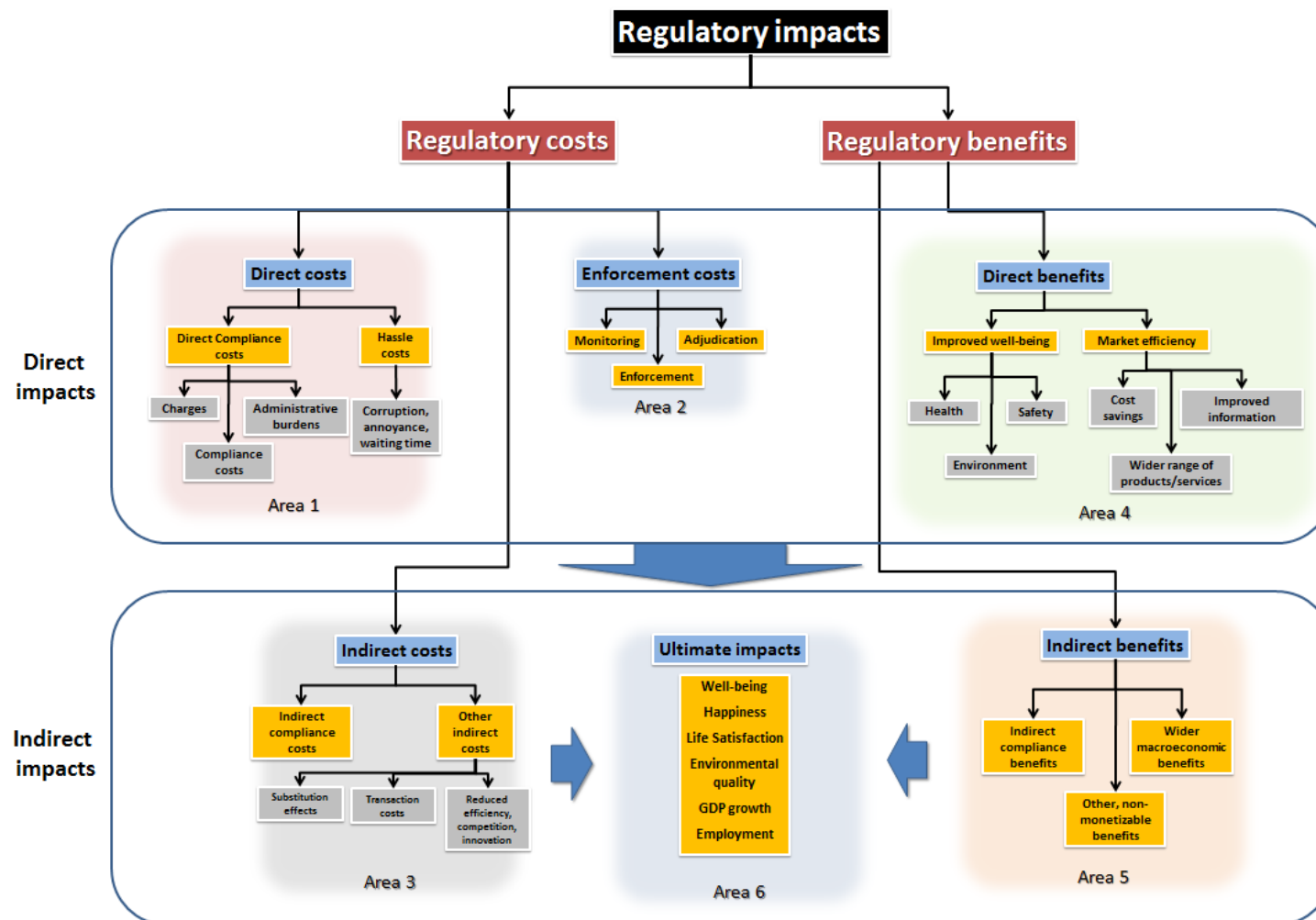
¹³ See Renda (2011) and Fujiwara and Campbell (2011) for a more detailed explanation.

¹⁴ One exception in this respect is the Australian government’s Best Practice Regulation Handbook, which clearly states that “costs and benefits are terms used to describe the positive and negative effects of a proposal”. Australian Government, Best Practice Regulation Handbook, 2010, Section 3.41.

compared to benefits, which are often less easy to measure, more widespread and long-term. This is why a number of EU member states has decided to focus mostly on costs, rather than benefits, when appraising legislation *ex ante*.

Finally, costs and benefits are often mirror images: for example, one of the most important category of benefits is that of cost savings, as many regulatory interventions aim at simplifying legislation and reducing regulatory costs. Similarly, costs are normally defined as “avoided benefits” (i.e. foregone opportunities, see below Box 2). Accordingly, below and in Section 2 – dedicated to specific methods of assessing of costs and benefits used at national level – we keep costs and benefits separate, but only for ease of illustration.

Figure 3 – A map of regulatory costs and benefits



Source: Authors' elaboration

1.3 *Types of regulatory costs*

A cost can be defined as “any item that makes someone worse-off, or reduces a person’s well-being”, and as such includes also those opportunities that are forgone because a particular policy measure has been implemented¹⁵. The practice of impact assessment entails the use of a number of different cost concepts. Of these, as suggested by several authorities around the world, the most comprehensive measure is that of “social cost”, intended as a reduction of social welfare arising as a consequence of a legal rule. Simply put, social cost represents “the total burden that a regulation will impose on the economy” and is defined as “the sum of all opportunity costs incurred as a result of a regulation”, where an opportunity cost is the value lost to society of any goods and services that will not be produced and consumed as a result of a regulation¹⁶.

To be complete, an estimate of costs should include both the opportunity costs of current consumption that will be foregone as a result of the regulation, and the losses that may result if the regulation reduces capital investment and thus future consumption. The strong focus of impact assessment on the concept of opportunity cost (see box 2 below) is explained by the fact that the ultimate impact of policies should be measured based on individuals’ well-being: and the latter depends also on foregone opportunities.

Moreover, it must be recalled that all costs generated by a new legal provision (just like benefits) are by definition incremental costs, *i.e.* they are additional with respect to the existing situation, as well as additional to the costs that would emerge absent legislative intervention. This means that all costs considered for the purposes of an impact assessment should exclude the so-called “business as usual” (BAU) costs, *i.e.* those costs that would materialize anyway, even in absence of a new policy measure.

Typically, costs can be distinguished based on various parameters:

- The type of cost *per se* (administrative, compliance costs, charges, non-monetary costs).
- The relation between the legislative act and the cost considered (direct and indirect costs).
- The frequency of occurrence of the costs (one-off costs, and recurring costs).

¹⁵ *Id.*

¹⁶ United States Environmental Protection Agency, Guidelines for Preparing Economic Analyses, December 2010, Chapter 8-1.

- The degree of certainty of the costs (costs v. risks).
- The nature of the addressee/target of the costs (businesses, citizens/consumers, public authorities, third country actors, etc.).
- Whether then can be described as economic, social or environmental costs.

Box 2: do economists understand opportunity costs?

In an influential article published a few years ago, Paul Ferraro and Laura Taylor (2005) prompted 192 professional economists with a questionnaire on opportunity costs, and concluded from the results received that most of them do not understand this rather complex economic concept. One of their surveys was among 192 economists attending the 2005 Allied Social Sciences Association (ASSA) meeting in Philadelphia. About 67% of them had a PhD and 33% were enrolled in PhD programs; approximately 45% were from ‘top-30 economics departments’ in the US, and about 61% had taught introductory economics at tertiary level. The understanding of the concept of opportunity cost was tested through this question:

“You won a free ticket to see an Eric Clapton concert (which has no resale value). Bob Dylan is performing on the same night and is your next-best alternative activity. Tickets to see Dylan cost \$40. On any given day, you would be willing to pay up to \$50 to see Dylan. Assume there are no other costs of seeing either performer. Based on this information, what is the opportunity cost of seeing Eric Clapton?”

A. \$0	B. \$10	C. \$40	D. \$50.
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As a result, 25.1% of the respondents said “A”, 21.6% said “B”, 25.6% chose “C” and 27.6% picked “D”. This was astonishing, since answers were almost evenly distributed among options, and even more strikingly, the correct one (“B”) was the one that got the lowest number of respondents.

This anecdote triggers a number of reflections. First, the concept of opportunity cost is as straightforward as superficially treated in economic textbooks (as “the next best alternative” to an existing action); as it is controversial in theoretical economics – for example, “Austrian” economists mostly reject the probability of attaching a monetary value to opportunity cost. Second, confusion and controversies about the concept are not a promising start for a concept that is presented as the cornerstone of policymaking.

As a matter of fact, “opportunity cost” is used as a generic term that refers to the need, for policymakers, to account for opportunities that have not materialized

when assessing the impact of a policy option that deprives individuals or businesses of certain possibilities for action. This is due to the fact that impact assessment seeks to capture the effects of policies on the well-being of individuals that compose society. It just refers to the fact that should a legislation ban the possibility, for people below 21 years of age, to attend Bob Dylan's concert, the cost that will be perceived by these individuals will be the net benefit they would have perceived had they attended the concert, *i.e.* \$10. This makes it more difficult to appraise costs for economists, since – as will be explained throughout this report – the benchmarks for assessing changes in individual well-being in policymaking are the willingness to pay for a product (and not what is actually paid); or the willingness to accept compensation for being deprived of an asset (and not what the asset is worth on the market, if any).

More generally, referring to the opportunity cost is the most appropriate way in economics to assess the costs generated by regulation: accordingly, opportunity costs are not a category of cost *per se*, separate from other categories of direct/indirect costs (and this is why they are not portrayed in Figure 3 above). Rather, they are the underlying concept that must be adopted as reference to describe all costs generated by regulation.

1.3.1 Types of direct costs

As explained above, direct costs can be broken down into compliance costs and hassle costs. Below, we describe more in detail each of those types of costs.

1.3.1.1 Compliance costs

Compliance costs are often the bulk of all direct costs generated by legislation: over time, they have become the subject of specific assessment methods in various countries¹⁷. Within this category, it is possible to distinguish between direct charges, substantive compliance costs, and administrative burdens.

Charges

Regulation often affects businesses and consumers by imposing the payment of fees, levies, or taxes on certain stakeholders. These costs are often easy to calculate, as their extent is by definition known. What is sometimes more difficult to assess is who will bear those costs, as this might depend on the extent to which these costs are passed-on to entities other than those targeted

¹⁷ See Section 2.1 below.

by the legal rule. For example, copyright levies might be passed-on downstream on end consumers in the form of higher prices for certain hardware devices.

Substantive compliance costs

Regulation normally also entails less explicit costs than direct charges. This is the case of substantive compliance costs which emerge as a result of “obligations” included in legislation, defined as “individual provisions inducing direct changes in costs, time expenditure or both for its addressees”, which “oblige addressees to comply with certain objectives or orders, or to refrain from certain actions”, or also “demand cooperation with third parties or to monitor and control conditions, actions, figures or types of behaviour”.¹⁸ Compliance costs can be further broken down into the following categories:

- ***One-off costs:*** these are faced by actors targeted by regulation since they have to adjust and adapt to the changes legal rule. For example, if a new environmental standard imposes the use of new equipment, the purchase of such new equipment would be needed immediately after the legal rule enters into force. Also, personnel will have to be re-trained as a result of the changes legal regime. All these costs are not likely to be borne by the targeted stakeholder on a regular basis in the future: to the contrary, they occur only once, after the entry into force of the new regulation.
- ***Recurrent costs:*** these are those types of substantive compliance costs that are sustained by the targeted stakeholders on a regular basis as a result of the existence of a legal rule that imposes specific periodic behaviours. For example, if a new regulation imposes the periodical re-training of employees in a specific economic sector (e.g. hospitals, schools), then the cost of training courses and the opportunity cost (see below) of the time spent by employees being trained will become a regular cost. Similarly, if a new regulation imposes the periodical roadworthiness tests for cars, mandating that they take place every second year after the purchase of the vehicle, the cost of the test for the car owner becomes a periodical compliance cost.

Compliance costs are most often calculated as a sum of capital costs, financial costs and operating costs.

- **Capital Costs (CAPEX)** occur when a company acquires or upgrades physical assets such as property, industrial buildings or equipment. This type of outlay is made by companies to maintain or increase the scope of their operations. These expenditures can include everything from repairing a roof to building a brand new factory. Once the asset is in place, capital costs

¹⁸ See Federal Government of Germany, *Normenkontrollrat* and Destatis, Guidelines on the Identification and Presentation of Compliance Costs in Legislative Proposals by the Federal Government, 2011, at page 8.

generally do not change with the level of activity and are thus functionally equivalent to “fixed costs”. In cost-benefit analysis, capital costs are usually “annualized” over the period of the useful life of the equipment.

- **Operating and Maintenance Costs (OPEX)** include annual expenditures on salaries and wages, energy inputs, materials and supplies, purchased services, and maintenance of equipment. They are functionally equivalent to “variable costs.”
- **Financial costs** are costs related to the financing of investment, and are thus normally considered in relation to CAPEX. However, they can also emerge with respect to OPEX whenever a new legal provision changes the structure of the working capital.

Administrative burdens

Administrative burdens are those costs borne by businesses, citizens, civil society organizations and public authorities as a result of administrative activities performed to comply with information obligations included in legal rules. More specifically, administrative burdens are the part of administrative costs which is caused by regulatory requirements: accordingly, they do not include so-called “BAU costs”, *i.e.* costs that would emerge also in absence of regulation.

1.3.1.2 “Hassle” or “irritation” costs

Often linked to administrative burdens measurements, irritation costs are a residual category of direct cost, which is more difficult to quantify or monetize, and also difficult to relate to a specific information obligation. These are more subjectively felt costs that are related to the overlapping of regulatory requirements on specific entities, be they citizens or businesses. By definition, these costs are important for subjective well-being, but very difficult to quantify or monetize (as such, they are kept as a separate, qualitative item in administrative burdens or compliance cost measurement, *e.g.* in the Netherlands). Hassle costs can include costs related to administrative delays (when not directly attributable to an information obligation) and relatedly, the opportunity cost of waiting time when dealing with administrative or litigation procedures. At the same time, irritation burdens are often accounted for in the measurement of administrative burdens (although they are normally not quantified) whenever they are related to specific information obligations, and especially in case of overlaps, redundancies or even worse inconsistencies between legislative provisions.

1.3.2 Indirect costs

Indirect costs are costs incurred in related markets or experienced by consumers, government agencies or other stakeholders that are not under the direct scope of the regulation. These costs are transmitted through changes in the prices, availability and/or quality of the goods or services produced in the regulated sector. Major indirect costs include indirect compliance costs such as regulation-induced price increases, quality/availability reductions and other, negative impacts related to the fact that someone other than the entity at hand is complying with legislation; increased transaction costs; and also other, secondary costs that include unintended effects, “risk/risk trade-offs”, etc.¹⁹

1.3.2.1 Indirect compliance costs

Indirect compliance costs arise to a given agent due to the fact that other agents comply with legislation. This type of indirect costs is usually transmitted through changes in the prices of the goods or services produced in the regulated sector. Changes in these prices then ripple through the rest of the economy, causing prices in other sectors to rise or fall and ultimately affecting the welfare of consumers. Government entities can also incur indirect compliance costs. For example, if the tax base changes due to the exit of firms from an industry, revenues from taxes or fees may decline. One example of indirect compliance cost is found in heavy industries such as steel and aluminium: there, the cost of electricity supply for producers is significantly high – among many other factors – also since price levels incorporate the cost of emission allowances purchased by electricity companies in order to be able to generate electricity: in a recent report on the aluminium industry led by CEPS (2013), these indirect costs were estimated at approximately €60/tonne, *i.e.* approximately 45% of regulatory costs for aluminium producers²⁰.

¹⁹ A risk-risk tradeoff is a situation that requires choosing between options that each may cause some harm: i policy analysis a risk-risk tradeoff can occur if, as a result of the implementation of a policy option, the remedy chosen reduces some risks but creates others. See i.a. Viscusi, W. K. (1994), *Risk-Risk Analysis*, Journal of Risk and Uncertainty, 8:5-17 (1994), making several examples including the following: “Chlorination of water is beneficial since it reduces the spread of a wide variety of diseases, but chlorinated water is also carcinogenic”.

²⁰ See Renda et al. (2013), *Assessment of Cumulative Cost Impact for the Steel and the Aluminium Industry*, a report by CEPS and Economisti Associati for the European Commission DG Enterprise and Industry, October 2013.

1.3.2.2 Other indirect costs

Other types of indirect costs, often termed “secondary costs”, are in most cases difficult to typify since they are inherently specific to the case at hand. Below, we offer a description of some common types of costs that arise as a result of regulatory intervention, with no ambition to be exhaustive.

Substitution effects

Regulation will often cause people to change their behaviour, and it is crucial that policymakers understand and anticipate these changes. If regulation results in an increase in the price of a product (for example, by increasing product standards), people will usually respond by buying less of that product and switching instead to other substitute goods. Such substitution activity reduces the costs in utility terms to consumers, at least in the first instance. However, substitution effects may also create unintended problems. For example reducing the risks in one area may create higher risks in another.

An example of this is increasing the stringency of airline safety regulation. Such an action can be expected to reduce the number of deaths due to plane crashes. However, it will also increase the cost of flights. This increase in the cost of flights will cause some people to decide that they can no longer afford to fly and to drive to their destination instead. However, because car travel is much less safe than air travel, the increase in the number of road crash victims may well be greater than the reduction in air crash victims.

Because of the importance of these substitution effects in determining the overall impact of the regulation, officers in charge of an impact assessment should try to identify likely changes of this sort and estimate how significant these changes are likely to be, before they draw any conclusion as regards the effectiveness of the regulatory options they are assessing.

Transaction costs

Transaction costs are the costs associated with transactions between individuals on the marketplace. The smaller the amount of transaction costs, the more market exchanges are considered to be potentially efficient. Accordingly, some scholars have advocated in the past that the role of government regulation is essentially that of facilitating market transactions by minimizing the impact of transaction costs (the so-called “Coase theorem”). Today, the vision of the role of government is more articulated, but it can still be argued that, other things being equal, regulation that reduces transaction costs is likely to increase efficiency.

Transaction costs relate to many different aspects of a transaction: from the search of a counter-party to the acquisition of information related to the transaction, to the opportunity cost of the time spent negotiating the agreement, the costs related to the strategic behaviour of the parties in a contract, etc. Whenever a policy option affects these variables by increasing the cost of identifying counter-parties and negotiating with them, the possible inefficiencies generated by transaction costs have to be taken into account.

Transaction costs are often downplayed or even neglected in the analysis of regulatory costs, also due to the difficulty of calculating them. In most cases, the measurement of transaction costs can take place only through approximations such as the opportunity cost of time spent performing given activities (e.g. looking for a counter-party); or through losses of surplus and welfare associated with the dissipation of resources (e.g. in the case of strategic behaviour).

Reduced competition and inefficient resource allocation

Some regulations can reduce the amount of competition in markets, thus affecting the efficiency of resource allocation. This is a particularly important cost impact. For example, regulation can reduce competition by:

- *Making it more difficult for new competitors to enter the market*, by creating regulatory requirements that are difficult for them to meet or simply discouraging entry by artificially reducing the profitability of a given market.
- *Preventing firms from competing aggressively* – for example by setting rules that reduce price competition or restrict advertising (e.g. rules that prohibit sales below cost, or set minimum prices); or depriving market players of their minimum efficient scale by imposing market fragmentation.
- *Inducing collusion*, by making it easier for market players to coordinate their strategies, e.g. through increased market transparency, imposed price changes, mandatory standard adoption, etc.

Reduced market access

Certain regulations might also have, as an indirect negative impact, the loss of market access opportunities for both consumers and businesses. For example, practices and conducts such as the abuse of economic dependence can reduce the possibility, for small suppliers, to have their products distributed by large supermarket chains: the weaker bargaining position of these players vis-à-vis large retailers might lead to a loss of market access for them, and a consequent loss of product variety for consumers. These behaviours are normally not tackled by competition law, but several Member States of the EU have regulation in place to avoid that smaller market players are harmed by the superior bargaining strength of their counter-parties.

Reduced investment and innovation

In addition to reducing allocative efficiency, regulation can also reduce dynamic efficiency – *i.e.* the ability of the economy to grow and innovate in the longer term – by reducing incentives to invest in research and development or, more generally incentives to produce innovative products. A typical example is that of inefficiently designed access policy in network industries, which causes a reduction of incentives to invest in infrastructure for the incumbent players, and sometimes a reduced incentive to invest in new infrastructure for new entrants, thus reducing dynamic efficiency in the market.

Uncertainty and investment

A related negative impact that might emerge as a result of regulation is regulatory or legal uncertainty, which might affect expectations as regards return on investment, and as such limit the extent of investment in the economy. In this respect, too frequent changes in legislation can generate uncertainty among investors, thus either discouraging them altogether from investing in a given country/sector, or inducing them to postpone their investment to a later date.

1.3.3 Enforcement costs

Legal rules have to be monitored and enforced to be effective. And, when controversies arise, courts have to solve them speedily and consistently for a rule to be reliable and effective. Depending on the type of rule and the regulatory option chosen, enforcement might be very cheap or very costly for public authorities. Consider the examples below:

- Speed limits enforced via street police require a lot of policemen on the road. The use of cameras and centralized control from police stations reduces the cost of enforcement by replacing the cost of street police with a one-off cost (camera installation) and the recurrent cost of maintenance, an increase in the cost of central police control and different administrative behaviour in treating fines and claims.
- Abolishing businesses reporting obligations on health and safety measures does not remove the desirability of monitoring the safety and health on the workplace: this will most likely lead to enhanced monitoring and inspection costs on the side of public authorities.
- Enabling citizens to report holes in city streets through a dedicated “App” reduces the cost of monitoring street-by-street and the corresponding labour costs.

- Enabling rules that encourage private antitrust damages actions also creates potential enhanced enforcement costs for the use of the legal system. This means potentially more backlog in cases handled by courts and potential indirect costs (waiting time, reduction of legal certainty, loss of credibility of the court system, etc.).

In summary, enforcement costs are an essential element to be considered in any cost-benefit analysis, as their magnitude can tilt the balance in favour of regulatory options that would not be chosen in a more partial assessment. We divide enforcement costs in the following categories:

- *One-off adaptation costs*: this is typically the case in which a new legal rule forces administrations to re-train their personnel or change equipment (e.g. buy personal computers, cars, etc.)
- *Information costs and administrative burdens*. These are the costs of gathering and collecting information needed to effectively monitor compliance. When these activities entail the production of information to be delivered to third parties according to a legal provision, they are called “administrative burdens”; however information costs can also be related to activities that are essential for carrying out enforcement actions, but do not entail any information obligation.
- *Monitoring costs*. The cost of monitoring compliance with the legislation, e.g. patrolling streets, collecting statistics, etc.
- *Pure enforcement costs*. These include the cost of running inspections, processing sanctions, handling complaints by the enforcing authority.
- *Adjudication/litigation costs*. These are the costs of using the legal system, or an alternative dispute resolution mechanism, to solve controversies generated by the new legal rule.

Enforcement costs are not only borne by public authorities: private actors face costs related to litigation when in need to use the legal system, as in the case of lawsuits: these are not strictly classified as administrative burdens, nor as compliance costs. They are costs that can be defined as the sum of the opportunity costs of the time spent dealing with litigation, plus the legal expenses that must be sustained (depending on the procedural rules that apply) in order to litigate a case as claimant or defendant.

1.4 The benefits of regulation

As already explained above, available taxonomies of benefits are not as sophisticated as the ones developed for costs, probably since benefits are at once the most apparent aspect of a regulation (they are often stated as the reason for

regulating) and the least easy to classify, since they tend to be very specific to the regulation at hand. That said, just like costs, benefits can be classified as direct and indirect, meaning that they can affect the stakeholders targeted by the legislation or go beyond the target groups and affect other groups, or even become diffuse, societal benefits (e.g. increased safety). Apart from this, available guidance documents at the international level spend very little time discussing types of benefits, and normally move directly to measurement techniques. As a result, in this section we will provide our own view of how the identification of benefits should be approached in carrying out an impact assessment.

More specifically, from a methodological viewpoint (and taking into account that there might be overlaps), direct benefits can be expressed in terms of:

- *Additional citizens' utility, welfare or satisfaction* – as we will see in Section 2 below, these are mostly valued through techniques aimed at capturing the sum of individual preferences for a future state of the world, whereas these preferences are often modelled through an approximation of individuals' willingness to pay for such state of the world²¹. Such benefits include, most notably, health, safety and environmental benefits, which we treat separately in the following sections²².
- *Improved market efficiency*, which might include improvements in the allocation of resources, removal of regulatory or market failures, or cost savings generated by regulation. Within this category, cost savings can be approached following the taxonomy of costs introduced in the previous sections. For example, a given regulation might lead to a reduction of administrative burdens or compliance costs: in this case, the identification process and the related definition of (saved) costs follows the same criteria described in the previous sections dedicated to costs.

Indirect benefits include the following:

- *Spillover effects related to third-party compliance with legal rules (so-called "indirect compliance benefits")*. These include all those benefits that accrue to individuals or businesses that are not the addressees of the regulation, but that enjoy positive effects due to the fact that other have to comply with the regulation. For example, the fact that mandatory safety standards are imposed (and enforced) to food producers might lead to

²¹ At this stage, we do not comment on the difference between GDP and happiness (to be discussed with the Commission).

²² A different, controversial issue is whether one could include in this group a category of benefits *per se*, which contribute to societal welfare regardless of whether stated or revealed preference techniques testify of the existence of demand for them. See Sunstein, C.R. and R.H. Thaler (2008), *Nudge: Improving Decisions about Health, Wealth, and Happiness*, Yale University Press.

important savings in monitoring costs by retailers. Also, the fact that more individuals comply with legislation mandating more healthy behaviour (e.g. no consumption of junk food) can lead to indirect benefits in the form of lower healthcare costs for society over time. This category also include difficult to monetize, but nevertheless important benefits such as enhanced legal certainty, positive externalities and spillover effects, deterrence and corrective justice.

- *Wider macroeconomic benefits* such as GDP increases, competitiveness and productivity effects, etc. For example, although with a significant degree of approximation and some rather heroic assumptions, a 25% reduction of administrative burdens has been estimated to trigger a GDP increase of up to 1.5% in the Netherlands, 1% in the UK and 1.4% at the EU level. This second-order effect depends, in particular, on the assumption that reduced red tape would lead to the reallocation of freed resources to more productive uses, and as such incorporates the concept of opportunity cost.
- *Other non-monetizable benefits*, such as protection of fundamental rights, social cohesion, international and national stability, etc.

1.4.1 Direct benefits

1.4.1.1 Improved well-being

Benefits from “lifesaving regulation”

A specific category of benefits accruing from increased social welfare or individual utility, which has been extensively covered in the literature, includes those benefits that are related to the so-called “lifesaving regulation”, a term used mostly to indicate regulation that can create positive effects on human health and the environment²³. The usual *caveat* applies: since costs and benefits are the flips of a same coin, which we can term “impacts”, cases in which regulation can lead to a reduction of these benefits can be treated as cases of costs of regulation.

Benefits from lifesaving regulation include the following:

²³ For a more technical introduction to life-saving regulation, see Graham, J. (2007), *Saving Lives through Administrative Law and Economics*, University of Pennsylvania Law Review, Vol. 157: 395. The term “lifesaving” is understood to encompass rules that curtail risk of nonfatal injury and illness (morbidity) as well as the risk of premature death (mortality). This use of the terminology “lifesaving” is attributed to Richard Zeckhauser, *Procedures for Valuing Lives*, 23 PUB. POL’Y 419 (1975), and Zeckhauser & Shepard, *Where Now for Saving Lives?*, Law & Contemp. Problems., Autumn 1976, at 5.

- *Reduction of mortality*: this is the case when regulation can reduce the number of fatalities, for example by imposing stricter safety requirements (e.g. seat belts when driving), or more generally increase life expectancy and reduce the risk of premature death.
- *Morbidity benefits*. A morbidity benefit is the reduction in the risk of non-fatal health effects that can be characterized by duration and severity. This easily translates into improvements of the health of those living with diseases. This category also includes the reduction in tension or stress, and improvements in mental health.
- *Environmental or ecological benefits*: regulation can lead to several beneficial impacts on the environment, ranging from broad impacts (reduced pollution, preserving biodiversity) but including, most notably, very specific effects such as:
 - Reduction of emissions of pollutants.
 - Waste disposal and recycling.
 - Soil protection.
 - Noise reduction.
 - Air quality.
 - Water quality and availability.
 - Promotion of use of renewable resources

1.4.1.2 Improved market efficiency

A typical benefit of regulation is achieved whenever the latter contributes to addressing a factor due to which the the interaction of market forces does not lead to an efficient outcome, a distortion that is often termed “market failure”. The underlying assumptions to this statement are: (i) that market forces, when they are not hampered by market failures, would achieve efficient outcomes; and (ii) that regulation can do something about it, *i.e.* that the cure to market failures is not worse than the disease.

The European Commission Impact Assessment Guidelines already address the issue of market failures, which are summarized as follows:

- *Externalities (positive or negative)*. Market prices do not reflect the real costs and benefits to society (‘externalities’).
- *Insufficient supply of public goods*.
- *Missing or weak competition* (including abuse of market or monopoly power).
- *Missing or incomplete markets*.

- *Information failures*, such as imperfect information or lack of access to information for decision takers (including consumers and public authorities), unless caused by a regulatory failure.

More specifically, economists normally define three different concepts of efficiency:

- *Productive efficiency* relates to the optimal use of resources in production processes, *i.e.* a more efficient outcome would be the possibility of producing the same quantity of output with less input.
- *Allocative efficiency* refers to the allocation of resources to those economic actors that value them the most. This is typically a result achieved through perfect competition, but can be challenged since in most cases it relies heavily on individuals' willingness to pay, which is a rather controversial measurement technique when used to approximate individual preferences (see below, Sections 2.3.1 and 2.4.2 for a more detailed discussion).
- *Dynamic efficiency* refers to incentives to invest and innovate, which might imply the availability of funds for R&D investment, and an investment-friendly environment.

The three concepts of efficiency are not always consistent and complementary. There has been a very long debate in economics as regards the market structure that is most conducive to allocative and dynamic efficiency, with many economists firmly believing that the latter can be achieved only at the expense of the former. Box 3 below summarizes this debate.

Box 3: which is the best market structure for dynamic efficiency?

The relationship between competition and innovation is among the most researched issues in economics, especially due to the long-lasting debate between two of the most prominent economists of the past century, Joseph Schumpeter and Kenneth Arrow, who had completely opposite views of the best market conditions that would contribute to stimulating innovation. According to Schumpeter, “[t]he introduction of new methods of production and new commodities is hardly conceivable with perfect – and perfectly prompt – competition from the start. And this means that the bulk of what we call economic progress is incompatible with it. As a matter of fact, perfect competition is and always has been temporarily suspended whenever anything new is being introduced – automatically or by measures devised for the purpose – even in otherwise perfectly competitive conditions”. On the other hand, Kenneth Arrow focused on a different view of dynamic efficiency, by looking at the incentive, for market players, to achieve superior levels of productive

efficiency (mostly reductions in unit costs of existing products) over time, which would allow them to beat rivals in reasonably competitive environments. Every time inventors can appropriate part of the social benefit of the invention they introduce, their private incentive will be aligned with the public interest. Since this is more likely to happen under competitive conditions, given the pressure exerted from rivals, more competition also means more innovation.

More recently, the work of Philippe Aghion and various co-authors has shed more light on the potentially beneficial impact of competition on innovation and growth. These include: (a) a “Darwinian effect” or “innovate to survive”, generated by intensified product market competition that forces managers to speed up the adoption of new technologies in order to avoid loss of control rights due to bankruptcy ; (b) a “neck-and-neck competition” effect, especially observed when innovation is incremental and firms compete to overtake one another in a constant competitive race; and (c) a “mobility effect” that emerges when skilled workers are able to easily switch to new production lines .

Also, the work of David Teece (1986) has shed a different light on the dynamics of innovation. Rather than adopting a “market structure” approach, like Schumpeter, Arrow and Aghion, Teece focuses on a contracting, “Williamsonian” approach to innovation policy . In particular, he considers that most innovative products have to be integrated in a nexus of complementary products to really unleash their full potential. Thus the modularity of modern products and the possibility of integrating innovation into existing system goods becomes one of the essential drivers of product innovation in a given economy.

As is easily observed, the debate over the preconditions for innovation has important policy implications: if a policymaker is confident that a more competitive market structure is conducive to more dynamic efficiency and innovation, then competition policy will become an important ingredient of innovation policy. To the contrary, if monopoly or oligopoly are thought to be optimal market conditions for long-term dynamic efficiency, then innovation policy will fall outside the remit of competition policy, and will potentially clash with it at times. Finally, if policymakers believe that the intellectual property regime and the role of the state as facilitator of the introduction of incremental innovation in existing system goods are the key pillars of innovation policy, then industrial policy and a pro-active innovation policy become the key mission of modern government.

1.4.2 Indirect benefits

1.4.2.1 *Benefits from third-party compliance with legal rules*

Regulation and legislation can often produce spillover effects, which go beyond active compliance behaviour by the addressees of the regulation. Respect of the law can indeed create benefits for other stakeholders, especially if located along the same value chain. Just as regulation can produce indirect compliance costs, in some cases it can also produce indirect compliance benefits: for example, regulation that mandates safety standards for food producers can lead to cost savings for retailers; regulation that leads to productivity improvements on the workplace can lead to lower prices for downstream market players and end consumers; etc.

In addition, third parties can benefit from enhanced compliance with legal rules also in other, less monetizable ways. This is the case when legislation discourages or deters criminal behaviour, thereby increasing safety – and more generally, every time legislation leads to the achievement of a public good.

Finally, more widespread compliance with legal rules can also produce benefits to all those players that were already complying with rules before the enactment of a new policy: this occurs whenever more widespread compliance leads to a more level-playing field between all market players, avoiding cases of free riding, or distorted competition.

1.4.2.2 *Wider macroeconomic benefits*

Macroeconomic benefits are an important area of benefits for impact assessment, especially in those case in which regulations have cross-cutting effects across sectors, and as such require that the assessment goes beyond partial equilibrium and approaches general equilibrium analysis. That said, two scenarios can emerge in an impact assessment:

- *In most cases, macroeconomic benefits are to be considered as indirect benefits of legislation that aims at more specific, sectoral results.* When this occurs, and as will be explained in more detail in Section 2 below, our advice is to retain a partial equilibrium analysis, and if proportionate and appropriate use “ready-made multipliers” to assess how sectoral, specific benefits might translate into macroeconomic benefits²⁴.

²⁴ The use of multipliers is, anyway, very controversial in the field of policy impact assessment. If multipliers are used, the scientific evidence behind them has to be carefully scrutinized and quoted in the analysis.

- *In some cases, macroeconomic benefits can be the direct goal of given policy initiatives.* This is the case, *i.a.* for impact assessments of flagship initiatives under the Europe 2020 strategy, as well as other broad initiatives such as Horizon2020. There, as will be explained in more detail in Section 2 below, the use of computational general equilibria becomes appropriate and proportionate, as it allows for the simulation of long-term impacts on the economy.

Macroeconomic impacts include impacts on GDP, productivity and growth, financial and macro-economic stability. The relative weight of these elements of course will depend on the specific proposal that is subject to impact assessment.

Achieving EU-specific goals

Benefits in many EU impact assessments entail the achievement of EU-specific goals. The following benefits emerge very often in impact assessment carried out by the European Commission:

- *Achieving the Internal Market* through an approximation of legislation, the abatement of barriers to cross-border trade or obstacles to any of the four freedoms is often construed as a benefit in and of itself. However, market integration is better approached as an intermediate goal, *i.e.* a goal that is worth being pursued only if it leads to the achievement of ultimate, long-term goals such as competitiveness, prosperity, sustainable development. At the same time, impacts on the internal market may be assessed against the potential loss of regulatory competition, which can lead – under certain conditions – to mutual learning and “races to the top” in the selection of most appropriate rules. In other cases, such competition between legal systems can lead to the opposite effect, a “race to the bottom” in which the less desirable rules prevail (e.g. forum shopping for least transparent corporate law regimes).
- *Enhanced protection of SMEs and micro-enterprises* is sometimes framed as a benefit in and of itself, especially under recent legislation that imposes that public authorities “think small first” in developing new legislation, and do not impose disproportionate burdens on smaller firms when choosing regulatory options. Again, it is important to recall that such benefit can be offset by the loss of other benefits, or additional costs imposed on other stakeholders (e.g. larger firms, or public authorities).

In most cases, these are to be considered as intermediate goals, rather than policy goals *per se*. In other words, achieving these positive impacts is considered, at policy level, to lead to improvements in terms of social welfare. The Single Market has traditionally been associated with important wider

macroeconomic benefits, whereas SMEs are often considered as a key engine of innovation, growth, productivity and jobs, and as such worthy of specific attention in Impact Assessment.

Box 4: Employment benefits: can regulation create jobs?

One of the often stated benefits of regulation is that it can create new jobs. The EU, for example, has put in place very ambitious strategies since year 2000 and again in 2010 to stimulate growth and jobs. However, whether jobs can be created through regulation is still a heavily debated issue in economics and in policy: many scholars still tend to deny that creating real jobs through policy is possible at all. The main reason for this is that regulation can transfer jobs from a market to another, but not create new jobs. And indeed, when regulation creates false incentives to hire people and allocate them to jobs in an inefficient way, the opportunity cost of diverting people from one job market to another will create a net social loss. A popular way of explaining this specific application of the concept of “opportunity cost” is the so-called “broken window fallacy”: if a stray baseball breaks a shopkeeper’s window, no net new productive employment will be generated simply because money is spent to replace the broken window. The same money could have been spent more productively elsewhere absent the break, and the foregone spending destroys jobs as surely as replacing the broken window creates them.

As a matter of fact, this explanation is not always convincing. In particular, when regulation manages to create more social welfare, for example by enhancing consumer surplus, leading to an increase in production output, of facilitating innovation, the ultimate effect might be to create new jobs. In other words, when regulation helps the economy fix “market failures” and pushes forward the efficiency frontier of a given society, then regulation can create new jobs. To the contrary, simply stating that one activity has to be performed twice rather than once, or mandating that firms have at least 10 employees can only lead to distortions in the job market, but not to the creation of net new jobs. This is similar to stating that, when regulation has positive macroeconomic effects (e.g. growth), it can also create new jobs. This being the case, new jobs have to be accounted for as an indirect benefit of that regulation. Accordingly, in figure 3 above and in the remainder of this report, employment benefits are never considered as a direct impact of regulation, and are included – where applicable – in the wider, macroeconomic benefits of a regulatory intervention.

1.5 *Distinguishing impacts based on affected groups*

Following our description in figure 3 above, it is possible to categorize costs also based on the type of stakeholder affected, *e.g.* consumers, businesses, governments, non-EU countries, etc. As shown in Table 2 below, general cost concepts can be applied to all stakeholders, including²⁵:

- ***Citizens and society as a whole (CIT)***: this category is used whenever impacts are widespread, and do not affect any particular sub-group in society in a specific way.
- ***Consumers (CONS)***: we refer to this category whenever the affected group is that of consumers of a specific product or service. Accordingly, consumers are not necessarily overlapping with citizens, and might be a sub-group of citizens, *i.e.* those citizens that participate to a given market targeted by the regulation (or a downstream market in case of indirect impacts).
- ***Businesses (BUS)***: this category refers either to businesses in general, or to specific types of businesses (*e.g.* SMEs).
- ***Public administrations (ADMIN)***: these could be EU, national, regional, or local administrations.
- ***Third countries (TC)***: these are all non-EU countries, of a sub-group thereof. More specifically, this category includes non-EU governments as well as businesses and citizens that live and operate in non-EU countries – it does not extend to multinationals having operations in the European Union, or non-EU nationals living in the EU²⁸. Accordingly, this category captures “external” impacts of EU rules, such as the creation of trade (tariff and non-tariff) barriers for companies wishing to export their products to the EU, the removal of obstacles to migration flows from non-EU to EU countries, etc.

The table also shows examples of types of costs that emerge for each of these categories.

²⁵ Please note that this categorization of stakeholder is a general one and different ones may be more relevant on a case-by-case basis.

Table 2 – Impact of regulatory costs on stakeholders

		Stakeholder affected				
		CIT	CONS	BUS	ADMIN	TC
Direct costs	Charges		●	●		●
	Administrative burdens	●		●	●	●
	Substantive compliance costs	●		●	●	●
	Hassle costs	●		●	●	●
Indirect costs	Indirect compliance costs		●	●		●
	Offsetting		●	●		
	Reduced competition		●	●		
	Reduced mkt access		●	●		●
	Reduced investment/innovation		●	●		●
Enforcement costs	Information and monitoring	●		●	●	
	Inspections and sanctions			●	●	
	Complaint handling	●		●	●	
	Adjudication/litigation	●		●	●	

As regards direct compliance costs:

- **Charges** fall normally on citizens, consumers and businesses, and in some cases their burden is shared between different actors (e.g. business taxes are partly passed on downstream in the form of higher prices, depending on the elasticity of consumer demand). Typical examples of charges that fall on citizens and businesses are taxes, levies and fees. Consumers often pay fees and levies indirectly, in the form of higher prices.
- **Administrative burdens, substantive compliance costs and hassle costs** are normally mentioned with relation to businesses: however, they can fall also on citizens and public administrations. Typical administrative burdens include the cost of familiarizing with new information obligations (one-off), record-keeping, time spent cooperating with administrations during inspections, etc. They can, of course, fall also on non-EU players whenever access to the EU market is made more burdensome by a new regulation (e.g. the administrative procedure for the approval of novel food

is made more lengthy and burdensome by the addition of new information obligations, or new substantive obligations)²⁶.

- Both citizens and businesses can face **hassle costs and waiting time** due to bureaucratic complexity, including costs associated to access to justice in case of litigation²⁷.

Indirect costs can take various forms and mostly fall on consumers, businesses and (where appropriate) non-EU players/countries.

- **Indirect compliance costs** can emerge for consumers whenever prices for certain goods and services increase as a result of a new regulation. The fact that producers of raw materials increase their price to recover the cost of enhanced safety regulations might produce (along with possible benefits) also costs for downstream players. Similarly, the fact that energy-intensive companies have to purchase pollution permits in order to operate could lead to a price increase for downstream players.
- **Substitution effects** can generate costs for businesses whenever the latter are forced to shift to alternative sources of supply as a result of a new regulation. The same could be said for consumers. For example, closing down the airspace due to security regulations can lead passengers to shift to alternative modes of transport, with enhanced opportunity costs due to the forced substitution.
- **Reduced competition.** The fact that other players along the value chain have to comply with competition-restricting regulation can lead to a loss of consumer surplus for consumers and/or a loss of producer surplus (or lost profit) for upstream and downstream players. This is very similar to the impact of a cartel or other forms of privately induced restrictions of competition on all players located along the same value chain, both upstream and downstream. Likewise, it has been proven that laws that prohibit sales below cost in retail distribution can have an indirect impact on consumers by inducing large retailers to keep prices artificially above their cost levels²⁸.
- **Reduced market access.** Sometimes as a result of regulatory intervention certain market actors, or also consumers, might not be able to access a given market (see above, on consumer protection). Very often these costs end up

²⁶ See http://ec.europa.eu/food/food/biotechnology/novelfood/index_en.htm

²⁷ The latter is quote also by the Victorian government guide to cost-benefit analysis and by the OECD (2008).

²⁸ See, i.a. Colla, E. (2006), « Distorted competition : below-cost legislation , « marges arrières » and pricing in French Retailing », “International Revue of Retail , Distribution and Consumer Research”, Volume 16, Number 3, pp353-375. And The (Irish) Competition Authority, “Price Trends in the Irish Retail Grocery Sector: A Description of the Evolution of Retail Grocery Prices between 2001 and 2007”, Grocery Monitor Report No. 2.

falling on SMEs and end consumers: for example, certain regulations related to public procurement – e.g. requiring more stringent certification of participants and lengthy, burdensome procedures to access public tenders – might lead to the exclusion of SMEs from public procurement markets.

- **Reduced investment/innovation.** Regulation can stifle incentives to invest and innovate whenever it deprives players of the necessary resources they would need to re-invest in R&D. For example, badly designed access policy in network industries can lead to reduced investment in R&D and, accordingly, reduced innovation. Similarly, badly designed competition law on joint ventures and cooperation between undertakings might lead market players to abandon efficiency-enhancing cooperation initiatives such as patent pools, cross-licensing agreements, etc.

Finally, enforcement costs typically affect public administrations, although different types of rules can exert different impacts on stakeholders, including citizens and businesses. More in detail:

- **Information and monitoring costs** are typically falling on public administrations. However, in cases of self- and co-regulation, they might also fall on private parties in charge of enforcing private rules.
- **Inspections and sanctions** typically affect public administrations, and imply both capital expenditure (vehicles, computer equipment) and operating expenditures (personnel, etc.). However, even these costs might at times fall on private parties: for example, in case of self- or co-regulatory measures, the burden of inspecting premises might fall on private parties: this is the case for certification schemes existing, *i.a.* in the food sector (GlobalGAP, GFSI, Utz and many others) and in the sustainability reporting scheme (GRI, ISEAL, etc.)²⁹. The same can be said also for the costs generated by **handling of complaints**, which can partly belong to the category of administrative burdens (for public administrations).
- **Adjudication and litigation** creates costs for public administrations, but also for citizens and businesses. The cost of administering justice can be affected by a plethora of regulatory interventions, including *i.a.* procedural law: for example, a rule that reduces the limitation period for filing suit might reduce the workload of courts and the associated costs. Costs related to adjudication and litigation might fall on private parties in several ways: as cost of legal aid and opportunity costs of time in case of citizens or businesses seeking access to justice; the CAPEX and OPEX of dedicated authorities in charge of specific regulatory or para-judicial tasks (e.g. competition authorities, sectoral regulators, privacy regulators, ombudsmen,

²⁹ See Cafaggi, F. and A. Renda (2012), *Public and Private Regulation: Mapping the Labyrinth*, Dovens Schmidt Quarterly n. 1, October 2012.

patent offices etc.); the cost for private parties to set up and administer alternative dispute regulation (ADR) mechanisms; the cost for private regulatory schemes to set up their internal dispute resolution, etc.

Similarly, it is possible to attribute specific types of regulatory benefits to certain categories of stakeholders. Needless to say, health and environmental benefits are typically reaped by citizens and society as a whole, whereas improved efficiency such as cost reductions and technological progress affect primarily businesses, and indirectly consumers. Employment benefits affect citizens and businesses. At the same time, indirect compliance benefits can affect all stakeholders, including third countries that benefits from compliance with legal norms in the EU (e.g. compliance with EU environmental policy benefits also non-EU countries). Finally, macroeconomic benefits and other, non-monetizable benefits are typically reaped by citizens and society as a whole.

Table 3 – Impact of regulatory benefits on stakeholders

		Stakeholder affected				
		CIT	CONS	BUS	ADMIN	TC
<i>Improved well-being</i>	Health	●				
	Safety	●				
	Environment	●				
<i>Improved market efficiency</i>	Cost savings			●		
	Wider range of products/services		●			
	Improved information			●		
<i>Indirect benefits</i>	Indirect compliance benefits	●	●	●	●	●
	Wider macroeconomics benefits	●				●
	Other, non-monetizable benefits	●	●	●	●	●

1.5.1 Transfers v. net losses

In assessing the likely impacts of proposed regulatory interventions, it is very important to distinguish between costs and benefits that represent net additions or reductions of total welfare, as opposed to costs and benefits that arise for specific categories of stakeholders as a result of a transfer of resources. The most typical example is that of a cartel (and many other types of reduction of competition): cartels normally generate two major costs for society: (i) a transfer of resources from consumers to the undertakings that have formed the cartel, which can be measured by multiplying the quantity of “cartelized” goods sold times the average increase in price (on average, approx. 15-10%) caused by

the cartel; and (ii) a net loss for society, *i.e.* the loss of welfare caused by the fact that the cartel leads to a reduction in the quantity of goods sold on the market: this leads to an opportunity cost for consumers (who will have to revert to a second-best choice since the good at hand is not available on the market at the competitive price), but also to other groups such as suppliers to the cartelists, who are forced to sell a lower amount of goods.

In standard cost-benefit analysis the latter effect is the one that should be represented as a cost for society: this is due to the fact that mainstream cost-benefit analysis does not focus on distributional impacts, and thus disregards transfers between categories of stakeholders. However, many legislators go beyond pure cost-benefit analysis in the attempt to identify who are the winners and the losers of a given policy intervention: this is often useful in order to understand what the ultimate impact of policy measures will be on society, since – as will be explained more in detail in the next sections of this report – there is growing consensus on the fact that the distribution of income in a society matters for overall welfare.

In more operational terms, it is important to avoid double-counting costs and benefits of regulation by including in the analysis both the gains of one category and the losses of another, without accounting for the fact that these are the flips of the same coin. For example, assume that a new technical standard will impose a additional €1 billion of direct costs to car manufacturers, and that the latter can be expected to pass-on downstream half of this amount in the form of higher prices for consumers. Counting both the €1 billion of additional direct costs for manufacturers and the half billion that will fall on consumers would lead to inflating the costs generated by the regulation. To the contrary, the opportunity cost borne by those consumers that, as a result of the price increase, will decide not to buy a car should be counted separately, as a net loss for society.

In order to avoid double-counting of costs and benefits, it is advisable to avoid assessing first the impacts on each group of stakeholders, and then aggregating these impacts to reach a final figure; to the contrary, it is preferable to start assessing overall direct impacts, and then breaking them down by stakeholder group.

1.5.2 Focus: the distributional dimension of costs

Reflecting on the groups that are affected by regulatory costs and benefits is important also in order to understand if any of those groups is likely to be affected by a regulatory proposal in a disproportionate way. While cost-benefit analysis is by definition aiming at net benefits, it is likely that most policies or

regulations will result in winners and losers. This is especially important at EU level, because winners and losers may also have a geographical connotation (i.e. certain regions or member states); and because even when distribution of costs and benefits is uneven e.g. between industries or income levels, each member state has its own peculiar mix of both.

More specifically, the fact that a given regulation deprives a group of stakeholders of certain resources to the advantage of another group of stakeholders is not necessarily a zero-sum game in impact assessment. This can be due to the following causes:

- individuals can display different valuations for the same asset³⁰;
- income features decreasing marginal returns³¹;
- the imposition of new rules creates inconsistencies, redundancies or overlaps with previously enacted legislation, in a way that creates undesirable burdens;
- certain categories have already been targeted by too much existing regulation, and the cumulative impact of all this regulation could lead to undesirable effects.

From an *ex ante* perspective, it is in some cases important to determine how an increase in the regulatory cost borne by a category of stakeholder may affect their behaviour. A relatively small increase in cost can have very different impacts on businesses depending on their overall financial health/competitiveness position. Accordingly, when entities that have to comply with the proposed legislative initiative are potentially at risk of suffering from a loss of competitiveness, it is advisable to carry out an assessment of their cost structure: when possible, this can improve the accuracy of the *ex ante* impact assessment, at the same time preventing rules from creating undesirable and unintended effects.

In 2012, the US administration recognized the need to account for cumulative impacts in the US RIA system: a new memorandum of the Office of Information and Regulatory Affairs, OIRA, explained to federal agencies that “consideration

³⁰ The willingness to pay (WTP) for a given good is the maximum amount an individual is willing to sacrifice to procure a good or avoid something undesirable, whereas WTA is the amount that a person is willing to accept to abandon a good or to put up with something negative, such as pollution. When a regulation forces the transfer of resources from citizen A to citizen B, the transfer might entail a cost if A's WTA is greater than B's WTP.

³¹ On a partly different issue, administrative and compliance costs are often said to affect smaller firms in a disproportionate way: this means that regulations that shifts such costs from a public administration or a large company to a smaller company might not be zero-sum exercises, but might create a net cost.

of cumulative effects and of opportunities to reduce burdens and to increase net benefits should be part of the assessment of costs and benefits”³².

To be sure, the availability of accurate data on cumulative costs per stakeholder can facilitate the work of the officer in charge of impact assessment, at the same time helping in the identification of unnecessary and undesirable burdens. An example of cumulative cost assessment is provided below, in box 5.

Box 5: DEFRA’s cumulative cost of regulation to farmers

The UK Department for Environment, Food and Rural Affairs (DEFRA) recently published an estimate of the cumulative cost of Forthcoming Regulatory Proposals on the Economics of Farming in England (May 2013). The report explicitly focuses on compliance costs and considers farm-specific measures that are likely to have a significant impact on current production costs and farm business incomes over the next decade. The estimate was made possible by two basic conditions. First, an Impact Assessment had been performed on the existing pieces of legislation, and this document reported the costs that would affect farmers. Second, the Farm Business Survey (FBS) provided additional data, which made it possible to allow consistent comparison of costs across the set of regulations³³.

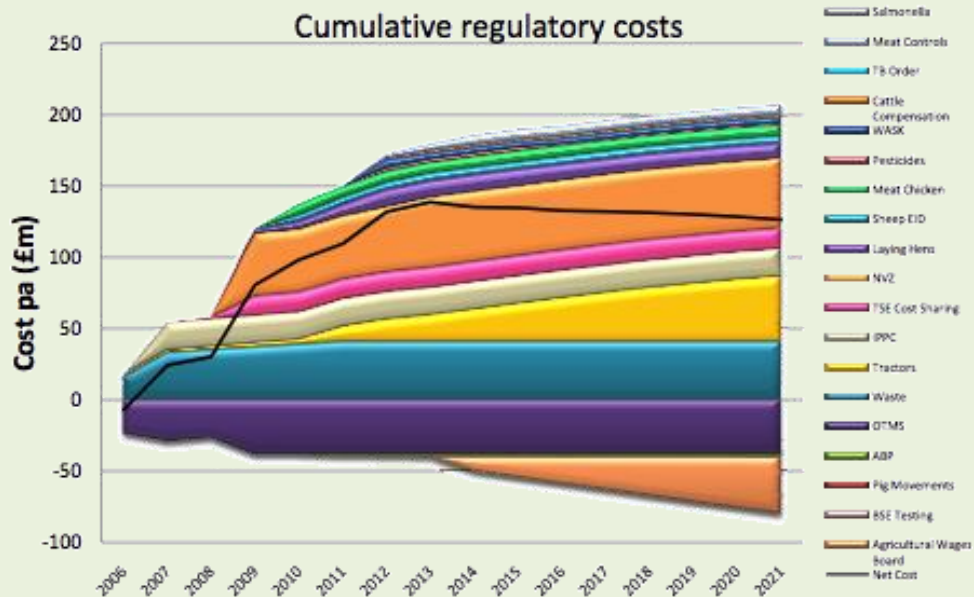
The legislation considered included the EU Laying Hens Directive, the sustainable pesticides regulation, the Welfare at Slaughter regulation, the Changes to BSE Testing requirements regulation, the pigs e-reporting and the Cattle Compensation regulations, the TB Pre-Movement Testing regulation, the Abolition of the Agricultural Wages Board, the Revision of Salmonella Fees, the Meat Controls charges regulation (non-Defra).

Although the estimates by DEFRA have several degrees of approximation, this exercise testifies of the increased emphasis being placed by regulators on the need to assess cumulative costs generated by regulation. This is, of course, more easily done in an *ex post* analysis than in an *ex ante* one.

³² Memo on cumulative effects of regulation, March 20, 2012, OIRA.

³³ The Farm Business Survey is an annual survey of about 1,900 farms in England which collects a wide range of physical and financial data.

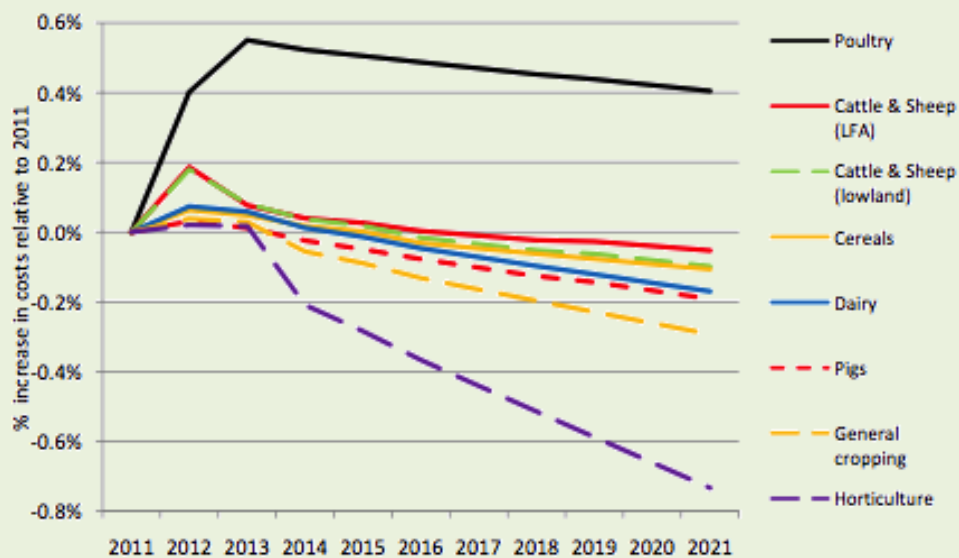
Figure 4 – Cumulative regulatory costs on farmers of new DEFRA regulations in the UK



Source: DEFRA (2013)

The impact was then broken down by type of farm, which – as shown in figure 5 below – led to an estimated reduction in costs for specific types of farms (horticulture in particular).

Figure 5 – DEFRA's estimated increase in average farm costs over time by farm type as a result of future regulatory costs



2 ASSESSING COSTS AND BENEFITS: A SURVEY OF METHODS USED BY GOVERNMENTS IN THE EU AND BEYOND

This section is dedicated to the illustration of a number of methods and techniques used to quantify and monetize specific costs and benefits of regulation in selected EU member states and non-EU countries. Most of the models we will discuss below are aimed at monetizing, rather than merely quantifying, costs and benefits, although the reader will find some exceptions, especially in the case of benefits assessment³⁴.

Section 2.1 below describes the first step of a full-fledged cost-benefit analysis: choosing whether to adopt a partial or a general equilibrium approach. Section 2.2 deals with cost assessment methods, starting with the cost-specific ones and then moving towards general impact assessment methods, and provides an assessment of the strengths and weaknesses of each surveyed method. Section 2.3 does the same for the assessment of benefits, whereas Section 2.4 concludes by providing a summary table of all methods assessed.

The main items considered for the evaluation of the various assessment methods are the following:

- **Scope of application:** this item variable explains whether the assessment method applies to all policy impacts, or only to a sub-set. For example, the Standard Cost Model applies to a very narrow subset of costs, whereas stated preference models can in principle be applied to most categories of benefits.
- **Data-intensity:** this item refers to the amount of data that need to be collected by the officer in order to use the method. For example, compliance cost assessment models are more data-intensive than the Standard Cost Model. And computational general equilibrium models require a large amount of data to be put to work.
- **Ease of data collection:** certain data sources are readily available, and officers would not have to dig too much into existing libraries and datasets in order to find them and use them. For example, Eurostat provides a number of important data sources that can be used directly in the Standard Cost Model. Also averting behaviour models – for example, in the housing market – can use easy-to-collect data.

³⁴ Quantification can take place through a different unit of measurement, *e.g.* tons of emissions, or number of jobs; whereas monetization always requires the conversion of quantitative results into money equivalents.

- **Possibility to use pre-calculated data:** this refers to whether officers can use existing datasets in order to apply the model, instead of having to collect data by themselves. For example, the life satisfaction approach requires that national statistics collect data on overall subjective well-being, before an officer can use them in a given policy proposal: running an *ad hoc* survey of subjective well-being would not be feasible. To the contrary, with limited exceptions in which values can be “transferred”, stated preference methods always require that new data are collected through surveys.
- **Accuracy:** a given model might provide tentative results, or more accurate results. Often, officers in charge of impact assessment must solve a trade-off in this respect: whether to opt for a less time-consuming model that provides less accurate result, or to invest more time and resources in the quest for more accurate data.
- **Possibility of application by the average desk officer:** for example, computational general equilibrium models and also benefit transfer models require adequate skills, whereas the assessment of direct costs (CAPEX and OPEX) and the assessment of compliance costs appear less prohibitive for a non-specialist. In general, all models that can make use of available data, without requiring the use of empirical techniques, and without requiring strong modelling and simulation skills are normally more compatible with the average skill of the desk officer in a large administration such as the European Commission.
- **Compatibility/complementarity with other methods:** some models can easily be coupled with others in order to reach more robust results: hedonic pricing models can be coupled with compliance cost assessment models. On the contrary, QALYs-based models are not easy to couple with VSL models in the assessment of human health.
- **Suitability of application at the EU level:** even the most effective and accurate method might not be suitable to the EU peculiar system of impact assessment, and of multi-level governance. For example, methods that require the extrapolation of data from a very small sample to the total of the population sometimes create enormous problems of accuracy when implemented in a 28-country, 500 million citizens environment such as the EU, with fragmented and diverse experience in enforcement, rule of law and culture of compliance. Similarly, problems related to value transfer make methods that use of complex, composite indicators very difficult to use in the EU context (e.g. the VSL method).

For each of those aspects, we provide a score ranging between ▲ (very low) to ▲▲▲▲▲ (very high). A summary table is reported at the end of this section, which enables a simpler comparison between the scores attributed to each of the models.

In addition to assessing these aspects, an analysis of the strengths and weaknesses of the analyzed methods is provided. This will be used in Section 3 below to develop specific guidance for desk officers in the European Commission on how to quantify and monetize costs and benefits in *ex ante* impact assessment.

2.1 *Partial v. General equilibrium analysis*

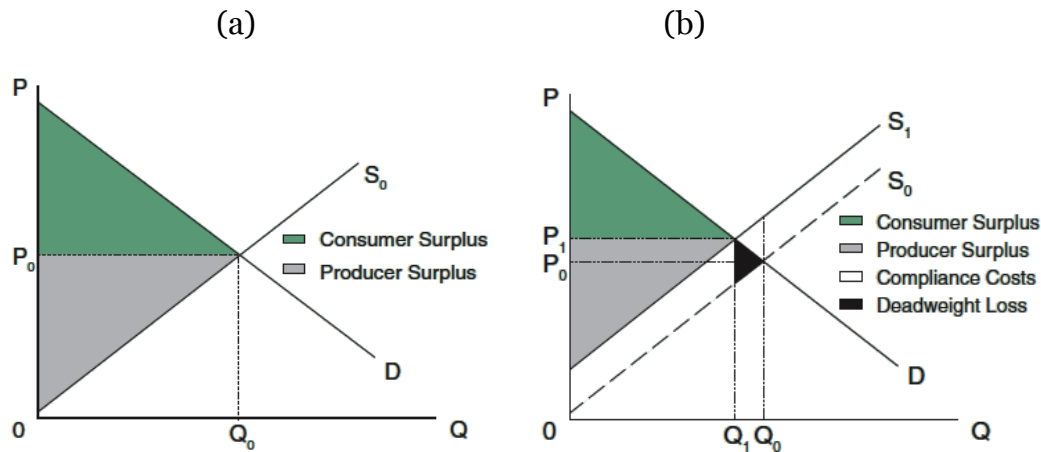
2.1.1 Partial equilibrium analysis

Conceptualizing regulatory costs is difficult, and implicitly requires the choice of an economic framework. *When the impact of the proposed regulation is expected to be limited, it makes sense to adopt a “partial equilibrium analysis”,* similar to the one reported in microeconomics textbooks used during the first years of university teaching. The use of partial equilibrium analysis assumes that the effects of the regulation on all other markets will be minimal and can either be ignored or estimated without employing a model of the entire economy. This means, in most cases, that indirect impacts (areas 3 and 5 in Figure 3 above) will be less significant than direct impacts (areas 1, 2 and 4), and will be confined to the passing-on of certain costs and benefits to downstream markets (see Section 2.1.1.1 below). This section presents some simple diagrams to show how social cost can be defined in a partial equilibrium framework. For the sake of simplicity, we refer to a market context: however, the problem of whether to focus on the sector directly affected by the regulation or also to a number of other more indirectly affected sectors or domains can also occur in cases where there is no market context to refer to.

Figure 6a shows a competitive market before the imposition of an environmental regulation. The intersection of the supply (S_0) and demand (D) curves determines the equilibrium price (P_0) and quantity (Q_0). The shaded area below the demand curve and above the equilibrium price line is the consumer surplus. The area above the supply curve and below the price line is producer surplus. The sum of these two areas defines the total welfare generated in this market: the net benefits to society from producing and consuming the good or service. In this market, assume that the imposition of a new environmental regulation raises firms' production costs. Each unit of output is now more costly to produce because of expenditures incurred to comply with the regulation. As a result, firms will respond by reducing their level of output. For the industry, this will appear as an upward shift in the supply curve. This is shown in Figure 6b as a movement from S_0 to S_1 . The effect on the market of

the shift in the supply curve is to increase the equilibrium price to P and to decrease the equilibrium output to Q_1 , holding all else constant.

Figure 6 – Partial equilibrium analysis



Source: EPA (2010)

As seen by comparing Figures 6a and 6b, the overall effect on welfare is a decline in both producer and consumer surplus. Compliance costs in this market are equal to the area between the old and new supply curves, bounded by the new equilibrium output, Q_1 . Noting this, a number of useful insights about the total costs of the regulation can be derived from Figures 6a and 6b. First, when consumers are price sensitive — as reflected in the fact that the demand curve is downward sloping — a higher price causes them to reduce consumption of the good. If costs are estimated *ex ante* and this price sensitive behaviour is not taken into account (i.e., the estimate is based on the original level of output (Q_0)) compliance costs will be overstated.

A second insight derived from Figures 6a and 6b is that compliance costs are usually only part of the total costs of a regulation. The “deadweight loss” (DWL) shown in Figure 6b is an additional, real cost arising from the regulation. It reflects the foregone net benefit due to the reduction in output. Moreover, unlike many one-time compliance costs, DWL will be a component of social cost in future periods. Under the assumption that impacts outside this market are not significant, then the social cost of the regulation is equal to the sum of the compliance costs and the deadweight loss (shown in Figure 6b). This is exactly equal to the reduction in producer and consumer surplus from the pre-regulation equilibrium (shown in Figure 6a). This estimate of social cost would be the appropriate measure to use in an impact assessment of the regulation.

The preceding discussion describes the use of partial equilibrium analysis when the regulated market is perfectly competitive. In many cases, however, some form of imperfect competition, such as monopolistic competition, oligopoly, or monopoly, may better characterize the regulated market. Firms in imperfectly

competitive markets will adjust differently to the imposition of a new regulation and this can alter the estimate of social cost. If the regulated market is imperfectly competitive, the market structure can and should be reflected in the analysis. In certain situations, when the effects of a regulation are expected to impact a limited number of markets beyond the regulated sector, it still may be possible to use a partial equilibrium framework to estimate social cost. Multi-market analysis extends a single-market, partial equilibrium analysis of the directly regulated sector to include closely related markets. These may include the upstream suppliers of major inputs to the regulated sector, downstream producers who use the regulated sector's output as an input, and producers of substitute or complementary products. Vertically or horizontally related markets will be affected by changes in the equilibrium price and quantity in the regulated sector. As a consequence, they will experience equilibrium adjustments of their own that can be analysed in a similar fashion.

2.1.1.1 Focus: passing on the cost of legal rules

Figure 6b above also shows that, depending on the elasticity of the demand and supply curves, legal rules can also produce unintended effects on stakeholders that are not those who are through to be directly affected by the rule. This is typically the case whenever firms that are subject to regulation through, say, the introduction of a stricter environmental or product standard are able to pass-on (and thus recover) part of the corresponding “compliance cost” on downstream actors or end consumers. This can lead to paradoxical situations as described in Box 6 below.

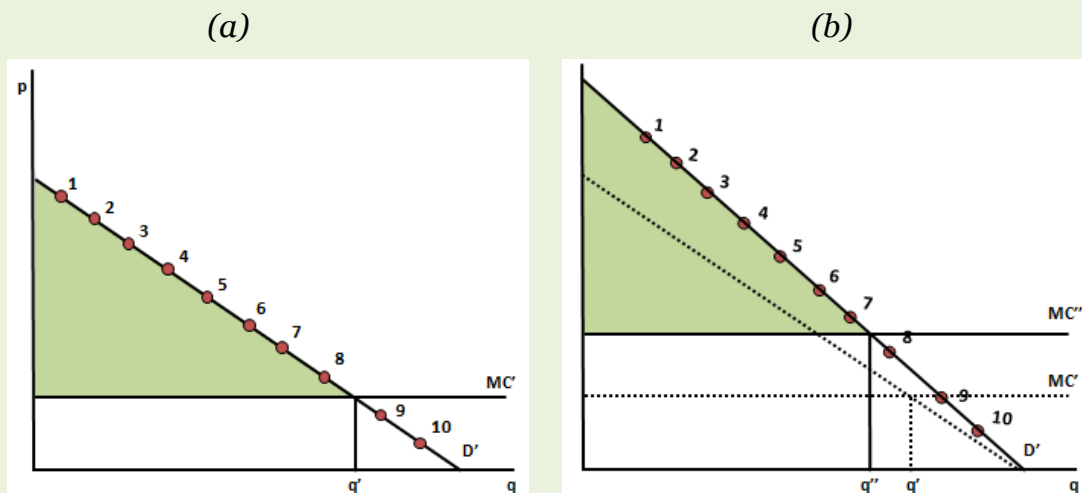
Box 6: who protects consumers from consumer protection?

In some circumstances, well-intended policy measures can have unintended, counter-intuitive effects. This has been heavily debated in the field of consumer protection for many years, since the late 1970s. We explain the concept of unintended effects by means of the example below.

Assume a policymaker has decided to protect consumers against the purchase of malfunctioning durable products through the imposition of a general obligation, for producers and vendors, to guarantee the functioning of the good for at least five years. Assume, further, that there are ten consumers willing to purchase the product, and are located on the demand curve as depicted in figure 7a below. Assume, further, that their willingness to pay (WTP) for the good in question is dictated mostly by their “ability to pay”, *i.e.* their income constraints. This means that consumers 9 and 10 are not able to buy the good due to limited

resources, even if their preference for the good is a strong one. Now, assume that the new law makes a five-year guarantee mandatory: since this is a form of insurance on the proper functioning of the good, consumers will have a higher WTP for the “good + guarantee” package: however due to income constraints the increase in the demand curve will not be the same for all consumers, and less endowed consumers will have smaller increases. This being the case, if the regulation increases marginal costs for the producers of the good, and this cost increase is passed-on downstream in the form of higher prices as in figure 7b, even in a perfectly competitive market (as the one we assume for simplicity in figure 7), the effect of the regulation might be to drive out of the market one additional consumer (n. 8 in figure 7b).

Figure 7 – contractual guarantees and demand curves



Source: own elaboration

Estimating the degree of passing-on is not always easy, and requires that those that carry out impact assessment are aware of the likely elasticity of demand and supply. However, while performing an *ex ante* impact assessment the degree of precision required may not always be extreme: contrary to what happens (and indeed happened) in some circumstances, awareness of the possibility that a minimal, significant or very substantial part of the increased cost might be passed on downstream or upstream can in any event lead to a better understanding of the consequences of adopting a given regulatory measure.

To be sure, the degree of passing on cannot be greater than 100%. A percentage greater than 100% would mean that targeted actors are able to recover the full cost of legislation and even profit from it – something that is hardly possible in reality.

2.1.2 General equilibrium analysis: mapping cumulative and cascading impacts

In some cases, the adoption of a new legislative measure might bear significant effects in many markets, including markets that are far from those that are directly subject to the regulation. As the number of affected markets grows, it becomes less and less likely that partial equilibrium analysis can provide an accurate estimate of costs and benefits. Similarly, it may not be possible to accurately model a large change in a single regulated market using partial equilibrium analysis. In such cases, a general equilibrium framework, which captures linkages between markets across the entire economy, may be a more appropriate choice for the analysis. These models are appropriate in particular when Areas 3 and 5 in figure 3 above (indirect impacts) are likely to be the most significant ones in terms of magnitude of expected impacts.

The US Environmental Protection Agency (2010) makes the example of the imposition of an environmental regulation on emissions from the electric utility sector may cause the price of electricity to rise. As electricity is an important intermediate input in the production of most goods, the prices of these products will most likely also rise (indirect costs, found in area 3 of our figure 3 above). Individuals and households will be affected as both consumers of these goods and as consumers of electricity. The increase in prices may cause them to alter their relative consumption of a variety of goods and services. The increase in the price of electricity may also cause feedback effects that result in a reduction in the total consumption of electricity.

General equilibrium models are able to simulate these shifts in supply curves and corresponding demand changes that can result from any change in the economy, from a price shock in raw materials to a new form of price regulation. Accordingly, they are able to model the links between connected markets in a way that shows the ultimate impact on outputs and consumption of goods and services in the new market equilibrium; and they can also determine a new set of prices and demands for various production factors (labor, capital, land). As a final result, they can also provide indications and estimates as regards macroeconomic changes, such as GDP, overall demand, etc.

General equilibrium models are, however, often too costly and complex to apply to individual *ex ante* impact assessment exercises. As a result, in most cases officers in charge of impact assessment perform some form of partial equilibrium analysis in order to estimate the consequences of a given regulation on one or more markets. An exception is found in selected sectors, such as

environmental, energy, and transport policies, in which the use of computational general equilibria is comparatively much more widespread. This, in turn, means that for many economic sectors and policy issues, the potential cascading impacts into connected markets will not be fully accounted for by the impact assessment: one way of limiting this problem would be to encourage officers to think about potential negative spillover effects into other markets, and the consequent emergence of additional deadweight losses and compliance or adjustment costs.

2.2 Selected cost assessment methods

Below, we analyze a number of existing methods used at national level to quantify and monetize specific costs of regulatory proposals, with specific focus on compliance costs.

2.2.1 Assessing compliance costs

2.2.1.1 Assessing direct charges from regulation

Direct charges such as levies, fines, fees etc. do not pose specific measurement problems, as they are expressed already in monetary terms. Accordingly, there is no need for specific methodologies in the assessment of the upfront cost of direct charges. The main methodological challenge in the assessment of the impact of direct charges from regulation on the targeted stakeholders is assessing the population that will have to comply with the obligation to pay the direct charge, and then multiplying it for the unit cost, *i.e.* the amount to be paid, and the frequency of payment.

However, in order to carry out a full assessment, including distributional impacts, it is also important that officers ask themselves what is the likely degree of passing-on of the direct charges, where appropriate. Officers might also qualitatively consider the likelihood of less than full compliance in order to qualify their results.

Figure 8 below shows an example of formula for the calculation of the cost stemming from direct charges, which is contained in the guidance on the measurement of regulatory costs issued by the government of New South Wales in Australia.

Figure 8 – Quantifying the impact of direct charges

Annual Regulatory Charges = Unit Cost x Quantity
(where Quantity = population x frequency)

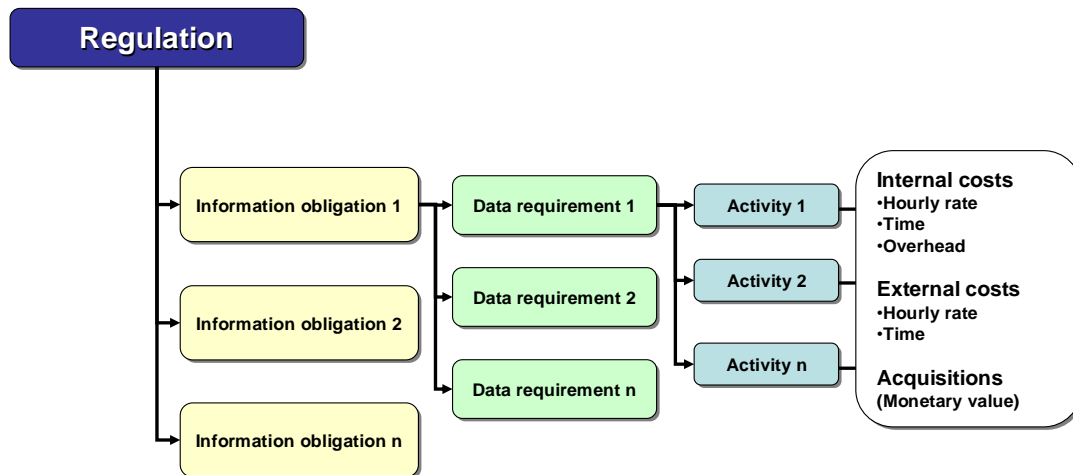
Unit Cost = this is the cost of the fee/licence/permit

Population = the number of businesses affected

Frequency = the number of times that the fee for the licence or permit is required to be paid per year

2.2.2 Assessing administrative burdens: the Standard Cost Model

The methodology followed by the Standard Cost Model (SCM) allows officers to produce standardised figures for the resources used by businesses in order to comply with specific laws and executive orders. In practice, the SCM aims at identifying those textual parts of regulation that require businesses to make information available to public authorities or third parties. These textual parts are called ‘information obligations’ (IOs). It is possible – although often difficult – to subdivide these information obligations into smaller pieces called ‘data requirements’ (DRs). To fulfil the required information obligations – or rather, to produce the requested information – affected businesses normally have to carry out additional administrative activities. The costs of these additional activities may refer to time spent by employees performing the administrative activities, or from the outsourcing of those activities (*e.g.*, fees for external experts, outsourcing costs, cost of acquisitions). Therefore the administrative costs of a regulation are defined as the costs of carrying out the various activities required. Figure 9 shows how the SCM splits the requirements of regulation into detailed activities, which can be measured or further estimated.

Figure 9 – Information obligation, data requirements, activities

Source: SCM Network, *International Standard Cost Model Manual*, p. 9

This detailed breakdown of administrative costs sets a framework for measuring the anticipated administrative impacts of a draft piece of legislation before its implementation (*ex ante* measurement), as well as of the factual administrative consequences for the businesses in respect of legislation already in force (*ex post* measurement)³⁵.

An important feature of the SCM adopted at national level (more than the EU one) is the differentiation of the administrative burden according to sources of regulation. In the original Dutch SCM, the administrative burdens – more precisely, the data requirements stemming from IOs contained in selected legislation – are segmented into burdens caused fully by international legislation; burdens caused by international legislation but the implementation of which is in the remit of national governments; burdens caused solely by national legislation; and burdens caused by regional or local legislation (for countries with a federal/regional structure).

The basic idea in the SCM tool to estimate the administrative burden of regulation is to split observed pieces of legislation into information obligations, and further break down information obligations in data requirements. Each data requirement is then expressed in terms of administrative activities: the cost of each administrative activity is then estimated with the following basic formula:

³⁵ *Ex post* measurements that are carried out on the overall administrative costs in a given policy area or on the entire corpus of legislation in force are defined as baseline measurements – i.e., a statement of the overall administrative costs that businesses must face in following a current set of regulations at a given point in time. Such measurements are also conducted in order to keep the baseline measurement updated over time with the consequences of new or amended regulations.

$$\text{Cost per administrative activity} = \text{Price} \times \text{Time} \times \text{Quantity (population} \times \text{frequency)}$$

Whereas:

- **Price** is the hourly cost of performing the activity, based on the average salary of the person in charge;
- **Time** means the number of time units (e.g. hours) needed to perform the required activity;
- **Quantity** represents how often the activity has to be carried out per year (frequency) by the effected number of businesses (population).

Additional costs (e.g. necessary acquisitions) also have to be considered as elements of cost relevant to the administrative activity at hand. The EU standard cost model introduced as Annex 10 to the European Commission's Impact Assessment Guidelines is slightly different compared to the original SCM. Major differences include the following:

- The concept of administrative burdens, originally applied only to businesses by national governments (with the exception of the measurement for citizens launched in the Netherlands in 2005), applies also to public administrations and citizens, as well as the voluntary sector.
- One-off costs are taken into account, whereas in the original SCM they were not.
- The classification of regulatory original implies at least four categories, *i.e.* international, EU, national and regional.

Recently, the Dutch government has updated the SCM with a “2.0 version”, which builds largely on the previous one. The description hereunder limits itself to some of the major additions to this. In addition to generating quantitative figures, SCM is now also used to link these data with qualitative information and data describing the degree of irritation or annoyance. To assess the qualitative indicators, the **subjective perception** of information duties by the respective norm addressee must also be recorded. For the recording, the following six statements were formulated (reply categories: very little / hardly – somewhat – satisfactorily – well):

1. The data the government expects me to provide are ... in line with the data from my own operating process which I already have available.
2. The way in which I am expected to provide the data to the government is ... in line with how I have them available
3. I understand ... why the government wants to have this information from me.

4. I understand ... why the government asks these details from me at these intervals.
5. The government ensures ... that I have to supply my data only once.
6. The amount of data asked by the government is ... proportionate to the purpose.
7. This request for information has been worded in a way that every businessperson / employee is ... able to carry it out.

The qualitative indicators are determined after the quantitative indicators or information costs are determined. Qualitative indicators are determined in the course of determining the information costs and/or in the form of interviews.

2.2.2.1 The Standard Cost Model: an assessment

Below, we assess the main features of the Standard Cost Model. We adopt the most updated version of the Dutch Standard Cost Model (the “2.0” version), which has already addressed some of the concerns that had been expressed in the past about the reliability of the model itself (Boenheim, Renda et al. 2006; Radaelli 2007; Allio and Renda 2011).

Scope of application ▲

The SCM applies only to **a narrow subset of the direct costs** generated by legislation, and thus focuses on a subset of Area 1 in Figure 3 above. Also, despite attempts to extend it to administrations and citizens, it remains a model **chiefly designed for the assessment of the administrative costs borne by businesses**. This is true also at the EU level, where no application to citizens has been made so far. The application to public administrations would require the rather acrobatic definition of a “normally efficient administration” for the national and sometimes regional level of 28 Member States.

Accordingly, **it cannot be used as a stand-alone model in the overwhelming majority of the impact assessment documents**. To the contrary, it can (and based on the current guidelines, should) be used whenever the officer has the need to measure the costs (net of the BAU factor) generated by information obligations contained in an existing or new proposed EU legislation. This also means that the SCM can be applied:

- **In the problem definition**, within the analysis of the *status quo* and the related baseline option, whenever the policy problem to be addressed is one of excessive red tape or need for streamlining or simplifying legislation (e.g. the 2008 IA on novel foods; or the 2012 IA on the proposed Regulation on

simplifying the transfer of motor vehicles registered in another Member State within the Single Market).

- **In the analysis of alternative policy options**, whenever the direct (or, in some cases, even indirect) costs of the proposed option would entail a significant increase or reduction of administrative burdens stemming from EU legislation, or a significant change in one of the key parameters of the SCM (population of firms, frequency, average hourly cost, time)³⁶.

Data-intensity ▲ ▲ ▲

The SCM is data-intensive, since it can only be applied in a quantitative way, even if the latest update to the SCM by the Dutch government allowed for the consideration of qualitative factors such as irritation burdens.

In order to fully apply the SCM, data on the population of firms affected by the proposal at hand, on the hourly wage of employees that perform administrative activities, on the cost of acquisitions and external counselling have to be collected by the officer on an *ad hoc* basis. Other data, such as the frequency of compliance with the IO, are normally straightforward as they are mandated by the legislative provision that contains the IO. Also, estimates of the BAU factor are normally needed, which entails the use of empirical techniques.

Not surprisingly, the cost of performing a full baseline measurement of administrative burdens has proven to be very high, especially in some countries that have sought to achieve a higher level of accuracy (e.g. the UK, see estimated costs in Boenheim, Renda et al. 2006). However, it is true that the SCM can be applied also with less resources and less “fresh” data, if the officer is willing to accept some reduction in the reliability of results. At the EYU level, a SCM calculator has been developed by a consortium of consultancy firms (Deloitte, CapGemini, Rambøll) and later validated by the European Commission with the support of external experts (including some of the authors of this report): the database is still not publicly available but can be used by desk officers of the European Commission through intranet resources³⁷.

Ease of data collection/elaboration ▲ ▲ ▲ ▲ ▲

There is nothing prohibitively difficult in the application of the SCM. Many of the data are easily found in major databases run by national institutes of statistics (including Eurostat, for example for what concerns average salaries

³⁶ The case in which indirect costs can include administrative burdens is indeed unlikely. For example, implementing the Digital Agenda by promoting the uptake of PCs and other IT equipment in enterprises would, as a second-order effect, also reduce the time spent by employees in complying with some information obligations stemming from legislation.

³⁷ See, for a presentation of the calculator, this [link](#).

per type of job profile). For data that are not readily available, a limited number of phone interviews or face-to-face interviews can normally solve the problem: it might take some time and patience, but data are normally available or reasonably easy to collect for an *ex ante* SCM exercise. A key source in this respect is Eurostat: for example, statistics on the population of enterprises by sector and labour costs and salaries by job profile, per country are easily found on Eurostat's website³⁸.

In addition, it is worth recalling that in many countries, including *i.a.* the UK and Denmark, empirical techniques such as focus groups, expert panels and face-to-face interviews have been used only for a subset of the IOs (see table 4 below for the UK): following an “80-20” or “Paretian” distribution, consultants and involved administrations have tended to devote their empirical efforts on those IOs that are likely to be more burdensome for the business sector. For example, in the UK business interviews were used only in 16.8% of the cases (but representing 69% of the total burden), and in combination with expert panels in an additional 1.4%. Direct assessment by the consultant was used in 55% of the cases (but representing a much smaller share of total costs).

Table 4 – Empirical methods used in the UK baseline measurement

Measurement method	% of IO/DRs measured by method	% of costs of IO/DRs measured by method
Business interview	16.8%	69.1%
Expert Panel (including Virtual Expert Panel)	26.1%	13.9%
Business interview and Expert Panel	1.4%	9.7%
Assessment	55.7%	7.4%
Total	100%	100%

Source: PwC (2006)

Possibility to use pre-calculated data ▲ ▲ ▲ ▲

Most countries that have implemented the SCM have decided to use standardized lists of information obligations and administrative activities. Also, tables have been made available, in which the amount of minutes needed to complete a given activity have been pre-specified

³⁸ A key source at Eurostat is the Structural Business Statistics [portal](#). Depending on the problem at hand and the sectors affected, officers must be able to easily consult Eurostat sources, which is sometimes problematic due to the fact that the website is not always user-friendly. See [here](#) for statistics relative to the manufacturing sector, and [here](#) or [here](#) for statistics on the labour force, including labour costs.

Accuracy ▲

The SCM cannot be considered a very accurate model. As a matter of fact, it is not meant to be very accurate. If anything, it was initially conceived as a model for the analysis of the stock of legislation, with the aim of generating a first, helicopter view of which areas of legislation, and which specific IOs, should be looked at in order to cut red tape. This, in the *ex ante* application of the model, becomes a sometimes unacceptable compromise between ease of measurement and accuracy of estimates. Notable examples are:

- **The “normally efficient business” concept**, which leads consultants to adopt very quick decisions as regards which findings should be considered acceptable or representative, and which ones are outliers;
- **The classification of origin**, which leads to often arbitrary decisions especially for what concerns the attribution of a given IO to EU or national legislation: the extent to which a given IO is the result of the inevitable, “minimum” implementation of a EU Directive or an act of gold-plating, for example, might be subject to different opinions by different consultants, and also by the EU and national governments.
- **Various methodological decisions** such as the level of overhead, the inclusion of one-off costs, the segmentation between size classes of firms and many others are interpreted differently in different variants of the SCM (see Boenheim, Renda et al. 2006). This creates problems also at the EU level.
- **The value of time** is sometimes included in the calculation in a way that is subject to debate: some IOs such as “keeping records” are not really reflecting any constant use of human resources, nor are they generating any opportunity cost. For example, the IO *“maintaining records, in relation to each employee, for three years after the end of each tax year, including details of any payment of statutory sick pay made (not including contractual remuneration for the employer) and records of sick leave of four or more consecutive days for each employee, whether or not the employee would normally have been expected to work on that day”* was calculated as generating £44 million of administrative burdens, mostly calculated based on the time spent keeping these records³⁹.
- **The assessment of the BAU factor** is often arbitrary, given that consultants that evaluate it often have to do it through direct assessment, and more rarely by asking businesses. Even when the latter occurs, it is not entirely clear whether businesses should be expected to possess an accurate knowledge of the exact extent to which a given activity would be performed

³⁹ See the measurement of Administrative Burdens on the UK Working Time Regulations. This figure was originally reported in the UK Admin Burdens calculator, which has now become unavailable to the public.

even absent legislation. Different employees in different companies might have diverging views on this, and for many IOs, data requirements and administrative activities declaring that, say, 83% of them would be performed also in absence of legislation is, to say the least, a heroic attempt.

- **The reliance on data supplied by the businesses themselves**, and also from a small sample of businesses, creates a risk of over-estimating the amount of administrative burdens, since businesses surveyed know that the data collection will form the basis for simplification efforts. The Irish government reported that *“it proved virtually impossible to arrive at a “standard” cost from business interviews alone ... it became evident during the course of the interviews that the amount of time that companies are spending in complying to some IOs varies significantly, depending on factors such as the sector in which the business operates; the complexity of its operations and the level of risk involved in the company’s activities; the size of the business or number of employees; interaction with the public etc. ... it can be extremely difficult to obtain usable information from business interviews alone for some complex areas of legislation”*⁴⁰.
- **The importance of learning curves** in dealing with red tape is often neglected in the measurement of administrative burdens. In reality, firms become gradually more efficient in performing routine activities, which should be taken into account in computing the total administrative burdens that falls on businesses. The European Commission has applied this concept at least once in the assessment of administrative costs: in its 2011 IA on the communication “Common Agricultural Policy: towards 2020”, where it stated that *“the involvement of external assistance and the use of technical solutions as a business culture while positive learning curve effect provides a potential for a reduction of recurrent administrative costs over a period of a few years”*⁴¹.
- **Assumptions as regards the compliance rate** are critical in the SCM, at least in certain areas (e.g. taxation). The first generation of the SCM assumed a 100% compliance rate for each IO, which created accuracy problems in the use of the SCM in *ex ante* estimates. This assumption has reportedly been removed in the new version of the Dutch SCM, but for the *ex post* measurement: however, at the EU level compliance rates have never been considered a variable of the SCM to date, to our knowledge⁴².

⁴⁰ See the Irish government report, 2009, [here](#).

⁴¹ See Annex 8 at http://ec.europa.eu/agriculture/policy-perspectives/impact-assessment/cap-towards-2020/report/annex8_en.pdf.

⁴² The Irish government, in applying the SCM, found that “in the case of the IOs measured as part of this project, although many were selected with assistance from business organisations, it became evident that in a number of instances businesses did not in actual

- As a consequence of the high degree of approximation used, **results are impossible to compare across countries, and even within the same country at different moments in time.** Suffice it to report what the UK government wrote in its guidance document on the SCM:

“The Netherlands plans to conduct a second baseline measurement exercise at the end of the period over which their targets have been set. Denmark has not yet made a decision about further measurements. With the SCM conducting a second measurement exercise is not straightforward. As the sample size is very small it is unlikely that any two samples drawn at different points in time would actually give comparable results.”⁴³

Possibility of application by the desk officer ▲▲▲▲

The SCM is certainly not a prohibitive method for the average desk officer. That said, its data intensity, some reluctance to adopt overly simplifying assumptions, the need to organize *ad hoc* interviews can sometimes discourage desk officers from engaging in this exercise. In summary, desk officers, if adequately supplemented by the availability of pre-calculated times and costs, might be led quite easily to the use of the SCM. It would however, be important to advise these officers that the SCM cannot, in most cases, be used as a stand-alone model in *ex ante* IA: this would be possible only in cases that require a least-cost analysis, where the only costs are administrative burdens.

Compatibility/complementarity with other methods ▲▲

In *ex ante* impact assessment, the SCM must be used with other methods. In particular, as will be observed below, the SCM is a perfect fit for compliance cost assessment methods that were developed as an extension of the SCM in the past few years. The SCM might also be useful when analysing impacts on SMEs, since administrative burdens are normally believed to affect SMEs disproportionately compared to larger firms. However, its low level of accuracy makes it a relatively inappropriate complement to a full-fledged cost-benefit analysis: the relative levels of administrative burdens and other types of costs might be distorted by the application of this method, with an overall lack of robustness of the results of the cost-benefit analysis exercise.

fact find that the specific IO was burdensome. While in some cases this was due to the fact that the information was required for other purposes or there was a high degree of BAU, in other instances, the likelihood of a business having to comply with the IO was low. This meant, therefore, that the feedback from businesses did not always support the selection of a particular IO as a priority area.

⁴³ See the UK SCM Manual, at this [link](#).

Suitability of application at the EU level ▲ ▲

The problems featured by the SCM in terms of low accuracy and low complementarity with other methods become magnified when one looks at the possibility of implementing the method at the EU level. In particular, as has emerged during the pan-European measurement of administrative burdens launched in 2007 by the European Commission, the difficulty of extrapolating values from a limited set of countries to 27 Member States has led to very unreliable and hardly comparable results.

At the same time, the classification of origin, if performed at the EU level, becomes prohibitive since the European Commission officer would need to collect data on the likely modes of implementation and transposition of the proposed legislation in all countries. This might, in the future, become more possible if countries will be called to submit implementation plans for the legislation they have to transpose and implement.

In any event, using national results to extrapolate data at the EU level appears a quite tentative exercise: Table 5 below shows the extrapolation performed by CEPS on a set of IOs included in Art. 110 (1) of Dir. 2006/48 (“a credit institution shall report every large exposure to the competent authorities”) and Article 30 (2) Dir 2006/49 (institutions’ overall exposures to individual clients and groups of connected clients shall be reported in accordance with Article 110 of Directive 2006/48/EC). At the time, absent a EU database on administrative burdens, we could find data on 4 national databases (UK, Denmark, Germany and Austria). Accordingly, we used those data and then extrapolated the results to the EU level based on a number of weights: (i) the number of firms per country; (ii) GDP; (iii) the country distribution by Kox (2005); and (iv) the frequency of reporting in different national implementation rules. The result is shown in the table below. Based on German data, the extrapolation would lead to a total burden of €16 million; based on UK data, burdens would skyrocket to €90 million. Results from Austria and Denmark were also hardly comparable between themselves, and with the other two countries.

Table 5 – Extrapolation related to large exposure reporting

	Administrative cost				Administrative burden			
	DK data	AT data	UK data	DE data	DK data	AT data	UK data	DE data
Austria	€ 1,202,617	€ 20,113,255	€ 3,439,429	€ 881,833	€ 962,093	€ 16,090,604	€ 2,751,543	€ 705,467
Belgium	€ 535,372	€ 1,461,344	€ 1,927,017	€ 335,795	€ 428,297	€ 1,169,075	€ 1,541,614	€ 268,636
Bulgaria* **	€ 77,424	€ 211,335	€ 278,679	€ 48,562	€ 61,939	€ 169,068	€ 222,943	€ 38,849
Cyprus	€ 610,937	€ 496,621	€ 2,374,264	€ 358,057	€ 488,750	€ 397,297	€ 1,899,411	€ 286,445
Czech Republic	€ 68,076	€ 185,820	€ 245,033	€ 42,699	€ 54,461	€ 148,656	€ 196,026	€ 34,159
Germany	€ 7,166,833	€ 19,562,499	€ 25,796,294	€ 4,495,165	€ 5,733,466	€ 15,649,999	€ 20,637,035	€ 3,596,132
Denmark	€ 780,335	€ 2,129,993	€ 2,808,737	€ 489,440	€ 624,268	€ 1,703,994	€ 2,246,990	€ 391,552
Estonia	€ 24,108	€ 65,806	€ 86,776	€ 15,121	€ 19,287	€ 52,645	€ 69,420	€ 12,097
Spain	€ 893,446	€ 726,268	€ 3,472,167	€ 523,629	€ 714,756	€ 581,015	€ 2,777,734	€ 418,903
Finland	€ 1,270,538	€ 3,468,045	€ 4,573,174	€ 796,904	€ 1,016,430	€ 2,774,436	€ 3,658,540	€ 637,523
France	€ 5,505,019	€ 15,026,432	€ 19,814,762	€ 3,452,846	€ 4,404,015	€ 12,021,145	€ 15,851,809	€ 2,762,277
Greece	€ 142,895	€ 390,045	€ 514,337	€ 89,626	€ 114,316	€ 312,036	€ 411,469	€ 71,701
Hungary	€ 521,260	€ 423,724	€ 2,025,754	€ 305,499	€ 417,008	€ 338,979	€ 1,620,603	€ 244,399
Ireland	€ 919,997	€ 2,511,213	€ 3,311,437	€ 577,039	€ 735,998	€ 2,008,970	€ 2,649,150	€ 461,631
Italy	€ 3,029,155	€ 8,268,345	€ 10,903,139	€ 1,899,940	€ 2,423,324	€ 6,614,676	€ 8,722,511	€ 1,519,952
Lithuania	€ 53,666	€ 146,487	€ 193,167	€ 33,661	€ 42,933	€ 117,190	€ 154,534	€ 26,928
Luxembourg	€ 2,831,115	€ 7,727,778	€ 10,190,316	€ 1,775,726	€ 2,264,892	€ 6,182,223	€ 8,152,253	€ 1,420,581
Latvia	€ 44,614	€ 121,779	€ 160,585	€ 27,983	€ 35,691	€ 97,423	€ 128,468	€ 22,386
Malta	€ 38,795	€ 105,895	€ 139,639	€ 24,333	€ 31,036	€ 84,716	€ 111,711	€ 19,466
Netherlands	€ 1,394,128	€ 3,805,395	€ 5,018,024	€ 874,422	€ 1,115,302	€ 3,044,316	€ 4,014,419	€ 699,538
Poland	€ 1,400,502	€ 3,822,792	€ 5,040,965	€ 878,420	€ 1,120,401	€ 3,058,234	€ 4,032,772	€ 702,736
Portugal	€ 239,583	€ 194,753	€ 931,084	€ 140,414	€ 191,667	€ 155,803	€ 744,867	€ 112,332
Romania**	€ 207,073	€ 168,327	€ 804,741	€ 121,361	€ 165,658	€ 134,661	€ 643,793	€ 97,089
Sweden	€ 759,737	€ 2,073,768	€ 2,734,595	€ 476,520	€ 607,789	€ 1,659,014	€ 2,187,676	€ 381,216
Slovenia	€ 39,931	€ 32,459	€ 155,181	€ 23,402	€ 31,944	€ 25,967	€ 124,145	€ 18,722
Slovakia	€ 69,546	€ 56,533	€ 270,273	€ 40,759	€ 55,637	€ 45,226	€ 216,218	€ 32,607
United Kingdom	€ 1,601,959	€ 4,372,687	€ 5,766,090	€ 1,004,777	€ 1,281,567	€ 3,498,150	€ 4,612,872	€ 803,822
Total EU27	€ 31,428,659	€ 97,669,398	€ 112,975,659	€ 19,733,932	€ 25,142,927	€ 78,135,518	€ 90,380,527	€ 15,787,145

* Frequency information not available for Bulgaria - we assumed quarterly reporting (= Q)

** Data on hourly wage rate not available from Eurostat (2004) - we applied the average hourly rate of the EU25 (€25.40).

Strengths

The real strength of the SCM is its simplicity and straightforward application.

Also, depending on the effort devoted to this part of the analysis, it is possible to state that reliance on empirical techniques to collect data directly from businesses is also another factor of strength.

Finally, and subject to the *caveats* spelled out in the previous sections, another strength of the SCM is its very widespread application in the EU27.

Weaknesses

Following the above the main weaknesses of the SCM are the following:

- Low/spurious accuracy;
- Low complementarity with other models;
- Too narrow focus;
- Extreme methodological simplification;
- Very limited samples of businesses surveyed (even more in the EU case);
- Possibility of sampling bias or biased/strategic responses to interviews;
- Ambiguous treatment of time.

Box 7: avoiding common mistakes in using the SCM: a checklist

Calculation of administrative burdens can lead to relatively easy quantification of cost savings from a new policy proposal. However, whenever you use this methodology, make sure you take into account the following:

- *A reduction proposal may lead to lower administrative burdens, but at the same time increase other compliance costs for the same targeted businesses.* As mentioned above, ABs constitute only a subset of costs imposed on businesses by legislative acts. For example, the implementation of an e-government or any other IT-enabled solution can reduce the amount of time related to compliance with the information obligation. At the same time, however, it may require a degree of investment in upgraded IT equipment and training of employees, which would not be considered as ABs, but fall generally in the category of compliance costs. Similarly, a proposal that reduces ABs may increase public expenditure in monitoring and enforcement (see below): these costs may be recovered by the government through higher tax burdens, thus increasing direct charges. Finally, a proposal may reduce burdens by requiring structural changes in the production process, which would guarantee a certain level of product safety without any need for burdensome certifications: in this case too, burdens are reduced, but costs may increase.
- *A reduction proposal may reduce administrative burdens, but at the same time increase administrative burdens of a different origin.* In the context of multi-level governance, the reduction of ABs achieved by eliminating some information obligations at a certain level of government – say, at the EU level – may require the introduction of new information obligations at the lower level – say, at the national or regional level.
- *A reduction proposal may reduce administrative burdens, but at the same time increase costs for other private actors (businesses and/or citizens).* For example, reducing labelling obligations for products may increase information costs borne by consumers, who would need to collect their information from other sources in order to make an informed choice of what products are most likely to fit their preferences.
- *A reduction proposal may lead to lower administrative burdens, but at the same time increase monitoring and enforcement costs for public authorities.* This is often the case whenever the information obligations eliminated involve the keeping and reporting of information available to businesses, but not to public authorities. For example, the provision of information on the respect of hygiene standards or the reporting of large exposure by banks are typical instances of very burdensome activities for businesses that comply with these requirements. These information

obligations are vital for public authorities, as they ensure that more informed businesses provide information that would otherwise not be readily available to public authorities. Absent the provision of this information, public authorities would have to deploy more resources to obtain the information, which is likely to lead to more inspections and enforcement costs – in our two examples, more hygiene inspections and more investigations into the riskiness of banks' exposure *vis à vis* certain clients.

- *A baseline measurement of administrative burdens can enable a more efficient, responsive and risk-based organisation of monitoring and enforcement by public institutions.* For example, the baseline measurement may lead to the identification of overlapping information obligations, leading to a more efficient use of reporting and inspections by public authorities. In this case, a reduction in ABs is coupled with a reduction in monitoring and enforcement costs, which leads to a more desirable “win-win” situation for public authorities and businesses. Such situations should be highlighted during the *ex post* evaluation as a potential “multiplier” effect of the administrative simplification sought by the reduction proposal. One case in point is in Finland, where it is reportedly observed that “the measures to reduce AB of businesses (*e.g.* by developing eGovernment solutions) also increase the productivity of the public sector”⁴⁴.
- *A reduction proposal may reduce administrative burdens, but at the same time reduce the benefits associated with the legal provision at hand.* When redundant and irritating burdens are reduced, normally no undesirable shortcoming follows. However, in most cases legal provisions are in place for a specific purpose – after all, regulation is primarily grounded in expected benefits. Take the example of product labelling for consumer (what is normally defined as a “third-party information obligation” in the jargon of ABs reduction programmes): removing labels that contain product information may well lower ABs, but this information can be essential for consumers in taking an informed decision on which products to purchase, and how to use them.

Table 6 below shows our summary assessment of the Standard Cost Model, by including both our scorecard analysis and our SWOT analysis.

⁴⁴ See the response by Finland to the questionnaire sent within the Cutting Red Tape II initiative.

Table 6 – Overall assessment of the Standard Cost Model

ITEM	Score
<i>Scope of application</i>	▲
<i>Data-intensity</i>	▲ ▲ ▲
<i>Ease of data collection</i>	▲ ▲ ▲ ▲ ▲
<i>Possibility to use pre-calculated data</i>	▲ ▲ ▲ ▲
<i>Accuracy</i>	▲
<i>Possibility of application by the average desk officer</i>	▲ ▲ ▲ ▲
<i>Compatibility/complementarity with other methods</i>	▲ ▲
<i>Suitability of application at the EU level</i>	▲ ▲

Strengths	Weaknesses
<ul style="list-style-type: none"> – Simplicity and straightforward application – Reliance on empirical techniques – Very widespread application in the EU27 	<ul style="list-style-type: none"> – Low/spurious accuracy; – Low complementarity with other models; – Too narrow focus; – Extreme methodological simplification; – Very limited samples of businesses surveyed (even more in the EU case); – Possibility of sampling bias or biased/strategic responses to interviews; – Ambiguous treatment of time.

2.2.3 The Dutch Compliance Cost tool

The Dutch Compliance Costs tool mirrors the SCM to a large extent, but looks at substantive compliance costs. Substantive compliance costs are caused by substantive duties, *i.e.* all those statutory duties of business, regulations, standards, conduct regulations and other requirements which are targeted at securing the public interest, and which need to be directly complied with or fulfilled. They can include:

- Capital costs (depreciation, repayment, etc);
- Personnel costs;
- Energy costs;
- Costs for raw materials and supplies;
- Costs for outsourcing (e. g. for outsourced services); and
- Other costs (insurance costs, building costs, costs for rehabilitation, etc).

Direct reimbursements, grants or other forms of subsidy on the part of the State are deducted from the calculated substantive costs.

Substantive compliance costs are further broken down into:

- *Transition costs*, also referred to as one-time costs, are costs incurred in modifying the production process, the means of production and/or modifying the products to statutory standards.
- *Structural costs*, i.e. costs incurred in the continuous fulfilment of the statutory duty. Overhead costs for office supplies, furniture, PCs, office space, etc are not calculated with a general mark-up on the individual costs.

The procedure followed in the Netherlands to identify substantive compliance costs can be divided into ten steps:

1. Identifying the enterprises which are affected by the relevant regulation (industry, size of the business, etc).
2. Identifying the type of statutory duty (focus is on substantive duties) and, if applicable, defining typical categories of enterprise
3. Identifying the activities undertaken or investments made in the fulfilment of the substantive duty and the activities undertaken and investments made which could be saved if the statutory duty fell away (if applicable, sub-divided according to typical categories of enterprises)
4. Interviewing of experts in order to identify, where applicable, the various activities undertaken or investments made in the fulfilment of the duty or various reactions to the falling away of the substantive duty (if applicable, subdivided according to typical categories of enterprise)
5. Defining the type of required cost and quantity parameters and determining the defined parameters with stakeholders (e. g. responsible administrative departments, relevant associations)
6. Selecting five norm addressees per typical category of enterprise or supplier (for investment measures)
7. Determining the cost and frequency parameters as well as any optimisation proposals with the aid of field work (determining the parameters for activities or investments which would be saved if the substantive duty would fall away)
8. Checking the plausibility of the results, where applicable. Continuation of field work and standardisation of the determined parameters (finding the median)
9. Verifying and, where necessary, modifying the preliminary results of the cost determination by specialists

10. Documenting the results of the cost determination per substantive duty in report form (content of report: activities and relevant costs per category of enterprise, proportional business-as-usual costs or additional costs, any optimisation proposals).

2.2.3.1 The Dutch Compliance Cost tool: an assessment

Below, we assess the main features of the Dutch Compliance Cost Assessment tool, which is being used within the Business Impact Assessment procedure in the Netherlands.

Scope of application ▲ ▲

Compared to the SCM, the Dutch Compliance Cost Assessment (CCA) tool looks at a much broader range of costs, even if it still limits itself to covering (the bulk of) one of the six areas of regulatory impact identified above in Figure 3 (Area 1, and not considering hassle costs). More specifically, it looks at a broad set of enterprise-related effects, including direct compliance costs (substantive compliance costs, administrative burdens, regulatory charges); and also indirect compliance effects (competition, socio-economic effects). Within the former, regulatory charges relate to taxes, fees or other levies, whereas substantive compliance costs are divided into BAU and additional (better, incremental) costs, and cover capital costs (depreciation, repayment, etc), personnel costs, energy costs, costs for raw materials and supplies, costs for outsourcing (e. g. for outsourced services) and other costs (insurance costs, building costs, costs for rehabilitation, etc). These include also both *transition (one-off) costs* and *structural, recurring costs*.

These costs are, for many IA documents, the bulk of the analysis to be performed. However, as already explained above, the model is conceived essentially for *ex post* analyses of the stock of legislation. Furthermore, it willingly excludes all direct costs for public administrations; all direct costs for citizens; and part of the indirect costs to society. The latter occurs since the indirect compliance costs considered are referred to the impact of a given substantive duty on competition and certain other socio-economic variables. But it is very unlikely that, in case of passing-on of the substantive compliance cost to other markets, that restrictions in those markets and cascading effects on consumers will be fully taken into account.

Moreover, the model does not account for corresponding benefits. This means that, when applied *ex ante*, it will need to be complemented with benefit assessment methods and other forms of cost assessment methods in order to provide a full picture of the likely impact on society of the proposed measures.

Finally, it must be noted that this model possesses some very interesting characteristics: (i) it can facilitate the (ex post) assessment of cumulative compliance costs ; and (ii) it was enacted with an important emphasis on searching for alternative modes of compliance, which might increase the effectiveness of business behaviour in response to substantive obligations included in the legislation.

Against this background, **this model cannot be used as a stand-alone model in the overwhelming majority of the impact assessment documents.** To the contrary, it can be used whenever the officer has the need to measure the costs (net of the BAU factor) generated by substantive obligations contained in an existing or new proposed EU legislation. This also means that the model can be applied:

- **In the problem definition**, within the analysis of the *status quo* and the related baseline option, whenever the policy problem to be addressed is one of excessive costs for the business sector.
- **In the analysis of alternative policy options**, whenever the direct (or, in some cases, even indirect) costs of the proposed option would entail a significant increase or reduction of compliance costs stemming from EU legislation, or a significant change in one of the key cost variable and model parameters used (population of firms, frequency, average hourly cost, time, capital costs (depreciation, repayment, etc), personnel costs, energy costs, costs for raw materials and supplies, costs for outsourcing).

Data-intensity ▲▲▲▲

The Compliance Cost Assessment tool is very data-intensive, since it can only be applied in a quantitative way. In addition to measuring administrative burdens from information obligations included in legislation, this model includes a wide variety of other cost variables, some of which are very difficult to collect and can be very specific depending on the sector and the type of business at hand (e.g. cost of raw materials, energy, etc.). This means that in order to fully apply this model in an ex ante impact assessment, resources should be devoted to the collection of all these data, which in some cases even businesses will be reluctant to share.

To help managing this complexity, central assistance is provided by the newly created Dutch Proposed Legislation Desk (PLD) (divided into two parts: i) *Quick Scan*, which validates the choice of instruments, and ii) performance and review of *Impact Analysis*). In addition, complexity is reduced by limiting the use of empirical techniques: normally up to five businesses are interviewed per relevant segment, per substantive obligation. This can reduce time and the use of resources, but at the same time is a critical simplification when it comes to

substantive compliance costs: extrapolation can lead to a loss of accuracy (see below).

Ease of data collection/elaboration ▲ ▲ ▲

Differently from the SCM, the Compliance Cost Assessment procedure can face great difficulties in collecting reliable data. More specifically, it might be easy to collect data for administrative burdens and charges, taxes, fees, levies, etc.. Also, personnel costs, new equipment costs and outsourcing costs can be inferred from market values or obtained directly from surveyed businesses. However, the cost of raw materials and energy and the BAU factor might become prohibitively difficult estimates for the officer in charges.

Possibility to use pre-calculated data ▲ ▲

Of course, collection and elaboration of data becomes easier if a number of pre-calculated data are made available to the officer: however, when a proposal will deal with one or many specific business sectors, pre-calculated data will have to become sector-specific, and in some sector should be even specific to a given business (e.g. in heavy industries, companies have completely different energy costs depending on their technology, their contracts with energy providers, their market and contractual power, the location of their plants).

Moving from administrative burdens to compliance costs is a non-trivial step when it comes to data collection. While the information related to administrative activities can, to a certain extent, be standardized, information on compliance behaviour is often sector-specific, if not company- (or even plant-) specific. In particular, information as regards capital expenditures, charges, operating expenditures such as labour costs must be collected from existing sources when possible: this means that a dataset should be prepared by the administration in advance.

Accuracy ▲ ▲

Accuracy depends significantly on the extent to which resources are devoted to data collection. In *ex ante* impact assessments, it is important to invest in a proportionate way in the collection of data on costs. The Dutch model appears potentially very accurate, but seems to suffer from some of the same problems faced by the SCM, which forms the core basis on which the model is built, and is also used as part of the total compliance cost to be calculated:

- **The “normally efficient business” concept**, when it comes to substantive obligations, is probably an even more evanescent concept. Decisions as regards which findings should be considered acceptable or

representative, and which ones are outliers, might become even more distortionary in the assessment of total costs.

- **The classification of origin seems as problematic as in the SCM.** This can lead to arbitrary decisions especially on the attribution of a given IO to EU or national legislation: the extent to which a given IO is the result of the inevitable, “minimum” implementation of a EU Directive or an act of gold-plating, for example, might be subject to different opinions by different consultants, and also by the EU and national governments. The *ex ante* application of the model inevitably makes this problem even more difficult to address.
- **Various methodological decisions** such as the level of overhead, the specific allocation of given personnel and human resources to specific substantive obligations, the allocation of fixed and common costs, the inclusion of one-off costs, the segmentation between size classes of firms, the need to break down firms into their relative economic sectors, etc. are subject to interpretation. In some areas of public policy (e.g. regulation of network industries, antitrust law) the right cost concept to use in the allocation of all business costs to a given service is still subject to debate.
- **The assessment of the BAU factor** can be even more arbitrary than in the SCM, as this information must be provided by the few firms surveyed for a given substantive obligation.
- **More generally, the reliance on data supplied by the businesses themselves**, and also from a small sample of businesses, creates a risk of over-estimating the amount of compliance costs, since businesses surveyed know that the data collection will form the basis for reform efforts.
- **The importance of learning curves** in dealing with compliance costs is even more important than in the case of pure administrative burdens. Since firms become gradually more efficient in performing routine activities in compliance with legislation, this should be taken into account in computing the total costs that fall on businesses over time.
- **Assumptions as regards the compliance rate** are critical in this model, at least in certain areas (e.g. taxation).

Possibility of application by the average desk officer ▲▲▲

The basic concepts and model design of this model are such that **a desk officer with some experience in policy analysis might be able to use the method**. This is a key advantage of this model, which however chiefly depends on the level of data collection and depth of the analysis required. Application of the model can be made easier, the larger the availability of tables and templates developed by the central administration, although – as stated above – not all

data can easily be produced as some of the compliance costs at hand will be critically dependent on the sector, size and technology of the businesses affected by the proposal. Compared to the SCM – and also in light of the much broader scope of this method – the ease of application is thus slightly lower, but still much larger than is the case for more comprehensive, sophisticated, computerized models of the whole economy such as CGE models.

Compatibility/complementarity with other methods ▲ ▲

In *ex ante* impact assessment, the compliance cost assessment method must be used with other methods in order to offer a full picture of the costs and benefits of proposed policy alternatives. That said, in cases in which the benefits are set or quantified (e.g. number of lives saved, tons of CO₂ avoided), and there are no significant enforcement costs, compliance costs for citizens, or indirect costs not covered by the model, then this model could be used as a stand-alone source of data for a cost-effectiveness analysis.

Suitability of application at the EU level ▲ ▲

The compliance cost assessment model can be adapted to the EU Impact Assessment model as an ingredient of the integrated IA, which already places emphasis on compliance costs. However, the same problems that have emerged with the SCM might, under the current model specifications, be exacerbated by an application at the EU level. For example, the number of businesses to be interviewed would need to be much higher, due to national and local differences, differences in technology, etc. The same could be said for the BAU factor and many substantive cost categories, as explained above. In addition, compliance costs chiefly depends on modes of enforcement, and the latter often cannot be predicted with accuracy when the legislation is being prepared by the European Commission, since (i) the proposal might be amended during co-decision; and (ii) Member States' authorities might choose different modes of enforcement, which in turn affects compliance costs.

Strengths

The real strengths of the Compliance Cost Assessment tool are primarily in its straightforward application mode, which is facilitated by the strong similarity with the overall architecture of the SCM. Reliance on empirical techniques to collect data directly from businesses is also another factor of strength, although it could become prohibitively costly if adopted at the EU level.

Moreover, the model is an interesting combination of an “accounting-based” approach – such as that used in the SCM – with the need to assess substantive

obligations and concrete business behaviour. It might thus provide a simple way to approach the concept of compliance costs.

Another strength of this model is its compatibility with assessments of cumulative costs, both as stand-alone exercises and as analyses of the *status quo* at the outset of an impact assessment.

Weaknesses

Some of the possible weaknesses in this model are dependent on the level of depth of empirical analysis. If surveys and interviews are conducted with due capillarity, then many of the accuracy problems disappear (but at a very high cost).

To the contrary, some weaknesses attributed to the SCM remain applicable also to the Compliance Cost Assessment tool. These are:

- Possibility of sampling bias or biased/strategic responses to interviews;
- Uncertain treatment of compliance rates;
- Ambiguous treatment of time.
- Arbitrariness in the selection of the BAU factor

Table 7 below shows our summary assessment of the Standard Cost Model, by including both our scorecard analysis and our SWOT analysis.

Table 7 – Overall assessment of Dutch Compliance Cost assessment model used in the Dutch Business Impact Assessment

<i>ITEM</i>	<i>Score</i>
<i>Scope of application</i>	▲ ▲
<i>Data-intensity</i>	▲ ▲ ▲ ▲ ▲
<i>Ease of data collection</i>	▲ ▲ ▲
<i>Possibility to use pre-calculated data</i>	▲ ▲
<i>Accuracy</i>	▲ ▲
<i>Possibility of application by the average desk officer</i>	▲ ▲ ▲
<i>Compatibility/complementarity with other methods</i>	▲ ▲
<i>Suitability of application at the EU level</i>	▲ ▲

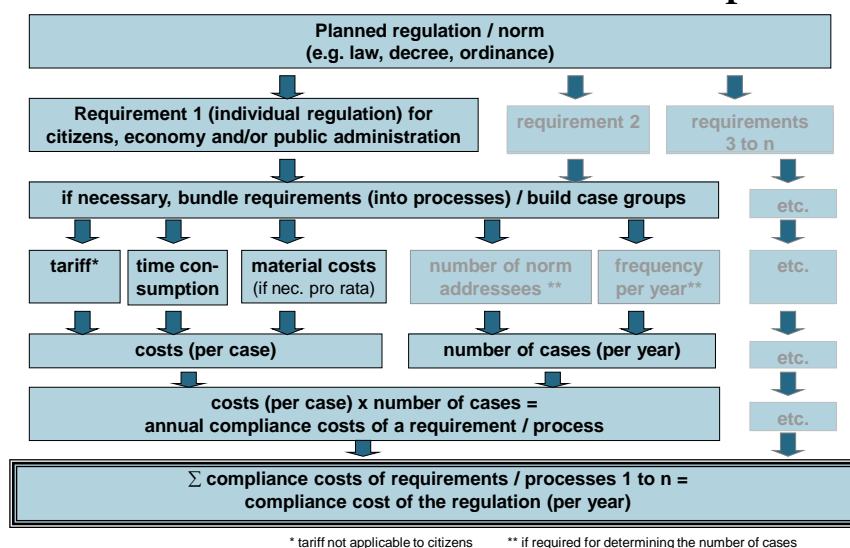
<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none"> - Clear design - Reliance on empirical techniques - A good basis for engaging in cumulative costs assessment in given economic sectors 	<ul style="list-style-type: none"> - Narrow focus (many costs not covered) - Limited samples of businesses surveyed - Possibility of sampling bias or biased/strategic responses to interviews;

- Uncertain treatment of compliance rates;
- Arbitrary selection of BAU factor.

2.2.4 The German regulatory cost model for citizens

According to Section 2 (1) of the Act on the Establishment of the National Regulatory Control Council, compliance costs include the total measurable time expenditure and the costs incurred by citizens, business and public authorities in order to comply with federal legislation. The available guidance document from the German government points desk officers at existing information and databases, which can help reduce the cost of the assessment. Such information is stored in the WebSKM database (www.destatis.de/weboskm) and reflects a clear attempt to help the work of officers in charge of assessment, even if at the expense of accuracy (since everything is standardized to the finest detail).

Figure 10 – Overview of the identification of compliance costs



Source: German Better Regulation Unit (2011)

Figure 10 above provides an overview of the model used in Germany for the measurement of compliance costs. It is important to recall that the term “compliance cost” does not include taxes, social security contributions and budget lines administered by the Länder, contrary to what happens in the

Netherlands (see above)⁴⁵. Indirect effects such as imputed costs (e.g. lost profits) and other charges are also not regarded as compliance costs: this means that **the model does not include opportunity costs**.

The German model is essentially composed of three steps:

- Identification of all obligations contained in the proposal (singular provisions) that lead to a change in compliance costs; if necessary, cluster obligations to form processes or form case groups
- Identification of the change in compliance costs
 - a. Identification of the change in the number of cases per obligation/process/case group
 - b. Identification of the change in the costs of each case per obligation/process/case group
 - c. Identification of the total change in compliance costs for citizens, business and public authorities.
- Presentation of the results – for example in the introductory summary and the explanatory memorandum.

Below, we describe more in detail each of these steps.

Step 1: identifying obligations

The German government defines “obligations” as the basic unit of analysis, defined as *“individual provisions inducing direct changes in costs, time expenditure or both for its addressees. They are the result of federal legislative acts. They oblige addressees to comply with certain objectives or orders, or to refrain from certain actions. They may also demand cooperation with third parties or to monitor and control conditions, actions, figures or types of behaviour”*⁴⁶. In this context, “direct” implies that the change in costs or time expenditure is directly connected to compliance with the particular provision.

When identifying obligations, it must be taken into account that:

- Information obligations are a specific case of obligations, and thus a sub-set of existing obligations;
- The lawmaker at times only stipulates targets or limit values in addition to orders or bans, or aims at a change in behaviour through state aid. Such individual measures are also regarded as obligations since they directly induce a change in costs or time expenditure for their addressees.

⁴⁵ These are, more specifically, costs arising according to Article 104a (3) and (4) of the German Basic Law (GG) .

⁴⁶ German better regulation unit (2011), at 8.

Compared to the original Standard Cost Model described above, the following new features have been introduced in the German methodology:

- *Case groups.* Assuming that addressees comply with obligations or processes in different ways, so-called “case groups” can be formed if major differences are expected to emerge. Compliance costs for each case group must be separately identified and described. It is irrelevant whether these differences arise because the addressees resorted to different approaches or because the underlying facts differ. For example, if as a result of a new, more ambitious environmental standards 40% of the targeted firms will convert their existing plants, whereas the remaining 60% will have to replace existing plants with new plants, this allows the creation of two separate case groups. The two case groups will have different levels of compliance costs⁴⁷.
- *Process.* The guidance document of the German Better Regulation Unit invites officers to combine various related obligations into a process, when appropriate, so that the full cost of the process can be measured. An example is whenever a piece of legislation contains two or more obligations that are complementary, such as training personnel and buying new equipment. In this case, the process is measured as a single unit of analysis.

As the result of step 1, a list displaying all obligations contained in a legislative proposal should be made available for further identification of the anticipated change in compliance costs. The list should show:

- Which obligations trigger compliance costs for which addressees;
- Which obligations form part of which (sub)process (combined identification of compliance costs);
- Which obligations or processes have been combined to form case groups, for which the compliance costs are separately identified;
- The obligations that are in fact information obligations for businesses, leading to administrative burdens.

Step 2: identifying the changes in compliance cost

In step 2, the anticipated changes in compliance costs induced by the proposed regulation are identified separately for citizens, business and public authorities. As a matter of principle, compliance costs must be identified separately for every obligation, process or case group. However, especially in the case of

⁴⁷ Of course, the identification of case groups must be distinguished from the identification of the normally efficient business: in each of the case groups there should be a normally efficient business that fulfils the obligation in a different way: there might be differences in efficiency between the two case groups, but these should be, where possible, based on objective structural factors, rather than on the firms’ ability to allocate resources efficiently. No real reflection is provided by the German government on this issue.

complex provisions containing numerous obligations or processes, it may become obvious after an initial check that some of them will only have a very minor impact. In this case, it may be possible to waive the identification and presentation of the change in compliance costs after consulting with the *Normenkontrollrat*. Nevertheless, the reasons as to why the change in compliance costs can be ignored must be expressly stated.

Step 2 requires the following activities:

- Attach a frequency to the activity: in the case of event-driven obligations, the number of annual cases is identified without first determining the frequency and number of affected entities. For other obligations that take place on a regular basis, behaviour with yearly frequency will be given a frequency of 1, obligations that trigger compliance behaviour twice a year will be given a frequency of 2, etc.
- Identify the main activities which are necessary to ensure compliance with an obligation or a process in an individual case.
- Identify the anticipated changes in time expenditure, personnel costs and material costs identified for these activities.
- Assess whether the obligations at hand are entirely new, amended or cancelled. For entirely new obligations or repealed obligations the entire cost must be shown (as an increase or decrease of compliance costs, respectively); whereas for amended obligations only the related change in compliance costs has to be displayed in the analysis.
- Assess, separately, *adjustment costs*. These are normally one-off costs that, as recalled in Section 1 above, belong to the category of substantive compliance costs, but do not give rise to periodical behaviour.
- Assess the “BAU factor”: if this changes significantly across regulated entities, different case groups should be identified to reflect this difference. Importantly, the BAU factor is also inferred in case of legislation creating the need to replace existing assets or equipment. The fact that equipment would have been changed anyway after a certain period of time would, in principle, imply that officers in charge of the analysis observe the residual life of existing equipments for all involved businesses: in order to avoid this complication, the German model introduces a basic (rebuttable) presumption that 50% of the purchase costs are regarded as compliance costs, while the remaining costs are considered to be so-called BAU costs.

Step 3: identifying the total change in compliance cost

The compliance costs for an obligation, a process or a case group are calculated by multiplying the number of cases by the costs per case. The total compliance

costs of a legislative proposal consist of the total costs of all obligations, processes or case groups contained in the proposal. The necessary calculations must be performed separately for each group of addressees (citizens, business, public authorities) on an annual basis, with the exception of one-off adjustment costs.

2.2.4.1 The German model: an assessment

Below, we assess the main features of the German model for the assessment of regulatory costs.

Scope of application ▲ ▲

The German model covers **all direct costs, with the exception of direct charges**, taxes, levies, social security contributions and other direct costs. Accordingly, it covers only Area 1 in Figure 3 above (and not all of it). The latter are, however, the easiest to quantify, especially given that in order to apply this model the population of addressees should be anyway calculated. More in detail, the German model considers **compliance costs for businesses, citizens and also enforcement costs by public authorities**, covering both the state, the regional and the local level. **What is not covered by the German model is the whole area of indirect costs**, for which additional assessment would be needed.

As a result, the German model can be used as a stand-alone mode in an ex ante impact assessment in those cases in which indirect costs are unlikely to be significant, and benefits are set or quantified, but not monetized, so that a cost-effectiveness analysis can be performed.

Data-intensity ▲ ▲ ▲ ▲

The German model is very data-intensive, since it requires that a figure be associated with each and every obligation. This means that data will have to be collected on, *i.a.*:

- the obligations contained in the law (both information obligations na other obligations);
- the population affected by each obligation;
- the likely compliance patterns with these obligations (which might lead to the creation of different “case groups” and different “processes”);
- the likely BAU factor per group;
- the material costs faced and time spent for each obligation and each process.

Ease of data collection/elaboration ▲▲▲▲

The German model is very easy to implement since everything is standardized to the finest detail and data are widely available on many of the variables needed for the calculation. What is even more important, all these data are stored in a dedicated website run by the German National Institute of Statistics (Destatis)⁴⁸. However, it can imply some difficulty in the collection of reliable data, at least for what concerns compliance patterns, BAU factors and the existence of different “processes”. The use of empirical techniques is not as rigidly classified as in the Netherlands, so the ability of the desk officer is essential in order to collect the right data and elaborate them in order to form the right processes and case groups.

Possibility to use pre-calculated data ▲▲▲▲▲

Almost everything is standardized in the German model. There are tables on labour costs, tables that specify the time needed to perform various tasks at various levels of difficulties, and tables related to standard activities and standard material costs. All this is, when needed, differentiated between calculations for citizens, businesses and public administrations. All this makes the life of the officer very easy, obviously at the expense of accuracy, and subject to a *caveat*: many items in cost assessment just cannot be standardized, as they are very specific to the case at hand and require a careful economic analysis, which cannot be approximated by standard pre-calculations.

Accuracy ▲

An important caveat put forward by the German government is that the model is not aimed at reaching any level of “scientific accuracy” in the assessment: to the contrary, it aims at offering the results of a “reasonable effort to provide the decision-makers and the general public with a realistic picture of the anticipated burdens and burden reductions from the perspective of the addressees of the regulation”.

Possibility of application by the average desk officer ▲▲▲▲

Desk officer have many data available, which can facilitate their task of quantifying compliance costs. No specific skills are needed. However, they still would need to gather information about populations, compliance patterns, existence of different “case groups” and “processes”. This can prove difficult in some cases, and more straightforward in others.

⁴⁸ See <https://www-skm.destatis.de/webskm/online>.

Compatibility/complementarity with other methods ▲ ▲

The German model is usable rather as a stand-alone model than in combination with other models. This is mostly due to its lack of accuracy, and its extreme level of standardization. In order to perform a complete cost-benefit analysis, officers would need to assume that the estimated compliance costs are a reliable proxy for the actual costs, and collect more data on direct charges, indirect costs, direct and indirect benefits. Once this has to be done, perhaps the added value of the standardized tables offered by the German government on its WebSKM database might become less evident. To put it more simply, this model is made for “quick” *ex ante* assessments, which means that it would be less useful as a component of a longer, more accurate cost-benefit analysis.

Suitability of application at the EU level ▲ ▲

In order to be applied at the EU level, the German model on compliance costs would need to be supplemented by EU tables that summarize (or, worse, extrapolate) timing and costs of various basic activities and actions, and distinguish according to the estimated level of difficulty. The collection of data for what concerns “case groups”, “processes” and “sub-processes”, which constitutes one of the most interesting features of the model and a meaningful innovation on the traditional SCM, would become way more time-consuming at the EU level, unless this exercise is organized at pan-European level as a one-off exercise, or – as already mentioned – rather extreme extrapolation is made to adapt the German tables to the EU27. Even in the latter case, the figures would need to be revised on a periodical basis, and this makes the application of the model at the pan-European level almost prohibitively difficult.

All in all, this model, if exported to the EU level, would probably become a feasible one for *ex ante* IAs that have no major macroeconomic impacts and pre-determined benefits; as well as for cumulative cost assessment exercises, but only as a first approximation of costs, or as a remedy of last resort for all cases in which a direct quantification cannot be performed.

Strengths

The real strength of the German model is its extreme simplicity and straightforward application. In addition, a unique feature of this model is its applicability to citizens and public administrations, besides businesses: this makes the model more compatible with the EU SCM. The emphasis on case groups and processes is also a good feature of the model, and could be also a good way to develop, over time, cumulative costs per processes, *i.e.* assessment of which legislation affects the same business process and compliance pattern.

Weaknesses

A key weakness of the model from the standpoint of our study is the lack of accuracy, which makes it difficult to combine with other methods of cost and benefit assessment. Table 8 below shows our summary assessment of the German model for the assessment of regulatory costs, together with an indication of its strengths and weaknesses.

Table 8 – Overall assessment of the German model on regulatory costs for businesses, citizens and public administrations

<i>ITEM</i>	<i>Score</i>
<i>Scope of application</i>	▲ ▲ ▲
<i>Data-intensity</i>	▲ ▲ ▲ ▲
<i>Ease of data collection</i>	▲ ▲ ▲ ▲
<i>Possibility to use pre-calculated data</i>	▲ ▲ ▲ ▲ ▲
<i>Accuracy</i>	▲
<i>Possibility of application by the average desk officer</i>	▲ ▲ ▲ ▲
<i>Compatibility/complementarity with other methods</i>	▲ ▲
<i>Suitability of application in the EU impact assessment system</i>	▲ ▲

<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none"> – Simplicity and straightforward application – Low resource-intensity – Application to citizens and public administrations, besides businesses – Emphasis on case groups and processes – Covers also Länder and local authorities 	<ul style="list-style-type: none"> – Low accuracy – Low complementarity with other models

2.2.5 Other models for compliance cost assessment

Below, we describe two additional models used at national level to assess regulatory costs: the Australian Business Cost Calculator and the French model for the assessment of the cost of delays.

2.2.5.1 The Australian Office of Best Practice Regulation's Business Cost Calculator

When new regulations are proposed by Australian Government agencies, they must complete a Regulation Impact Statement (RIS), including estimates of compliance costs (unless the impacts are of a minor or machinery nature). Compliance costs must be estimated using the OBPR Business Cost Calculator (BCC), or an equivalent that is approved by the OBPR. The BCC is also used by some state and territory governments to measure progress against red tape reduction targets.

The BCC is an IT tool derived from the Standard Cost Model. Eight types of regulatory compliance tasks are included in the BCC. These include administrative costs (record keeping, publication and documentation and procedural tasks) and substantive compliance costs (education, permission, purchase costs and enforcement) and 'other' tasks. "Economic costs" are not accounted for in the BCC, which in turn means that the concept of opportunity cost is not applied here: to the contrary, the analytical approach is similar to the SCM, although with a broader range of costs taken into account.

When the Office of Best Practice Regulation's Business Cost Calculator (BCC) is used to carry out ex ante evaluations of proposed reform, the process followed involves:

- Setting out the regulatory options (for example, ban a product, restrict access to licensed users or take no action).
- Identifying the actions that would have to be taken for each of the regulatory options. (such as providing information, keeping records and purchasing equipment)
- Identifying the total number of firms in the industry, and the percentage likely to face obligations for each action.
- Estimating the number of staff that would have to perform the action for each affected business, the number of times per year they would have to act and the time taken for the activity
- Enter the labour costs (manually, or using an in-built wage calculator).

Based on this information, the BCC calculates the estimated cost to each affected firm and to the industry as a whole, of each of the activities that would be required under each of the regulatory options.

2.2.5.2 France's assessment of the cost of delays for the business sector

In France a method for determining the costs caused to business on account of delays in administrative departments was developed in connection with the measurement of administrative burdens to business or administration.

The determination of the costs of delays is related to the measurement of administrative delays by the administration and the measurement of the costs incurred by business due to administrative delays by the administration. The measurement of administrative delays would, theoretically, be oriented to the processing time of an administrative procedure which are designated by enterprises as “not as expected” or as “not normal”. As the “normal” processing time generally is not transparent, for reasons of practicality, the overall processing time, e. g. in the mailing of an application to the administrative department or the receipt of a notice by the enterprise, is determined as a “total administrative delay”. The measurement of the costs incurred by the administrative delay occurs in three areas: operative costs, financial costs, and social costs. The measurement of the operative costs is further broken down into increased (overhead) costs and lowered production or decreased sales.

The French model is an add-on to the Standard Cost Model, which looks at one single occurrence – delays by public administration – but takes a very comprehensive and meaningful approach to the analysis of its consequences. Within the rather narrow setting of administrative delays, the French model looks at operative costs, financial costs, and also social costs, since it focuses on the opportunity cost, *i.e.* on the economic value of time lost due to delays in public administration processes. Accordingly, it accounts for both increased (overhead) costs and the lost production or decreased sales due to the delay. The latter is broken down as the sum of personnel, financing costs, fines or compensation payments, costs incurred in the award of sub-contracts, costs incurred by the loss in value of goods or products, etc.

Even if the method has a very narrow application, the amount of data to be collected is quite significant, since the real aim of the model is to reach a quantitative figure for the delays due to public administration lengthy procedures, in a form that captures also the opportunities foregone due to the delay. The French model includes operative costs, financial costs, social costs, personnel costs, financing costs, fines or compensation payments, costs incurred in the award of sub-contracts, costs incurred by the loss in value of goods or products, etc.

The procedure in identifying the costs of delays can broadly be broken down as follows:

1. Determining the basic data of the affected enterprises (size, industry, turnover, etc).
2. Determining the total administrative delay (= total processing time of the administrative procedure).
3. Determining the operative, financial and social costs of the total administrative delay (incl. the opportunity costs or the foregone profits).

The increased costs on account of the administrative delay can be:

- Personnel costs (e. g. costs for personnel which could not be utilised due to the administrative delay);
- Financing costs (e. g. additional loan costs for bridging the administrative delay);
- Fines or compensation payments (e. g. because certain orders could not be fulfilled in time);
- Costs incurred in the award of sub-contracts;
- Costs incurred by the loss in value of goods or products, etc.

The effects caused by lowered production or decreased sales can extend to the current, as also to the future, situation of the enterprise, e. g. with respect to certain market share. Financial costs result from a non-utilisation of invested capital (taking into account all asset components). The costs of delays are calculated as opportunity costs or profits foregone on account of the delay (e. g. using average returns in relation to the foregone sales or the capital that was not invested).

When applied to the EU level, this model can prove very data-demanding, as delays by public administrations at national level are not always available. Of course, the model could also be applied by the European Commission for the specific case of delays by EU institutions (e.g. in clearing mergers, or in approving novel food, or in pharmacovigilance). In this latter case, the model should be applicable very easily to the IA system of the European Commission.

2.3 *Benefit assessment*

This section focuses on the illustration of existing valuation techniques for benefits. The overall idea behind benefit assessment is related to the need to capture the total economic value of a given asset, including its use and non-use value (when applicable)⁴⁹. Techniques are broken down into two major families (revealed preferences and stated preferences), and are mostly based on various ways to capture individuals' willingness to pay (WTP) for given assets or changes in their current condition.

Section 2.3.1 below explains the main proxy used to evaluate benefits, *i.e.* willingness to pay (WTP), and the related but different concept of willingness to accept compensation (WTA). Section 2.3.2 and 2.3.3 describe the two main approaches used to measure WTP and WTA, *i.e.* stated preferences and revealed preferences. Section 2.3.4 describes the “benefit transfer” approach, while 2.3.5 provides a brief description of the “life satisfaction” approach recently introduced, along with the other methods, in the UK. Section 2.3.6 focuses more in-depth on the valuation of specific non-market benefit items, such as mortality and morbidity, and the environment.

2.3.1 **Willingness to pay and willingness to accept: a theoretical introduction**

Officers in charge of assessing and monetizing benefits are normally called to use willingness to pay (WTP) as a measure of stakeholders' demand for a given future state of the world, and thus associate a measure of social benefit to this state of the world. This practice has deep roots in economics, which we will shortly explain in the following lines. Originally, economists like Jeremy Bentham postulated that the role of the state should be that of maximizing happiness for the maximum number of people in a given society. Economists have tried to operationalise happiness through the concept of “utility”, but then realized the difficulty and arbitrariness of measuring and comparing utility across individuals. This is why in the early 20th Century economists have started to use a proxy for utility, *i.e.* income. Most of modern cost-benefit analysis relies on the assumption that income can be used as a proxy for happiness and utility,

⁴⁹ Use value is the value that individuals derive from the direct use of (or access to) a given good. Non-use value refers to the value that people assign to economic goods (including public goods, public assets or public resources) even if they never have and never will use it. For natural resources, both concepts are considered to be essential in order to capture the overall value to be attributed to a good in cost-benefit analysis. See *i.a.* Freeman (1993).

and accordingly that benefits can be approximated by the willingness of individuals to trade their income for a future state of the world. Also, economists normally assume, in performing cost-benefit analysis, that the level of happiness of a given individual does not depend on what other individuals have (so-called “methodological individualism”)⁵⁰.

This is why, in mainstream economic theory, benefits are calculated as the sum of the WTPs of all individuals involved by a given policy change. To the extent that this calculation is possible, economists have the possibility of expressing all benefits with a common unit of measurement, *i.e.* money.

But what is WTP? In economics, this is the amount (demand price) that an individual is willing to pay for an incremental unit of a good or service, which measures its economic value to the demander and hence its economic benefit to the economy. On any demand curve, the willingness to pay of the individuals on the market is portrayed: this is why, as price decreases, the volume of products sold normally increases: this simply means that a lower price level can attract more individual consumers, since they will see that the price is lower than their willingness to pay. The underlying concept is very simple: if I am willing to pay the market price of €30 to buy a given book, it means that that book is worth to me at least €30 – or, at least, this is what I think or expect.

WTP is a very powerful measurement instrument in cost-benefit analysis. For example, it can measure the maximum amount of money an individual would be willing to pay to improve its or others’ health, to avoid getting hurt, to obtain an environmental improvement or to preserve natural resources, etc. Accordingly, the WTP concept is often used to estimate impacts that are otherwise impossible to measure, such as the preservation of biodiversity: asking people what they would be willing to pay to preserve the environment should give a first-blush assessment of what this is worth to citizens today.

However, many economists doubt that WTP can always be a good proxy for the assessment of benefits. The main reasons can be quickly summarized as follows:

- Income is not a good proxy for utility and happiness;
- It is rather the “ability to pay”, not the “willingness to pay”, that dictates market choices: people face income constraints that cost benefit analysis often neglects;
- People’s happiness depends also on what other individuals are endowed with;
- People sometimes tends to underrate the value of long-term impacts, especially if they are weighed against shorter term ones, due to a lack of inter-generational altruism or simple shortsightedness;

⁵⁰ See Renda (2012)

- People make mistakes for what concerns their WTP (due to both bounded rationality and rational ignorance)⁵¹;
- People make mistakes for what concerns the real value associated with their actions;
- People value differently gains and losses due to the “endowment effect”.

The latter critique has led economists to focus also on another proxy for the intensity of individual preferences, *i.e.* WTA. WTA compensation is the minimum amount of money an individual is willing to accept for not receiving a given improvement, or for being deprived of resources or assets they used to possess before⁵². As shown in box 8 below, the two measures can substantially diverge. The main reason is that, when we possess something and consider it to be part of our “normal” endowment, we are normally more reluctant to get rid of it than when we have never possessed that good.

Box 8: Willingness to pay and willingness to accept

Several empirical studies have found substantial divergence between WTP and WTA. For example, Horowitz and McConnell (2002) examine 45 studies of a wide range of goods (ranging from pens to nuclear waste repositories) and find that, on average, WTA is about seven times higher than WTP.

Figure 11 – WTA/WTP Ratios

Type of good	Ratio	Standard error
Public or non-market	10.4	2.5
Health and safety	10.1	2.3
Private goods	2.9	0.3
Lotteries	2.1	0.2
Timing	1.9	0.2
All goods	7.2	0.9

⁵¹ Rational ignorance refers to the fact that rational individuals do not find it convenient to acquire all possible information on a future course of action, due to excessive cost of information collection compared to the marginal benefit of acquiring an additional piece of information. Bounded rationality, to the contrary, refers to the fact that people make systematic mistakes that lead them to deviate from a rational course of action.

⁵² Part of the literature uses also the terms “equivalent variation” and “compensating variation” to denote the value underlying the concepts of WTP and WTA. See, also, the UK Green Book on evaluation, Section 2.1., at http://www.hm-treasury.gov.uk/d/green_book_valuationtechniques_250711.pdf.

Source: Horowitz and McConnell (2002), based on 45 usable studies

This ratio varies with characteristics of the good and tends to be higher for items not ordinarily purchased in the marketplace. Several economists, beginning with Kahneman, Knetsch, and Thaler (1991) and including subsequent work by Knetsch (2010), attribute such differences to loss aversion and the endowment effect. Individuals often value changes more strongly if they are viewed as a loss rather than as a gain; the endowment effect determines whether they view their present state or their state after the change as the reference point. If the reference state is one's current status, WTP for a gain will be smaller than WTA for a loss of the same magnitude.

This divergence creates challenges for benefit-cost analysts (Robinson and Hammitt, 2011). It can be difficult to determine the appropriate reference state for a particular analysis and the choice of reference may be easily manipulated by describing or framing the decision in alternative but logically equivalent ways (Tversky and Kahneman, 1974). While some (e.g., Freeman, 2003) argue that the reference state should be based on property rights, such rights are not clearly defined in many policy contexts and may not be consistent with how an individual views his or her own reference state. It seems reasonable, however, to assume that individuals will often view their current status as the reference state when considering health-improving policies. In this case, WTP for the improvement, rather than WTA as compensation to forgo the improvement, would be the appropriate measure. The appropriate measure may be ambiguous in some settings, leading to difficulties in determining whether benefits exceed costs as well as in estimating the extent to which a policy is cost-beneficial. Whereas analysts could test the sensitivity of their results to the choice of WTP or WTA estimates, in practice this may not be possible without new primary research. Most studies that address health risk reductions focus on estimating WTP, and WTA estimates are often not available for comparison.

2.3.2 Revealed preference models

Revealed preference models are based on the assumption that people's behavior, when spontaneous, is the best possible indication of the preference of individuals. For example, the extent to which citizens are willing to travel to visit a city, a monument or a natural beauty – and the price they are willing to pay to get in, when applicable – can be taken as a proxy of how much they value the site. Likewise, the extent to which people are willing to pay more to purchase a house in a quieter area compared to dwellings in noisy places is reflected in the

real estate price, and approximates the value attached by the market to the better location of the house. Moreover, the extent to which people are willing to pay to insure themselves against a given risk is used as a proxy for the value people attach to this risk.

A variety of revealed preference methods for valuing environmental changes have been developed and are widely used by economists. The following common types of revealed preference methods are discussed in this section:

- Travel cost models;
- Hedonic models;
- Averting behavior models; and
- Cost of Illness (COI).

2.3.2.1 Using the opportunity cost of time to assess benefits: “travel costs” models

Travel cost models are often referred to as recreation demand models because they are most often used to value the availability or quality of recreational opportunities. They are conceptually very simple, and focus on the choice of the number of trips to a given site or set of sites that a traveller makes for recreational purposes. Because there is no explicit market or price for recreation trips, travel cost models are frequently based on the assumption that the “price” of a recreational trip is equal to the cost of travelling to and from the site. These costs include both participants’ monetary cost and opportunity cost of time. Monetary costs include all travel expenses. For example, when modelling day trips taken primarily in private automobiles, travel expenses would include roundtrip travel distance in miles multiplied by an estimate of the average cost per mile of operating a vehicle, plus any tolls, parking, and admission fees. A participant’s opportunity cost of time for a recreational day trip is the value of the participant’s time spent travelling to and from the recreation site plus the time spent recreating.

A variety of approaches have been used in the literature to define the opportunity cost of time. Most commonly, researchers have used a fixed fraction ranging from one third to 100% of a person’s hourly wage as an estimate of participants’ hourly opportunity cost of time (see also box 9 below). In most cases, the fraction used depends on how freely individuals are assumed to be able to substitute labor and leisure. If a person can freely choose their work hours then their opportunity cost of time will be equal to their full wage rate. However, if a person cannot freely substitute labor for leisure (for example if they have a set 40 hour work week), then the opportunity cost of the time they have available for recreation is unobservable and may be less or more than the

full wage rate. Many other factors can influence the opportunity cost of time, including the utility received from traveling, non-wage income, and other non-work time constraints.

Travel cost models can logically be divided into two groups:

- **Single-site models.** Single-site travel cost models examine individuals' choice of how many trips to make to a specific site over a fixed period of time (generally a season or year). It is expected that the number of trips taken will increase as the cost of visiting the site decreases and/or as the benefits realized from visiting increase. Single-site models are most commonly used to estimate the value of a change in access to a site, particularly site closures (e.g., the closure of a lake due to unhealthy water quality). The lost access value due to a site closure is the difference between the participant's WTP for the option of visiting the site, which is given by the area between the site's estimated demand curve and the implicit "price" paid to visit it. Estimating the value of a change in the cost of a site visit, for example the addition or increase of an admission fee, is another common application of the model.
- **Multiple-site models** examine an individual's choice of which site to visit from a set of available site (known as the "choice set") on a given choice occasion and in some cases can also examine how many trips to make to each specific site over a fixed period of time. Compared to the single-site model, the strength of multiple-site models lies in their ability to account for the availability and characteristics of substitute sites. By examining how people trade the differing levels of each site characteristic and travel costs when choosing among sites it is possible to place a per trip (or choice occasion) dollar value on site attributes or on site availability for single sites or multiple sites simultaneously. The two most common multiple-site models are the random utility maximization (RUM) travel cost model and Kuhn-Tucker (KT) system of demand models. Both models may be described by a similar utility theoretic foundation, but they differ in important ways. In particular, the RUM model is a choice occasion model while the KT model is a model of seasonal demand.

Scope ▲

- **Narrow scope.** Travel cost methods are normally applied to a fairly limited set of impacts, most often when non-market, recreational goods have to be attached a value. They cannot be used for impact assessment unless the benefits to be assessed imply that consumers travel to have access to these sites.

Data intensity ▲ ▲ ▲

- **Very data-intense.** No travel cost method without a full dataset.

Ease of data collection ▲ ▲ ▲ ▲

Data collection is normally quite easy. The key advantage of travel cost methods is that collecting data is normally quite easy, and a certain amount of statistical information is already available before the data collection has started. Once the site to be analyzed is known, both the companies or institutions that manage the site or national institutions in charge of tourism policy are likely to possess useful data on the flows of tourists to and from the site.

Therefore it is important to know:

- the number of trips to the site over a given time period;
- the costs of the trips to the site, from different zones split into the different components:
 - o the monetary costs; in particular
 - travel costs,
 - admission price (if relevant),
 - on-site expenditures
 - expenditure on capital equipment necessary for consumption;
- the time spent travelling and its value.

Possibility to use pre-calculated data ▲ ▲ ▲

- **It is possible to use pre-calculated data,** although fresh data almost always have to be produced.

Accuracy ▲ ▲

Specific problems with this approach are related to ‘multiple purpose trips’; because many trips have more than one destination, it is difficult to identify which part of the total travel cost is related to one specific destination.

Since only the benefits of the direct consumption of the environmental services are considered in this approach, non-use values (option value and existence value) cannot be considered.

Can be harmed by the following elements.

- **Difficulties in measuring the cost of visiting a site.** It may actually be quite difficult to measure the cost of accessing a site or amenity. This is because of the opportunity cost associated with the travel time. If the

opportunity cost of all individuals is the same then the estimated price will be accurate. If, however, the opportunity cost of individuals accessing the site varies, which is more likely, then the measure will be inaccurate. For example, one individual's opportunity cost of the travel time spent accessing a recreational site is equivalent to one hours wage equalling €35. However, another individual's opportunity cost for an hours wage is only €8. This is problematic to the travel cost method as if individual's opportunity costs differ including the costs of time spent at the site, this would change the price faced by different individuals by different amounts.

- ***The estimation of willingness to pay used in the travel cost method is for entire site access rather than specific features.*** As the travel cost method only provides a price or value relating to the cost of accessing the amenity or recreational site, it does so for the whole site. It may, however, be the case that we wish to value a certain aspect of the site in our project appraisal. For example, we do not wish to value a whole park, but instead the fishing ponds within it.
- ***The exclusion of the marginal cost of other complementary goods.*** The travel cost method does not account for the costs involved in purchasing complementary goods which may be required in order to enjoy accessing the amenity. For example, individuals accessing a park area may take a football with them, or a picnic. Alternatively, individuals accessing a recreational site may take walking equipment and tents with them. The marginal costs of using this equipment should be included in the price estimated.
- ***Multi-purpose or multi-activity journeys.*** Individuals may visit an amenity or recreational site in the morning, but then visit another site or enjoy some other activity in the afternoon. The travel endured to access the amenity was also undertaken to enable access to the afternoon activity. In this case the cost incurred in travelling to the amenity does not represent the value the individuals place on the amenity, but that which they place on both the amenity they visited in the morning and the one which they visited in the afternoon.
- ***Journey value.*** It may be the case that the journey itself has a value to the individual. If this is true then some of the cost incurred in travelling to the amenity should not actually be applied to the individual accessing the amenity, and as such should be removed from the estimation of the amenities value.
- ***Assumed responses to changes in price.*** The travel cost method method assumes that individuals respond to changes in price regardless of its composition. For example, travel cost method assumes that individuals

will react consistently to a €10 increase in travel cost as they would to a €10 increase in admission costs.

Possibility of application by the average desk officer ▲▲▲

The method can be applied since the data needed are normally not too difficult to collect. However, the data-intensity and the limited accuracy of the method make it unattractive for the purposes of impact assessment.

Compatibility/complementarity with other methods ▲▲▲▲

The travel cost method can be and is combined with hedonic pricing methods and stated preference methods in order to obtain a more accurate picture of the benefits to be assessed. It is also possible to use it within a more general cost-benefit analysis, the only caveat being its potential lack of accuracy.

Suitability of application at the EU level ▲

To our knowledge, the travel cost method has never been used in a Commission impact assessment. Some of the general equilibrium models developed with funding from the European Commission (e.g. EXIOPOL, ExternE) make use of the model, and DG Regio extensively quotes this model in its cost-benefit analysis guide for investment projects⁵³. The narrow scope of application and the existence of more accurate models has so far limited the possibility to use this method in Impact Assessment.

Table 9 – Overall assessment of the travel cost method

ITEM	Score
<i>Scope of application</i>	▲
<i>Data-intensity</i>	▲▲▲
<i>Ease of data collection</i>	▲▲▲▲
<i>Possibility to use pre-calculated data</i>	▲▲▲
<i>Accuracy</i>	▲▲
<i>Possibility of application by the average desk officer</i>	▲▲▲
<i>Compatibility/complementarity with other methods</i>	▲▲▲▲
<i>Suitability of application at the EU level</i>	▲

Strengths	Weaknesses
– Clarity of scope	– Multiple-purpose trips and multi-site

⁵³ See the guide, at this [link](#).

<ul style="list-style-type: none"> - Real behaviour, not stated preferences - Ease of data collection - Assumptions clearly stated 	<ul style="list-style-type: none"> - trips make it difficult to apply - Difficult to assess the real cost - Does not include the non-use (option or existence) value of the good to be assessed - Does not break down into specific features of the asset or good to be assessed
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2.3.2.2 Valuing specific attributes: hedonic pricing models

The hedonic method dates back at least to Waugh (1928). Other early contributors include Court (1939) and Stone (1954). It was, however, only after Griliches (1961, 1971) that hedonic methods started to receive serious attention (see Schultze and Mackie 2002 and Triplett 2004). The conceptual basis of the approach was laid down by Lancaster (1966) and Rosen (1974).

Hedonic pricing models use statistical methods to measure the contribution of a good's characteristics to its price. Cars differ in size, shape, power, passenger capacity, and other features. Houses differ in size, layout, and location. Even labor hours can be thought of as "goods" differing in attributes like risk levels, and supervisory nature, that should be reflected in wages. Hedonic pricing models use variations in property prices or wages and are commonly used to value the characteristics of properties or jobs. The models are based on the assumption that heterogeneous goods and services (e.g., houses or labor) consist of "bundles" of attributes (e.g., size, location, environmental quality, or risk) that are differentiated from each other by the quantity and quality of these attributes. Environmental conditions are among the many attributes that differ across neighbourhoods and job locations. Hedonic pricing studies estimate economic benefits by weighing the advantages against the costs of different choices. For example, these studies are very frequently used in the evaluation of the benefit of reducing noise exposure of given real estate, or the benefit of improving certain environmental conditions in as inferred by real estate values⁵⁴. They have also been used in the labour market and food safety domains.

This method has been applied to labour and property markets for measuring the benefits of various regulatory improvements.

⁵⁴ The most frequent example of the latter is probably air quality (see Smith and Huang 1995 for a meta-analysis of many studies), although water quality (Leggett and Bockstael 2000), natural amenities (Thorsnes 2002), land contamination (Messer et al. 2006) and other examples have been studied. Other hedonic studies evaluate endpoints other than environmental conditions. A good example would be hedonic wage studies that are used in the computation of the VSL. (See Viscusi 2004 for a recent example.)

- **In labour markets**, models are based on the premise that individuals make trade-offs between higher wages and occupational risks of injury or death. The key lies in separating the portion of compensation associated with occupational health risks from other job characteristics, including managerial responsibility, job security, and other factors. The outcome of these models is an estimated value for small changes in mortality or morbidity risks. The key assumption is the provision of perfect labour markets in which workers are mobile and there is perfect information available regarding jobs and job risks.⁵⁵
- The other application of the model is for the estimation of **property values**. For example, the value of a house can be a function of its location, size, age, proximity to amenities, and property tax as well as other factors such as the noise level in the neighbourhood, the quality of local schools, and crime rates. When sales are made, individuals make trade-offs between the prices they are willing to pay and these attributes. Using statistical techniques, one can estimate the value of a lakeside location by comparing the price of houses located on lakefronts with similar houses located elsewhere. It can also enable the analyst to separate from the effects of other attributes the effect of the relevant environmental attributes, such as air quality and a lakefront, on the price of a house.
- Applicability of the hedonic pricing method is not limited to the property and labor markets. For example, hedonic pricing methods can be combined with travel cost methods to examine the **implicit price of recreation site characteristics** (Brown and Mendelsohn 1984). Results from other studies can be used to infer the value of reductions in mortality, cancer, or injury risks. Hedonic pricing can also be used to estimate the **value of non-market goods such as air pollution, water quality, noise exposure, and road traffic**.

How hedonic models work: a simplified explanation⁵⁶

The hedonic regression analysis is conducted in two steps.

The first step entail building a formula which describes the relationship between the price of an asset (the dependent variable) and all of its various characteristics (independent variables). For example, the price of a house can be summarised using a hedonic price function as below:

⁵⁵ Hedonic wage studies have used the US Bureau of Labour Statistics Census of Fatal Occupational Injuries (CFOI) as the source for workplace risk information (Viscusi 2004; Viscusi and Aldy 2007; Aldy and Viscusi 2008; Kniesner, Viscusi, and Ziliak 2006; Leeth and Ruser 2003; Viscusi 2003; and Scotton and Taylor 2009).

⁵⁶ Based on Boardman *et al.* (2001), pages 349-352.

$$P = f(LOC, TYPE, SIZE, VIEW, NEIGH)$$

Where the price of a house (P), is a function of its location relative to a local urban centre (LOC), the type of house (TYPE), the size of the plot (SIZE), the quality of its view (VIEW), and neighbourhood characteristics (NEIGH) such as school quality and crime.

The change in a house price resulting from the marginal change in one of these characteristics is called the hedonic price (sometimes referred to as the implicit price or rent differential). The hedonic price can therefore be interpreted as the additional cost of purchasing a house that is marginally 'better' in terms of a particular characteristic.

Usually researchers estimating hedonic prices assume the hedonic price function has a multiplicative functional form. This means that as a characteristic increases (or improves) the house prices increase but at a decreasing rate. This is expressed in the following way:

$$P = \beta_0 LOC^{\beta_1} TYPE^{\beta_2} SIZE^{\beta_3} VIEW^{\beta_4} NEIGH^{\beta_5}$$

Here the parameters β_0 to β_5 are elasticities. These parameters measure the proportional change in prices caused by proportional changes in characteristics. For example, we would expect $\beta_3 > 0$ as house prices will increase as plot size increases. The hedonic price of a particular characteristic is therefore the slope of this equation with respect to that particular characteristic. For example, the hedonic price of plot size is expressed as:

$$P_s = \beta_3 \frac{P}{SIZE} > 0$$

The hedonic price of house sizes is dependent on the value of the parameter β_3 , the price of the house, and the size of the house. The hedonic price of a characteristic can be interpreted as the willingness to pay of households for a marginal increase in that particular characteristic.

The second step of the hedonic regression analysis estimates the **willingness to pay of households but additionally accounts for households having different incomes and tastes**. The willingness to pay function therefore becomes:

$$P_s = W(SIZE, Y, Z)$$

Where the willingness to pay for the size characteristic is dependent on size of the house (SIZE), income of the household (Y), and a vector (Z) which denotes tastes (based on age, race, social background, family size etc).

Box 9: property values and WTP⁵⁷

- A statistical study of residential property values in Buffalo, NY, examined how values varied for properties within one-half mile of light rail transit stations. It found that every foot closer to a light rail station increased average property values by \$2.31 (using geographical straight-line distance) and \$0.99 (using network distance). Consequently, a home located within one-quarter of a mile radius of a light rail station can earn a premium of \$1300-\$3000 (Hess, 2007).
- Studies over two decades show average housing value premiums associated with being near a station (usually expressed as being within 1/4 to 1/2 mile of a station) are 6.4% in Philadelphia, 6.7% in Boston, 10.6% in Portland, 17% in San Diego, 20% in Chicago, 24% in Dallas, and 45% in Santa Clara County (Cervero et al, 2004).
- A study of experiences in the San Francisco Bay Area study found that for every meter closer a single-family home was to a BART station, its sales price increased by \$2.29, all else being equal. Alameda County homes near BART stations sold, on average, for 39% more than otherwise comparable ones 20 miles from the nearest station (Cervero et al, 2004).
- A detailed study conducted by researchers at the University of Toronto in 2000 indicated that proximity to a subway station in Toronto generated approximately \$4,000 in additional residential property value for a home with a value of \$225,000. (Canadian Transit Association, 2003)
- A study of the DART system compared differences in land values of “comparable” retail and office properties near and not near light rail stations. The average change in land values from 1997 to 2001 for retail and residential properties near DART stops was 25% and 32%, respectively; for “control” parcels, the average changes were 12% and 20% (Weinstein and Clower, 2003).

Scope ▲ ▲

Hedonic studies of the property market have been used to identify the value of non-market goods such as traffic noise, aircraft noise, air pollution, water

⁵⁷ Based on Weisbrod (2007).

quality and proximity to landfill sites. The application of hedonic pricing methods is mostly focused on labour markets and housing markets.

Data intensity ▲ ▲ ▲ ▲

There is no possibility of using the hedonic pricing models without extensive availability of market data. The only advantage with these models, compared to other revealed preference models, is that in most cases it is not necessary to collect new data.

Ease of data collection ▲ ▲

Market data on the housing sector and labour markets are usually available, although in aggregated form⁵⁸. Depending on the type of benefit to be assessed, data collection can become challenging, especially if markets have to be broken down into sub-segments. It is therefore important that governments keep detailed regression results, which facilitate the work of analysts in performing impact assessment: a good introduction to existing methods and sources is provided by Eurostat's Handbook of Residential Property Prices Indexes (RPPIs)⁵⁹.

Not having to run a large-scale survey is a big advantage also in terms of cost, especially when market data are readily available. However, some hedonic studies and all travel cost applications require some original data to be collected. This cost may be lower, however, than the cost of running stated preference surveys.

Possibility to use pre-calculated data ▲ ▲ ▲ ▲

Rather than an option, in this case using pre-existing data is a must. Since this model is a revealed preference model and is based, by definition, on the observation of existing consumer behaviour and choices, creating new data is not part of the task to be performed. However, there is extensive modelling and data processing to be done in order to implement this method correctly.

Accuracy ▲ ▲ ▲ ▲

Hedonic pricing can reach a good level of accuracy. Revealed preference models like these base their estimates on market prices: this, in turn, means that the

⁵⁸ Housing market statistics are normally kept by national institutes of statistics. At the EU level, Eurostat collects some data (see [here](#)). However, these data normally are not sufficiently disaggregated to allow for a hedonic regression.

⁵⁹ See [here](#).

analyst can rely on the full set of preferences of individual consumers, not on responses given by a sample of consumers.

However, the following problems have to be taken into account and addressed before the results can be considered robust:

- ***Models incorporate market imperfections.*** Hedonic pricing models are crucially based on the assumption that underlying markets are perfectly competitive and in equilibrium⁶⁰. This is a very strong assumption, which is very unlikely to correspond to reality at any given moment of time, in any economic sector⁶¹. The hedonic pricing model in the housing market ideally requires that a variety of different houses are available so that individuals are able to obtain the particular house of their choosing, with a combination of characteristics they desire. However, in reality it may be the case that a family wishing to purchase a large house with a garden in a busy city centre location, may find that the city centre only contains small houses, or houses without gardens.
- ***Models incorporate bounded rationality and rational ignorance.*** Behavioural economics and neuroeconomics have, since the seminal contributions of Maurice Allais and Herbert Simon, demonstrated that the paradigm of the *homo oeconomicus* is far from similar to the way individuals act in reality. In our daily decisions, we make systematic mistakes, which reverberate in imperfect outcomes and market distortions. Accordingly, inferring individual preferences from “boundedly rational” and/or “rationally ignorant” choices poses a twofold problem: either the inferred preferences will be wrong compared to the real ones; or the inference process is correct, but individual preferences might be systematically distorted anyway.
- ***Information:*** the model requires that all individuals have prior knowledge of the potential positive and negative externalities they may face. For example, they should have prior knowledge of the level of pollution an open cast mining site will cause and how this will affect them. Of course in reality this is not always the case.
- ***Measurement validity:*** the quality of the measures used in the independent ‘explanatory’ variables is of key importance. If proxy measures

⁶⁰ In housing market applications, this implies a number of criteria. Households must have full information on all house prices and house attributes; there must be zero transaction and moving costs; and market prices must instantly adjust to a new equilibrium after supply and demand change. There are analogous criteria for labour market hedonic wage studies.

⁶¹ However, imperfect information seems likely in a number of cases, including assessments of the probability of risks of injury or death in a job (Viscusi, 1993) and the environmental conditions in housing neighbourhoods (Poor et al, 2001). In addition, Greenwood et al. (1991) and Glaeser et al. (2005) argue that markets may be in disequilibria for some time.

are used, for example for the build quality of a house, this could result in an inaccurate coefficient being generated in the regression analyses.

- ***Multicollinearity.*** Care must be taken where a good can have several intangible attributes. If the attributes included as explanatory variables are closely correlated with each other, coefficient estimates can be biased. Multicollinearity can also bring instability to the parameter estimates and, if serious, can reduce the confidence attached to model predictions. For example, it may be the case that large houses are only found in green areas with low pollution, and small houses are only found in urban areas with high pollution. In this case it would be impossible to separate out pollution and house size accurately.
- ***Omitted variable bias and wrong choice of functional form.*** Analysts must decide which characteristics to include as explanatory variables; omitting a characteristic that has a significant impact on the market good can lead to biased coefficient estimates. Additionally, analysts must decide on the functional form for the hedonic price function.
- ***Price changes:*** hedonic pricing models assume that market prices adjust immediately to changes in attributes. In reality there will likely be a lag associated with this, especially in areas where sales and purchases are rare.

All these factors lead to variance in the results of the estimates. Table 10 below shows the average WTP for abating noise levels calculated through hedonic pricing models, as reported by DG MOVE's 2008 cost handbook (see Maibach et al., 2008).

Table 10 - Comparison of mean WTP-values per person per year for noise abatement, all estimated by the hedonic pricing method

Study	Mean WTP per person per year
UNITE, 2003	NSDI = 0,9 per dB
RECORDIT, 2001	NSDI = 0,9 per dB
TRL, 2005	NSDI = 0,61 per dB
INFRAS/IWW, 2004a	0.11% per capita income
OECD/INFRAS/Herry, 2003	0.11 % per capita income
ECMT, 1998	0.09% per capita income
CE Delft, 2004b	0.11% per capita income
ITS, 2001	NSDI = 0,2 - 0,67 per dB
Hvid, 2004	1.20% – 1.64% of real estate price per dB
Kristensen et al., 2004	1.20% – 1.64% of real estate price per dB
SAEFL, 2003	1% of real estate price per dB

Source: Maibach et al. (2008)

Possibility of application by the average desk officer ▲ ▲

Normally the use of a hedonic pricing model would require an external consultant with adequate skills, or an officer with sufficient knowledge of existing models that incorporate hedonic pricing methods.

Compatibility/complementarity with other methods ▲ ▲ ▲ ▲ ▲

These models are normally used in conjunction with other (mostly stated preference models) and also within larger partial or general equilibrium models used in certain sectors (transport, housing, labour).

Suitability of application at the EU level ▲ ▲ ▲

Hedonic pricing models have a limited scope, but are commonly used within that narrow set of applications. At the EU level, the effects of transport noise are usually measured through hedonic pricing. Maibach et al. (2008) suggests that “hedonic pricing used to be the preferred method for quantification of amenity losses due to noise”: the Noise Depreciation Sensitivity Index (NDSI) is a tool for applying this method which gives the average percentage change in property prices per decibel. EU-funded models such as ExternE make use of hedonic pricing techniques in the so-called bottom-up “Impact Pathway Approach”.

Hedonic pricing was already used in European Commission Impact Assessment documents, notably in the 2011 Impact Assessment on the proposed regulation on the sound level of motor vehicles, which relied extensively on the 2003 EU position paper on the valuation of noise. Box 10 below shows the way in which the Commission handled this problem.

Box 10 – Valuing noise – the European Commission’s approach to the sound level of motor vehicles

The perceived benefit of noise reduction per household per year, based on willingness-to-pay and hedonic pricing calculation methods, was found to be a figure of 25 €/dB/household/year (2002). Benefits were calculated for the number of exposed persons, *i.e.* 451 million. Assuming 2.4 persons per household (Eurostat 2008) the number of households affected was 188 million. Around 10% are assumed not to be significantly exposed due to a housing location free of traffic.

For a yearly noise reduction of 1dB in 2010, when the valuation is 27€ per dB per household per annum, for the exposed EU27 population of 451 million and an average household occupancy of 2.4 persons, the benefits would amount to

$27 \times 451 / 2,4 = 5074$ million €/dB. In 2020 for an exposed population of 498.2 million and valuation of 29.80 € the benefits amount to 6186 million €/dB.

The calculation was made for a final average noise reduction of 2.5 dB(A) for option 4 and for 3.1 dB(A) for Option 5 of the impact assessment”.

Below, we report as an example the table referred to option 4 only.

Table 11 – Benefits and costs of noise reduction, option 4

Year	Acc. noise reduction dB	Benefits					Costs		Acc. net Benefits M €
		Social benefits M €*	Health benefits M €*	Abatement savings M €**	Total benefits M €	Acc. total benefits M €	Industry costs M €*	Acc. total costs M €	
2010	0,0	0	0	0	0	0	42,3	42	-42
2011	0,0	0	0	0	0	0	40,7	83	-83
2012	0,0	0	0	0	0	0	39,1	122	-122
2013	0,0	0	0	0	0	0	1027,3	1149	-1149
2014	0,0	0	0	0	0	0	851,8	2001	-2001
2015	0,2	744	11	4	759	759	688,3	2690	-1931
2016	0,3	1487	33	8	1529	2287	536,2	3226	-938
2017	0,5	2232	65	13	2310	4597	362,5	3588	1009
2018	0,7	2979	108	17	3104	7701	232,4	3821	3881
2019	0,9	3731	160	22	3913	11614	111,7	3932	7681
2020	1,1	4489	221	27	4737	16351	0	3932	12418
2021	1,3	5255	291	33	5580	21930	0	3932	17998
2022	1,5	6033	370	39	6442	28373	0	3932	24440
2023	1,7	6824	458	46	7328	35700	0	3932	31768
2024	2,0	7633	554	53	8239	43940	0	3932	40007
2025	2,2	8462	659	60	9181	53121	0	3932	49188
2026	2,5	9318	771	68	10157	63278	0	3932	59345
2027	2,5	9139	880	69	10088	73365	0	3932	69433
2028	2,5	8964	984	69	10018	83383	0	3932	79451
2029	2,5	8793	1084	70	9947	93331	0	3932	89398
2030	2,5	8625	1181	71	9876	103207	0	3932	99274
		94707	7831	669			3932		

* 4% discount rate applied ** 1% interest rate applied

Source: European Commission Impact Assessment, SEC(2011)1505, page 36, table 11

Table 12 – Overall assessment of the hedonic pricing method

ITEM	Score
Scope of application	▲ ▲
Data-intensity	▲ ▲ ▲ ▲
Ease of data collection	▲ ▲
Possibility to use pre-calculated data	▲ ▲ ▲ ▲
Accuracy	▲ ▲ ▲ ▲
Possibility of application by the average desk officer	▲ ▲
Compatibility/complementarity with other methods	▲ ▲ ▲ ▲ ▲
Suitability of application at the EU level	▲ ▲ ▲

Strengths	Weaknesses
<ul style="list-style-type: none"> – Use real market data – Map real consumer preferences 	<ul style="list-style-type: none"> – Assume markets in perfect equilibrium – Incorporate market imperfections and

<ul style="list-style-type: none"> - Relative ease of data collection - Assumptions clearly stated 	<ul style="list-style-type: none"> bounded rationality of consumers - Multi-collinearity - Can estimate use values alone, not option or existence values - Requires extensive house market data - Assume instant adaptation to price changes - Current evidence suggests it is not suitable for use in benefits transfer
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2.3.2.3 Averting Behaviour

The averting behaviour method is similar to the travel cost method but differs to the extent that it infers values from observing how individuals change their behaviour in response to changes in the quality of the environment, health, or safety. For example, individual perception of mortality risks can be estimated by observing the amount of money people spend on averting activities such as the purchase of safety helmets to reduce the risk of dying in an accident. In the case of the environment, the value of a quiet location may be estimated by what people are paying to install double-glazed windows.

The basic steps of an analysis based on averting behaviour include the identification of an observable pattern of consumption of a given good or service, or an attribute thereof, which can be considered as a proxy for the degree of exposure to a given risk; and the measurement of the WTP associated with that good or characteristic. Once this has occurred, the average WTP for consumers that participate to a given market is extrapolated to all citizens in the portion of territory that is subject to analysis (country, region, etc.).

This technique has many applications in different areas. However, the situation can be complicated by the fact that many types of averting behaviour not only reduce the particular type of damage this policy addresses, but also provide other benefits (for example, double glazing of windows reduces the noise, but also insulates the building against loss of heat or cold). An approach to deal with these biases could be to use a survey involving a hypothetical product. For instance, a survey could be produced that asks respondents to value a sunscreen that might reduce the risk of developing skin cancer. By measuring the willingness to pay for such a risk reduction, the other benefits of the product would be controlled for.

Although the first applications of the method were directed toward environmental quality changes (Harford 1984), recent research has primarily

focused on health risk changes⁶². Conceptually, the averting behaviour method can provide WTP estimates for a variety of other benefits such as damages to ecological systems and materials.

Scope ▲ ▲ ▲

This technique has many applications in different areas. A typical application is the estimate of the value of a statistical life or value of a prevented fatality. In addition, all areas of so-called “life-saving regulation” and risk regulation can be approached with extensive use of averting behaviour methods. In the environmental field, this approach has been used, *i.a.* in assessing water quality, noise nuisance, air pollution and radon contamination.

Data intensity ▲ ▲

Averting behaviour models are in most cases not extremely demanding in terms of data collection. They often require the collection of data on one single behaviour.

Ease of data collection ▲ ▲ ▲

As recalled above, these models require the collection of data on one single behaviour: whenever such behaviour can be singled out easily compared to other behaviours adopted by the sampled individuals, then the collection of data is reasonably easy. However, it is normally necessary to collect data through surveys and other empirical techniques, rather than relying on existing data.

Possibility to use pre-calculated data ▲ ▲ ▲

Normally, an officer in charge of using the averting behaviour model will need to collect data relative to the specific behaviour he or she has to analyse to infer WTP for certain assets, impacts or environmental conditions. Several studies are of course available for what concerns specific levels of WTPs measured partly or totally through averting behaviour models (e.g. mortality and morbidity risks measured through VSL and VSLY): in these cases, the use of

⁶² Pearce et al. (2006) report the findings of a study by Bresnahan, Dickie and Gerking (1997) on behaviour and change in health risks that arise from exposure to concentrations of ground-level ozone. The underlying assumption is that people, in order to avoid peaks of ozone concentration, might spend less time outdoor. After surveying a sample of non-smokers with a high representation of individuals with compromised respiratory functions, they reported that two-thirds had changed their behaviour in some meaningful way on days when air quality was poor: 40% of respondents claimed either to re-arrange leisure activities or stay indoors during such days, and 20% of respondents increased their use of home air conditioning units. The authors, however, do not attach a monetary value to the costs borne by these individuals that decide to stay indoor more than they would have chosen absent poor air quality.

pre-calculated data and existing references is de facto compulsory, but the transfer of these value is much more delicate and sensitive than is often through among impact assessment experts and officers.

Accuracy ▲ ▲

The accuracy problems most often associated with use of averting behaviour models are listed below:

- ***Many types of averting behaviour not only reduce the particular type of damage this policy addresses, but also provide other benefits*** (as in the double-glazing of windows). The joint nature of production may create a bias in the measurement of willingness to pay. Failure to account for the other benefits associated with averting behaviour will also bias the estimates. For example, double glazing of windows both reduces the noise coming from outside and also insulates the building against loss of heat or cold.
- ***Individuals or firms may undertake more than one form of averting behaviour*** in response to any specific change: for example, instead of spending money in building renovation or double-glazing windows, some owners would prefer to move to another area.
- ***The model incorporates bounded rationality and rational ignorance***. This argument mirrors the explanation offered above for hedonic pricing.
- ***Much defensive expenditure is often not continuous and not a reversible decision but is rather discrete and irreversible***, such as double-glazing which is expensive to remove once installed. In that context, it could be difficult to measure other future variations of environmental quality⁶³.
- ***These models only estimate the use values of specific assets***, which in the case of the environment might represent a problem due to the failure to capture also the non-use (option or existence) value.

For these reasons the method often over or under estimates benefits associated with environmental quality changes.

Possibility of application by the average desk officer ▲ ▲

Desk officers normally make use of pre-calculated values such as the standard values offered by the impact assessment guidelines on VSL and VSLY, which are concepts largely based on the idea of averting behaviour. However, using these

⁶³ http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide02_en.pdf

methods requires adequate skills, especially since in most cases the use of averting behaviour models requires the ability to select behaviours which can be easily and unequivocally attributed to the goal of avoiding a given outcome and not achieving other objectives. In addition, these models appear hardly suited for *ex novo* use during an impact assessment: they require the availability of past data, rather than inference on future behaviour.

Compatibility/complementarity with other methods ▲▲▲▲▲

Averting behaviour models are normally used in conjunction with other (mostly stated preference models) and also within larger partial or general equilibrium models used in certain sectors (transport, housing, labour).

Suitability of application at the EU level ▲▲▲

Certain values obtained through averting behaviour techniques, such as VSL and VSLY are regularly used in European Commission impact assessment. However, the behaviours observed might change radically across the EU27 (think about sensitivity to noise, or propensity to double-glaze windows, or even propensity to purchase insurance against a given risk). Accordingly, extensive *ex ante*, general purpose modelling and reporting is needed in order to allow officers in charge of impact assessment to use pre-calculated data and adapt them by performing a clear, well-defined, limited set of actions.

Table 13 – Overall assessment of averting behaviour models

ITEM	Score
Scope of application	▲▲▲
Data-intensity	▲▲
Ease of data collection	▲▲▲
Possibility to use pre-calculated data	▲▲▲
Accuracy	▲▲
Possibility of application by the average desk officer	▲▲
Compatibility/complementarity with other methods	▲▲▲▲▲
Suitability of application at the EU level	▲▲▲

Strengths	Weaknesses
<ul style="list-style-type: none"> – Do not require extensive data – Use real market data 	<ul style="list-style-type: none"> – Incorporate bounded rationality of consumers – can estimate use values only – problem of multiple averting expenditures – problem of benefits of averting expenditure

	<ul style="list-style-type: none"> – problem of non-continuous, irreversible choices – requires past data
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2.3.2.4 Avoided costs as benefits: the Cost of Illness approach

The Cost of Illness (COI) method estimates the financial burden of an illness based on the combined value of direct and indirect costs associated with the illness. More specifically:

- *Direct costs* represent the expenditures associated with diagnosis, treatment, rehabilitation, and accommodation.
- *Indirect costs* represent the value of illness-related lost income, productivity, and leisure time.

Most existing COI studies estimate indirect costs based on the typical hours lost from a work schedule or home production, evaluated at an average hourly wage. This also means that other costs, such as pain and suffering, are not accounted for in COI methods. The direct medical costs of illness are generally derived in one of two ways. The empirical approach estimates the total medical costs of the disease by using a database of actual costs incurred for patients with the illness. According to the perspective adopted, as shown in table 14 below, the types of costs that will be included in the analysis will change.

Table 14 – Costs included in COI studies

Perspective	Medical Costs	Morbidity Costs	Mortality Costs	Transportation/ Nonmedical Costs	Transfer Payments
Societal	All costs	All costs	All costs	All costs	—
Health care system	All costs	—	—	—	—
Third-party payer	Covered costs	—	Covered costs	—	—
Businesses	Covered costs (self-insured)	Lost productivity (presenteeism/ absenteeism)	Lost productivity	—	—
Government	Covered (Medicare, Medicaid)	—	—	Criminal justice costs	Attributable to illness
Participants and families	Out-of-pocket costs	Lost wages/ Household production	Lost wages/ Household production	Out-of-pocket costs	Amount received

Source: Segel (2006)

The COI method is straightforward to implement and explain to policy makers, and has a number of other advantages. The method has been used for many years and is well developed. Collecting data to implement it often is less expensive than for other methods, improving the feasibility of developing original COI estimates in support of a specific policy. The only two conditions that must be met are: (i) the estimates of direct costs must reflect the economic value of goods and services used to treat illness (prices in hospitals, for example, are unlikely to reflect the underlying cost); (ii) a person's earnings must reflect the economic value of lost work time, productivity, and leisure time. Because of distortions in medical and labour markets, these assumptions do not always hold.

In the US, COI estimates for many illnesses are readily available from existing studies and span a wide range of health effects. EPA's Cost of Illness Handbook (EPA 2007) provides estimates for many cancers, developmental illnesses and disabilities, and other illnesses.

In the EU, Rand Europe (2010) reported that "tobacco-related diseases incur considerable direct and indirect costs for society, including direct healthcare costs and indirect costs such as productivity losses (absenteeism, lost skills, unemployment), welfare provision costs (sickness and unemployment benefits) and fire and other accidents (property losses, wild fires), as well as intangible costs such as pain and suffering that result from loss of life or illnesses brought on by tobacco use. These costs have been estimated to be up to €363 billion in 2000, corresponding to 3.9 percent of EU-27 GDP"⁶⁴.

Box 11: the cost of obesity in Australia

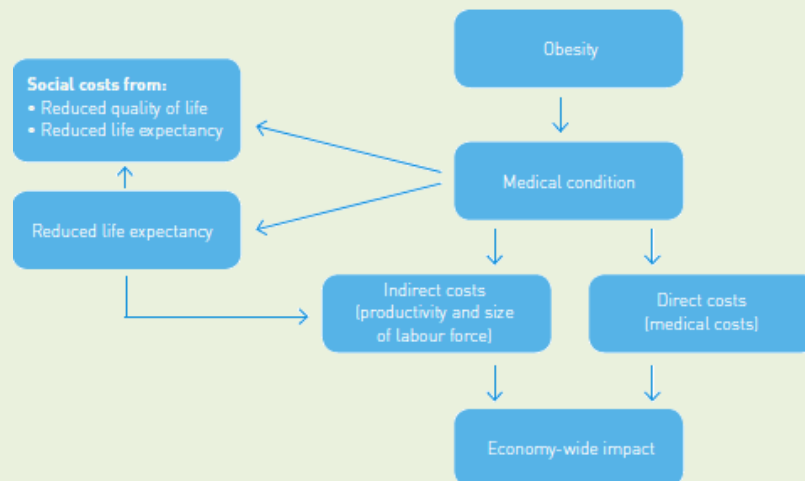
In Australia, KPMG estimated that 7,200 citizens die each year due to obesity and obesity related illness. The direct and indirect costs of obesity and obesity-related illnesses in 2008/09 were estimated to be \$37.7 billion. Loss in productivity due to obesity through absenteeism, presenteeism and premature death is estimated to be \$6.4 billion a year. Research shows that obesity intervention policies aimed at reducing the prevalence of obesity in Australia would yield strong benefits for the economy.

Figure 12 below shows the various components of the cost of obesity, including direct and indirect costs. The direct costs of treating obesity-related conditions are borne by governments, private health insurers and individuals. The indirect costs associated with obesity include the impact of being absent from work (absenteeism) and being less productive at work than a healthy person

⁶⁴ http://ec.europa.eu/health/tobacco/docs/tobacco_ia_rand_en.pdf.

(presenteeism). Absenteeism was found to be 14% higher in obese employees compared with normal-weight employees in the working population. These costs have an economic impact on the Australian economy, through productivity losses resulting in lower output. Medical conditions associated with obesity lead to social costs for individuals and families in the economy. This is created through reduced quality of life and shorter life expectancy.

Figure 12 – The social cost of obesity



Source: MediBank (2012)

Scope ▲ ▲

Like the defensive expenditures method, the cost of illness (COI) method focuses on expenditures made in response to the health effects of non-market impacts. In this case, however, the expenditures are focused on medical products and treatments. As a result, COI methods are very specific to a given sector, and often only account for one dimension of cost, with little attention for indirect costs such as the loss of income or the loss of leisure time, and the cost of pain and suffering.

Data intensity ▲ ▲ ▲

COI methods are all about data: private expenditure and the cost of medical treatments make the most of the results of these models.

Ease of data collection ▲ ▲ ▲ ▲ ▲

Collecting data to implement it often is less expensive than for other methods, improving the feasibility of developing original COI estimates in support of a specific policy. The only two conditions that must be met are: (i) the estimates of direct costs must reflect the economic value of goods and services used to

treat illness (prices in hospitals, for example, are unlikely to reflect the underlying cost); (ii) a person's earnings must reflect the economic value of lost work time, productivity, and leisure time. Because of distortions in medical and labour markets, these assumptions do not always hold.

Possibility to use pre-calculated data ▲ ▲ ▲ ▲ ▲

Pre-existing data must be available for this method, as for every method that uses real market data. In the US, COI estimates for many illnesses are readily available from existing studies and span a wide range of health effects. EPA's Cost of Illness Handbook (EPA 2007) provides estimates for many cancers, developmental illnesses and disabilities, and other illnesses. At the EU level, the Impact Assessment on the "Together for Health" strategy reports the following existing data on COI⁶⁵:

⁶⁵ SEC(2007)1374.

Box 12. Cost of Illness Estimates in SEC(2007)1374

- Treating Cardiovascular Disease costs around €74 billion per year in the EU and losses in production of goods and services cost around €106 billion¹⁰⁸. 80% of all cardiovascular diseases are considered to be preventable by reducing risk factors like smoking and unhealthy diet⁶⁶.
- WHO European Region studies show that estimates of direct costs of obesity during the 1990s ranged from 1% of healthcare expenditure in the Netherlands⁶⁷ to 1.5% in England and France, and 3.1–4.2% in Germany. A study from Belgium reported estimates of 6%⁶⁸. In England it was estimated that in 1998 obesity accounted for 18 million days of sickness absence and 30,000 premature deaths, equivalent to €715 million per year to treat obesity⁶⁹.
- 25% of people suffer mental health problems at some point in their lives and in several countries this is shown to be an increasing factor in worker absenteeism. It is estimated that mental disorders cost 3-4% of GDP per year⁷⁰.
- It is estimated that alcohol abuse cost the health, welfare, and criminal justice sector in the EU approximately €125 billion in 2003.
- The loss to Scottish employers due to decreased productivity, higher rates of absenteeism and fire damage caused by smoking has been calculated at 0.51% - 0.77% of Scottish GDP⁷¹. Currently asthma affects 30 million people across the continent and costs healthcare services approximately €17.7 billion a year.⁷²
- The SARS epidemic in 2003 was a serious incident which was brought under control by an effective international response. It ultimately killed about 800 people, and despite the well organised response, led to a total cost for the

⁶⁶ Liu et al, Heart 2002;88:597-603

⁶⁷ Seidell JC, Deerenberg I. Obesity in Europe: prevalence and consequences for use of medical care. Pharmacoeconomics, 1994; 5: 38–44.

⁶⁸ Institute Belge de l'Economie de la Santé. Evaluation du coût de l'obésité en Belgique. Briefing 29, June 2000

⁶⁹ National Audit Office (England) 2001

⁷⁰ Estimation by ILO. http://agency.osha.eu.int/publications/newsletter/8/en/index_23.htm

⁷¹ Parrott S, Godfrey C, Raw M. Costs of Employee Smoking in Scotland. Tobacco Control 2000; 9: 187-192.

⁷² The European Lung White Book: The First Comprehensive Survey on Respiratory Health in Europe 2003.

East and Southeast Asian economies as a whole of about US \$18 billion.⁷³ Without the effective intervention, the cost would have been much higher.

- A UK study from 2000 indicated that a 10% reduction in the number of hospital acquired infections could result in a saving of 150 million Euros per year⁷⁴.

Accuracy ▲

The COI method is not very accurate, for several reasons:

- ***It does not estimate WTP/WTB***, but only changes in explicit market costs resulting from change in incidence of illness.
- ***Is often does not account for indirect costs*** such as the loss of income or the loss of leisure time, and almost never account for the cost of pain and suffering. Therefore, the reduction in medical costs incurred because of a health intervention should be considered a lower bound estimate of the WTP.
- The difference between COI and averting behaviour is that usually the ***decision concerning health care expenditure is not made by individuals alone***, but involves social administrators, politicians and taxpayers. This circumstance introduces a complex evaluation issue because the decisions of public administrators and politicians reflect not only the assessment of the negative impacts of the non-market good, but also other types of considerations (politics and ethics).
- An additional problem with this approach is that ***changes in expenditure on treatments of health impacts are usually not easy to observe***, as changes in other, non-market factors (for example air pollution) can cause changes in expenditure over time, which should not be attributed to the cause one was trying to single out.

Possibility of application by the average desk officer ▲▲▲▲

The COI method is straightforward to implement and explain to policy makers, and this is probably its main advantage, since its application does not require sophisticated modelling and analytical skills, nor extensive empirical analysis.

⁷³ Assessing the Impact of SARS in Developing Asia, Asian Development Outlook 2003 Update (www.adb.org/documents/books/ado/2003/update/sars.pdf).

⁷⁴ Plowman R., Graves N., Griffin M., Roberts J.A., Swan A., Cookson B, et al. The socio-economic burden of hospital acquired infection. London: PHLS, 2000.

Compatibility/complementarity with other methods ▲▲▲▲▲

The COI method can be used with all other stated and revealed preference methods, as well as within a cost-benefit analysis. It is indeed recommended to couple this method with methods that capture indirect costs and pain and suffering more completely.

Suitability of application at the EU level ▲▲▲▲▲

There are no major obstacles to the application of COI methods to the specific IA system of the European Commission, as testified by the fact that COI values have been used in Commission IAs.

Table 15 – Overall assessment of COI models

ITEM	Score
Scope of application	▲▲
Data-intensity	▲▲▲
Ease of data collection	▲▲▲▲▲
Possibility to use pre-calculated data	▲▲▲▲▲
Accuracy	▲
Possibility of application by the average desk officer	▲▲▲▲
Compatibility/complementarity with other methods	▲▲▲▲▲
Suitability of application at the EU level	▲▲▲▲▲

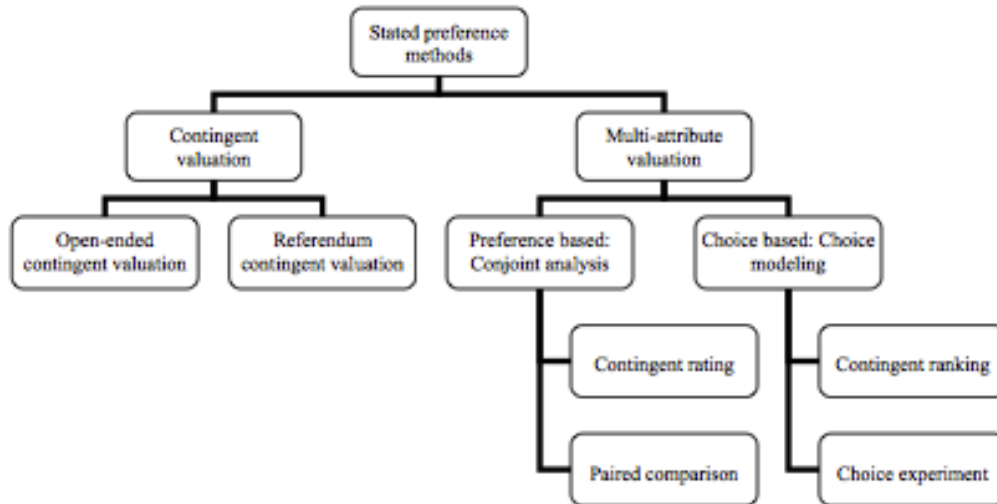
Strengths	Weaknesses
<ul style="list-style-type: none"> – Do not require extensive data – Use real market data 	<ul style="list-style-type: none"> – Scope is too narrow, often does not include indirect costs and pain and suffering – Decisions on health are normally mediated and constrained – Changes in treatment not easily observable

2.3.3 Stated preference models

When it is impossible to infer individuals' WTP from an observed behavior or by means of any revealed preference method, policy analysts can resort to stated preference models, which imply that individuals surveyed state their WTP or

WTA for a given change in policy, or a related impact. Inevitably, the accuracy of these estimates depend on the ability of the analyst in designing the survey and framing the context in which surveyed individuals will respond to their questions. Figure 13 below shows the most common variants of the stated preference models.

Figure 13 – Families of stated preference models



Source: Merino-Castello (2003).

2.3.3.1 Contingent valuation

The most common application of the stated preference methods is certainly contingent valuation⁷⁵. The contingent valuation method does not require the public goods or services to be linked to actual market transactions. It asks respondents in a hypothetical market if they would pay a specified amount for a prescribed commodity. The approach has gained increased acceptance among many academics and policy makers as a versatile and powerful technique for estimating the monetary value of non-market impacts of regulatory policies.

As a matter of fact, the format and design of surveys is a decisive factor for the accuracy and representativeness of the results given by the surveyed sample. The survey format chosen should minimize survey costs, non-responsiveness, unexplained variance, and complications associated with WTP estimation. The

⁷⁵ See e.g. Arrow, Kenneth, Robert Solow, Paul R. Portney, Edward E. Leamer, Roy Radner, and Howard Schuman, "Report of the Natural Oceanic and Atmospheric Administration A Panel on Contingent Valuation." In: Federal Register, 58, No. 10, January 15, 1993; Carson, Richard T., "Contingent Valuation: A User's Guide." In: Environmental Science & Technology, Vol. 34, No. 8, 2000.

Canadian cost-benefit analysis guide recommends the following steps in performing these types of contingent valuation studies:

- The survey should be conducted within an acceptable length for a typical interview in order to collect adequate information and reduce refusal rates from respondents;
- A pilot survey is important to finalize the construction and design of the questionnaire;
- The good or service being evaluated should be clearly explained to the respondent, as well as the objectives of the study;
- The socio-economic and demographic characteristics should be part of the questionnaires in order to cross-check the respondent's WTP;
- WTP questions should be designed within the budget limits of the respondent;
- The selection and size of the sample should be stratified or clustered according to proper sampling techniques;
- Statistical adjustments to the results should be made to account for non-response bias, if any; and
- Statistical analysis should be transparent and properly documented.

Two main types of stated preference survey format are currently used: direct WTP questions and stated choice questions. Stated choice questions can be either dichotomous choice questions or multi-attribute choice questions. Table 16 below – from Pierce et al. (2006) shows common formats used for these surveys, from open ended questions to iterative “bidding games”, “payment cards” and single- and double-bounded dichotomous questions.

Table 16 – Common elicitation formats in contingent valuation models

Format	Description
Open ended	What is the maximum amount that you would be prepared to pay every year, through a tax surcharge, to improve the landscape around Stonehenge in the ways
Bidding game	Would you pay GBP 5 every year, through a tax surcharge, to improve the landscape around Stonehenge in the ways I have just described? <i>if Yes: interviewer keeps increasing the bid until the respondent answers No. Then</i> <i>if No: interviewer keeps decreasing the bid until the respondent answers Yes. Then</i>
Payment card	Which of the amount listed below best described your maximum willingness to pay every year, through a tax surcharge, to improve the landscape around 0 GBP 0.5 GBP 1 GBP 2 GBP 3 GBP 4 GBP 5 GBP 7.5 GBP 10 GBP 14.5 GBP 15 GBP 20 GBP 30 GBP 40 GBP 50 GBP 75 GBP 100 GBP 150 GBP 200 > GBP 200
Single-bounded dichotomous choice	Would you pay GBP 5 every year, through a tax surcharge, to improve the landscape around Stonehenge in the way I have just described? (the price is varied randomly)
Double-bounded dichotomous choice	Would you pay GBP 5 every year, through a tax surcharge, to improve the landscape around Stonehenge in the way I have just described? (the price is varied randomly) <i>if Yes: and would you pay GBP 10?</i> <i>if No: and would you pay GBP 1?</i>

Source: Pierce et al. (2006)

Box 13: the value of working and non-working time

In transport economics, the value of time is the opportunity cost of the time that a traveller spends on his/her journey. In essence, this makes it the amount that a traveller would be willing to pay (WTP) in order to save time, or the amount they would accept (WTA) as compensation for lost time.

Whenever policymakers have to estimate the benefit associated with an improvement in the transportation infrastructure or a reduction of traffic (e.g.

because more intelligent transport systems are being adopted, or because accidents and associated congestion will be reduced) they can use stated preferences to infer the value of time.

The UK Department for Transport calculates on the basis of surveys the average values of time for travel on various modes of transport so that these values can be used to appraise transport projects as part of its New Approach to Appraisal. The so-called unit 3.5.6 of the WebTAG guide to policy appraisal uses, since October 2012, the revised values for working and non working time shown below (LGV is large goods vehicle, PSV is a public service vehicle):

Figure 14 – Values of working and non-working time in the UK

Table 1 Values of Working Time per person (£ per hour, 2010 prices and values)			
Vehicle Occupant	Resource Cost	Perceived Cost	Market Price
Car driver	28.35	28.35	33.74
Car passenger	20.31	20.31	24.17
LGV (driver or passenger)	10.92	10.92	13.00
OGV (driver or passenger)	10.92	10.92	13.00
PSV driver	10.92	10.92	13.00
PSV passenger	21.69	21.69	25.81
Taxi driver	10.48	10.48	12.47
Taxi/Minicab passenger	47.95	47.95	57.06
Rail passenger	39.65	39.65	47.18
Underground passenger	38.57	38.57	45.90
Walker	31.79	31.79	37.83
Cyclist	18.24	18.24	21.70
Motorcyclist	25.65	25.65	30.53
Average of all working persons	28.68	28.68	34.12

Table 2 Values of Non- Working Time per person (£ per hour, 2010 prices and values)			
Purpose	Resource Cost	Perceived Cost	Market Price
Commuting	5.43	6.46	6.46
Other	4.80	5.71	5.71

Source: DfT (2012)

Recently, the US Department of Transportation updated the figures it uses in its economic analyses, which applying to commuting time a fraction of the total earnings per hour. Figure 15 below shows the value of time for local and inter-city travel, personal and business traveling.

Figure 15 – Recommended values of travel time savings, US DOT

Recommended Values of Travel Time Savings (per person-hour as a percentage of total earnings)		
Category	Surface Modes* (except High-Speed Rail)	Air and High-Speed Rail Travel
Local Travel -		
Personal	50%	--
Business	100%	--
Intercity Travel -		
Personal	70%	70%
Business	100%	100%

Vehicle operators- 100% on all modes

* Surface figures apply to all combinations of in-vehicle and other time. Walk access, waiting, and transfer time should be valued at 100% of hourly income when actions affect only those elements of travel time.

Scope ▲▲▲▲▲

A contingent valuation method can be used to monetize almost everything, given its broad scope. It simply relies on the idea that individuals could directly state what their WTP or WTA is with respect to a future benefit or cost. This also means that, depending on the asset to be evaluated, there will be different methodological problems that emerge.

Data intensity ▲▲▲▲▲

Contingent valuation requires that data are created on purpose for the analysis, and a sufficient number of responses must be secured for the results to be sufficiently robust. Accordingly, the quality of the survey and the size of the sample are key for the reliability of the results.

Ease of data collection ▲▲

Contingent valuation methods are complex, costly and time consuming. They are increasingly made more sophisticated and articulated for reasons of accuracy: for example, there are very extensive guides on how to structure a questionnaire for the purposes of avoiding various types of biases.

Possibility to use pre-calculated data ▲ ▲

All data must be collected through surveys and other empirical techniques, which makes the use of pre-existing databases virtually impossible.

Accuracy ▲ ▲ ▲

The level of accuracy that can be reached by the contingent valuation method substantially depends on the quality of the survey, the size and selection of the sample, and the time and resources spent on the survey.

To be sure, an element of accuracy is that the CV model allows analysts to explore the reasons behind preferences. Stated preference questionnaires can include questions relating to:

- the respondent's characteristics or attitudes toward the non-market good; and
- the reasons behind the respondent's choices or answers to the WTP/WTB questions.

This, if subject to adequate analysis, can lead to a better understanding of the problem and interpretation of the results⁷⁶. Also, exploring the variation in responses is useful for identifying the winners and losers of an intervention. This is useful for stakeholder analysis (Bateman, 2002).

In the application of this model, biases that must be avoided include the following:

- **Hypothetical bias.** The hypothetical nature of the good in question and the payment mechanism can lead to inflated values in surveys. It is widely believed that individuals overstate their valuation of a good by a factor of two to three when comparing hypothetical versus actual payments for goods (Murphy et al., 2005)⁷⁷.
- **Non-commitment bias;** respondents may overstate their true WTP because they do not face a budget constraint and do not consider substitute goods within the world of the hypothetical scenario. Including simple reminders of substitutes and real world constraints or the adoption of more formal techniques have been suggested as solutions (Kemp and Maxwell, 1993).

⁷⁶ This is an advantage compared to hedonic pricing. For example, in hedonic pricing studies, it is often identified that house prices increase with the air quality in their neighbourhood (Smith and Huang, 1995). The exact reason for this correlation is often not clear. For example, it could be due to lower cleaning bills, the neighbourhood being more aesthetically pleasing, or due to the health damages associated with polluted air (Portney, 1981).

⁷⁷ See Blumenschein et al. (2008) for a review of the methods developed to tackle hypothetical bias in contingent valuation.

- **Strategic bias:** respondents in stated preference surveys may have an incentive to deliberately misrepresent their true preferences in order to achieve a more desirable outcome for themselves. An individual's incentive to behave strategically will be conditional on their beliefs of how their response will affect the price they pay and the provision of the good⁷⁸. Sometimes this behaviour is called “yea-saying”, when respondents overstate their true WTP in order to show support for situation described in survey questions.
- **Protest valuations.** Respondents with a positive true WTP may put forward a zero stated valuation due to, for example, ethical objections to the idea of paying for the good under consideration. If such respondents are not identified through follow up questions, and their responses consequently excluded from the statistical analysis, then biased estimates of the value of the good will result⁷⁹.
- **WTP-WTA disparity.** All stated preference survey choices and questions can be presented in terms of WTP or WTA. In theory, WTA for most goods should exceed WTP by a few percentage points, but sometimes differences are much wider, and not fully explained through concepts such as loss aversion and the endowment effect. Accordingly, even if in principle WTA can be considered as a conceptually more appropriate measure of losses, authoritative commentators have argued in favour of using always WTP (Arrow et al., 1993).
- **Information bias,** related to non-neutrality in the presentation of information to the surveyed sample. For example, Cameron and Huppert (1991) and Cooper and Loomis (1992) find that mean WTP estimates based on dichotomous choice questions may be sensitive to the ranges and intervals of dollar amounts included in the WTP questions. Kanninen and Kriström (1993) show that the sensitivity of mean WTP to bid values can be caused by model misspecification, failure to include bid values that cover the middle of the distribution, or inclusion of bids from the extreme tails of the distribution.
- Face-to-face or telephone surveys also create the potential for **interviewer bias** if respondents deviate from their true preferences under influence

⁷⁸ - Adamowicz et al. (1998a) also suggests that respondents may be less likely to behave strategically when responding to multi-attribute choice experiments. Repeatedly choosing from several options gives the respondent some practice with the question format that may improve the overall accuracy of her responses, and gives her repeated opportunities to express support for a program without always selecting the highest price option.

⁷⁹ Hanley and Shrogen (2005) suggest that protest values can be reduced by making WTA scenarios more acceptable by specifying community-level compensation rather than individual compensation –if individuals are adverse to the idea of benefiting personally in money terms).

exerted by the interviewer. Of course, this effect should be avoided with well trained interviewers (Carson, 2000).

- **Non-response bias** occurs if individuals who feel strongly for or strongly against a good or issue are more likely to respond, which can lead to either an upward or downward bias. Based on recommendations from the NOAA Blue Ribbon panel (Arrow et al. 1993), many surveys now include “don’t know” or “no preference” options for respondents to choose from.

Reliability can be ensured by the analyst through a number of means, including test-retest approaches, meta-analysis of survey results, and tests on content validity, criterion validity and convergent validity.

Possibility of application by the average desk officer ▲

A dedicated training is needed in order to apply contingent valuation in a way that does not retrieve distorted, mistaken results. The simplicity of the underlying concept should not lead to false illusions: contingent valuation models have become a very complex exercise in the past years, especially if one wants to ensure that the several biases that can affect the questionnaires are avoided.

Compatibility/complementarity with other methods ▲▲▲▲▲

Many guidance documents emphasize the need to couple contingent valuation with other models, also in order to perform a robustness check. These models are easily coupled with all revealed preference models.

Suitability of application at the EU level ▲▲▲

The main problem that would emerge at the EU level is the design of the questionnaire, which would have to take into account the diversity in the population of the EU27 and the different attitudes with respect to policy outcomes, risks etc.

Table 17 – Overall assessment of contingent valuation models

ITEM	Score
<i>Scope of application</i>	▲ ▲ ▲ ▲ ▲
<i>Data-intensity</i>	▲ ▲ ▲ ▲ ▲
<i>Ease of data collection</i>	▲ ▲
<i>Possibility to use pre-calculated data</i>	▲ ▲
<i>Accuracy</i>	▲ ▲ ▲
<i>Possibility of application by the average desk officer</i>	▲
<i>Compatibility/complementarity with other methods</i>	▲ ▲ ▲ ▲ ▲
<i>Suitability of application at the EU level</i>	▲ ▲ ▲

Strengths	Weaknesses
<ul style="list-style-type: none"> - Can measure non-use values - Based in economic utility theory and can produce reliable estimates. - Most biases can be eliminated by careful survey design and implementation. - Widely used and researched: it is being constantly improved to make the methodology more reliable 	<ul style="list-style-type: none"> - Costly and time-consuming - Estimates of non-use values are difficult to validate externally. - Stated intentions of willingness to pay may exceed true feelings. - Several potential biases to control for

2.3.3.2 Choice modelling and conjoint analysis

Choice Modelling and conjoint analysis have been widely used in the market research and transport literatures and, more recently, to other areas such as the environment⁸⁰. This technique can be described as a family of survey-based methodologies for modelling preferences for goods where goods are expressed in terms of their attributes and the categories of these attributes. Respondents are asked to make a choice of a good based on the preferences for the types and levels of the attributes associated with the good. The amount of WTP can be estimated indirectly from the prices of the relevant attributes of the good being valued. For example, assume you want to know how tourists weigh certain features of given locations before deciding whether to go there on vacation; or the value attributed by drivers to air conditioning as opposed to electronic stability systems in a car: in cases like these, you can structure your survey around various questions with mix and match these products/services with

⁸⁰ E.g. for the market research and transport applications, Green and Srinivasan, 1978; Henscher, 1994. And see Pierce et al. 2006 for an analysis of the applications in the environmental field.

various attributes, in a way that will help you single out the preference expressed for a single attribute.

The main phases of a choice modelling experiment are summarized as thus the following:

- ***Selection of attributes.*** Identification of relevant attributes of the good to be valued. Literature reviews and focus groups are used to select attributes that are relevant to people while expert consultations help to identify the attributes that will be impacted by the policy. A monetary cost is typically one of the attributes to allow the estimation of WTP.
- ***Assignment of levels.*** The attribute levels should be feasible, realistic, non-linearly spaced, and span the range of respondents' preference maps. Focus groups, pilot surveys, literature reviews and consultations with experts are instrumental in selecting appropriate attribute levels. A baseline "status quo" level is usually included.
- ***Choice of experimental design.*** Statistical design theory is used to combine the levels of the attributes into a number of alternative scenarios or profiles to be presented to respondents. Complete factorial designs allow the estimation of the full effects of the attributes upon choices: that includes the effects of each of the individual attributes presented (main effects) and the extent to which behaviour is connected with variations in the combination of different attributes offered (interactions). These designs often originate an impractically large number of combinations to be evaluated: for example, 27 options would be generated by a full factorial design of 3 attributes with 3 levels each. Fractional factorial designs are able to reduce the number of scenario combinations presented with a concomitant loss in estimating power (i.e. some or all of the interactions will not be detected). For example, the 27 options can be reduced to 9 using a fractional factorial. These designs are available through specialised software.
- ***Construction of choice sets.*** The profiles identified by the experimental design are then grouped into choice sets to be presented to respondents. Profiles can be presented individually, in pairs or in groups. For example, the 9 options identified by the fractional factorial design can be grouped into 3 sets of four-way comparisons.
- ***Measurement of preferences.*** Choice of a survey procedure to measure individual preferences: ratings, rankings or choices.
- ***Estimation procedure.*** Ordinary least squares (OLS) regression or maximum likelihood estimation procedures (logit, probit, ordered logit, conditional logit, nested logit, panel data models, etc.). Variables that do not vary across alternatives have to be interacted with choice-specific attributes.

A good case study on choice modelling is provided by Charlie Nelson from Sydney University, and is based on an experiment with university students. 89 third-year students were asked specify the attributes of breakfast cereals which were important to them; observe the research design process; and then act as survey respondents. Table 18 shows the attributes and levels chosen for the experiment.

Table 18 – Example of attributes and levels in a choice modelling experiment

Attribute	Levels
Brand	Kellogg, Sanitarium, Uncle Tobys, No Frills
Price (relative to average)	-30%, -10%, +10%, +30%
Sugar content	Low, High
Fibre content	Low, High
Fat content	Low, High
Toys in pack	Yes, No

Using a dedicated software (Bretton-Clarke), it was possible to test students on several combinations of attributes, which yielded interesting results: it emerged that students make their decisions mostly based on brand (roughly 37% of weight in the final decision), fat (approx. 20%), price (approx. 18%), fibre (13-14%), level of sugar (approx. 7%) and presence of toys (4%).⁸¹

Harpman (2008) describes a similar example for the analysis of an environmental policy problem: the operation of the Glen Canyon Dam in the US.

Scope ▲▲▲▲▲

A choice modelling method can be used to monetize almost everything, given its broad scope. It relies on the idea that individuals could provide more information about their WTP or WTA if one prompts them with problems of rating, ranking of choices amongst a series of alternative packages of characteristics from where willingness to pay can be indirectly inferred. Importantly, just like contingent valuation methods, these methods can look at future benefits or costs with no need for pre-existing data; and they can be used also to assess the non-use value of given (mostly environmental) assets.

⁸¹ Roberts, J. and C. and Nelson (1996) "Using the Diagnostics of Dynamic Choice Models to Manage or Defend Against New Product Launches" Australasian Journal of Market Research, 4, No. 1, (January) pp 13-34.

Data intensity ▲ ▲ ▲ ▲ ▲

Just like contingent valuation, choice modelling requires that data are created on purpose for the analysis, and a sufficient number of responses must be secured for the results to be sufficiently robust. Accordingly, the quality of the survey and the size of the sample are key for the reliability of the results. In addition to contingent valuation, questionnaires are usually more complicated as they avoid direct question and proceed through ratings, rankings or gradual exclusion of options.

Ease of data collection ▲

Choice modelling is complex, costly and time consuming. An accurate application of these models requires the precise identification of the main attributes that the analyst needs to single out, and a number of careful steps to avoid that biases, confusion or consistency/transitivity problems emerge in the responses; the identification of relevant attributes of the good to be valued, the assignment of attribute levels through focus groups, pilot surveys, literature reviews and consultations with experts; the choice of an experimental design, the construction of choice sets, the measurement of preferences and finally running regressions or other estimation procedures to process the results.

Possibility to use pre-calculated data ▲

All data must be collected through surveys and other empirical techniques, which makes the use of pre-existing databases virtually impossible.

Accuracy ▲ ▲ ▲ ▲ ▲

The level of accuracy that can be reached by the contingent valuation method is potentially very high, but all depends on quality of the survey design, the appropriate choice of attributes and attribute levels, the size and selection of the sample, and the time and resources spent on the survey.

To be sure, like in contingent valuation an element of accuracy is that the choice modelling methods allow analysts to explore the reasons behind preferences and provide a lot of additional information as regards individuals' relative ranking or absolute rating of chosen and discarded alternatives. In terms of accuracy, some of the variants of choice modelling (choice experiments, and partly contingent rating/ranking) are arguably more informative than discrete choice contingent valuation studies as respondents get multiple chances to express their preference for a valued good over a range of payment amounts.

In addition, choice modelling methods can reach unmatched levels of accuracy for situations where changes are multi-dimensional: here, these methods profit

from their ability to separately identify the value of individual attributes of a good or programme, typically supplied in combination with one another. In this respect, they are homologous to what hedonic pricing seeks to do in the domain of revealed preference models. Choice modelling, however, can more directly take into account surveyed individuals' bounded rationality.

Finally, since they avoid direct responses, choice modelling methods might mitigate some of the biases that emerge in contingent valuation studies (see above, Section 4.2.2.1).

Possibility of application by the average desk officer ▲

A dedicated training is needed in order to apply choice modelling in a way that does not retrieve distorted, mistaken results. These models entail a number of very complex steps and a careful survey design.

Compatibility/complementarity with other methods ▲▲▲▲

Choice modelling methods can be coupled with any other method, however their cost and the level of resources and skills needed suggest that they are applied as stand-alone methods, and only whenever their complexity is justified by the importance and multi-dimensional character of the impact to assess.

Suitability of application at the EU level ▲▲▲

Provided that they are run by dedicated research centres (e.g. the JRC) or by consultants, possibly using dedicated software, choice modelling methods can be used at the EU level. It is however advisable to use them subject to the principle of proportionate analysis, which means that they might be used only when the magnitude and complexity of the impacts to be assessed justifies the commitment of remarkable resources.

Table 19 – Overall assessment of choice modelling

ITEM	Score
<i>Scope of application</i>	▲ ▲ ▲ ▲ ▲
<i>Data-intensity</i>	▲ ▲ ▲ ▲ ▲
<i>Ease of data collection</i>	▲
<i>Possibility to use pre-calculated data</i>	▲
<i>Accuracy</i>	▲ ▲ ▲ ▲
<i>Possibility of application by the average desk officer</i>	▲
<i>Compatibility/complementarity with other methods</i>	▲ ▲ ▲ ▲
<i>Suitability of application at the EU impact assessment system</i>	▲ ▲ ▲

Strengths	Weaknesses
<ul style="list-style-type: none"> – Can deal with situations where changes are multi-dimensional – Possibility to use multiple choices – Users can express preference for a valued good over a range of payment amounts – Relying on ratings, rankings and choices to infer WTP can overcome some problems of the Contingent Valuation Method. 	<ul style="list-style-type: none"> – Respondents might find problems in dealing with multiple complex choices or rankings – Inefficiency in deriving values for a sequence of elements implemented by a policy or project. – WTP estimate very sensitive to study design.

2.3.4 Valuing major benefit items

Valuation techniques have become gradually more sophisticated and specific over the past few years, with a myriad of models available in specific economic sectors. Accounting for all techniques, models and economic sectors would be impossible and outside the scope of this report, which is aimed at offering basic guidance to officers in charge of impact assessment, regardless of the policy domain in which they operate. In this section, we give account of specific measurement techniques that have emerged in the valuation of specific non-monetary benefits such as human health and the environment, which have become common practice in a number of legal systems. The description is not meant to be exhaustive, but will hopefully inform the reader as regards the plurality of approaches that can be taken to the valuation of a given benefit. Section 2.2.6.1 explains the main methods used to value human health-related impacts, whereas Section 2.2.6.2 is dedicated to ecological impacts.

2.3.4.1 Valuing human health

Health and environmental policies may affect human health in a number of ways: they can save lives by reducing the risk of “mortality”, and also improve the health of those living with diseases, i.e. there may be a “morbidity” benefit; they can reduce tension or stress, or improve mental health. Policies on health and safety generally are expected to reduce the risks of premature death; and Human health improvements from environmental policies include effects such as reduced mortality rates, decreased incidence of non-fatal cancers, chronic conditions and other illnesses, and reduced adverse reproductive or developmental effects. In the US the term “lifesaving regulation” has become part of the jargon of regulatory practitioners to encompass all health, safety and environmental regulation which are most often aimed at reducing certain risks.

The most consolidated (but still controversial) approach to the valuation of risk reductions such as the avoidance of fatalities or serious injuries, or gains in terms of life years saved is the preference-based measurement of individuals’ willingness to pay to avoid certain risks. Accordingly, benefits are usually measured in terms of the value of statistical lives (VSL), a measure derived from the aggregation of many small risks over an exposed population⁸². VSL estimates take time: accordingly, it makes sense to provide officers with pre-existing research and figures in order to facilitate the incorporation of these values in the impact assessment. This has happened in a number of occasions also in EU impact assessment (e.g. in cases regarding road safety by DG ENTR and DG MOVE, or environmental policies by DG ENV).

One alternative approach to valuing risk reduction in life-saving regulation, especially in the case of morbidity effects, is the use of non-monetary parameters such as Quality-Adjusted Life-Years (QALYs) or Disability-Adjusted-Life-Years (DALYs). These can also be combined with other indicators and methods to build monetary measures of “WTP per QALY”, which of course present the same methodological challenges of WTP-based models.

Mortality: from the “human capital” approach to the Value of a Statistical Life

Economists have initially tried to measure the benefit associated with a saved death with the so-called “human capital approach”, which equates the value of a statistical life with foregone earnings. This has largely been rejected as an

⁸² Thomas Schelling (1968) was the first to describe what has come to be known as the value of a statistical life (VSL), made the case for establishing a monetary value of the benefit of life saving policies. See Schelling, T. C. (1968) The life you save may be your own. In: S.B. Chase, Jr. (Eds.), Problems in Public Expenditure Analysis. (pp. 127–162). Washington DC: The Brookings Institute.

inappropriate measure of the value of reducing mortality risks because it is not based on WTP for small risk reductions and as such does not capture the value associated with avoided pain and suffering, dread, and other risk factors that are thought to affect value (Viscusi 1993); and also since it would under-estimate the value of losing the lives of children and the elderly⁸³.

The human capital approach was then replaced with three different preference-based approaches⁸⁴:

- *Hedonic wage (wage-risk) methods* in which value is inferred from the income-risk trade-offs made by workers for on-the-job risks⁸⁵.
- *Averting behaviour models*, which study value risk changes by examining purchases of goods that can affect mortality risk (e.g., bicycle helmets)⁸⁶.
- *Stated preference studies*. These studies use survey techniques to capture or infer individuals' WTP to avoid major risks⁸⁷.

The underlying idea is based on individuals' WTP for reducing low-probability risks, such as a one-in-10,000 annual chance of dying in a road traffic accident. For these low-probability risks, these models assume that WTP to avoid the risk

⁸³ Valuing mortality risk changes in children is particularly challenging. In the US, EPA's Handbook for Valuing Children's Health Risks (2003) provides some information on this topic, including key benefit transfer issues when using adult-based studies. The OMB Circular A-4 also recognizes this subject, specifically advising: "For rules where health gains are expected among both children and adults and you decide to perform a BCA, the monetary values for children should be at least as large as the values for adults (for the same probabilities and outcomes) unless there is specific and compelling evidence to suggest otherwise" (OMB 2003). OMB guidance applies to risk of mortality and of morbidity.

⁸⁴ Recently, some US researchers have begun to use meta-analysis to combine study results and examine the impact of study design. Recent examples include Viscusi and Aldy (2003), Mrozek and Taylor (2002), and Kochi et al. (2006). EPA applications of VSL are numerous, and include the Clean Air Interstate Rule (CAIR), the Non-Road Diesel Rule, and the Stage 2 Disinfection By-Products Rule (DBP). At the OECD level, see Braathen, Nils Axel, Henrik Lindhjem and Ståle Navrud (2009), Valuing lives saved from environmental, transport and health policies: A meta-analysis of stated preference studies, OECD, Paris. Lindhjem Henrik et al. (2010), Meta-analysis of stated preference VSL studies: Further model sensitivity and benefit transfer issues, OECD, Paris. Biaisque, Vincent (2010), The value of statistical life: A meta-analysis, OECD, Paris. Navrud, Ståle and Henrik Lindhjem (2011), Valuing Mortality Risk Reductions in Regulatory Analysis of Environmental, Health and Transport Policies: Policy Implications, OECD, Paris. Lindhjem, Henrik, Ståle Navrud, Nils Axel Braathen, and Vincent Biaisque (2011), "Valuing Mortality Risk Reductions from Environmental, Transport, and Health Policies: A Global Meta-Analysis of Stated Preference Studies", Risk Analysis, Vol. 31, No. 9, 2011.

⁸⁵ A general overview of common approaches and issues in mortality risk valuation can be found in Hammitt (2003). Viscusi (1993) and Viscusi and Aldy (2003) provide detailed reviews of the hedonic wage literature. Black, Galdo, and Liu (2003) provide a technical review of the statistical issues associated with hedonic wage studies.

⁸⁶ Blomquist (2004) provides a review of the averting behavior literature.

⁸⁷ Some key issues related to stated preference studies are included in Alberini (2004).

of death increases proportionately with growing risk. That is, when an individual is willing to pay \$1,000 to reduce the annual risk of death by one in 10,000, she is said to have a VSL of \$10 million. The assumption of a linear relationship between risk and willingness to pay therefore implies that she would be willing to pay \$2,000 to reduce risk by two in 10,000 or \$5,000 to reduce risk by five in 10,000⁸⁸.

Key considerations in all of these studies include the extent to which individuals know and understand the risks involved, and the ability of the study to control for aspects of the actual or hypothetical transaction that are not risk-related. Because the value of risk reduction may depend on the risk context (e.g., work-related vs. environmental), results from any single study may not be directly applicable to a typical environmental policy case. There are also additional methods that can be used to derive information on risk trade-offs. Van Houtven et al. (2008) use a risk-risk trade-off model to examine preferences for avoiding fatal cancers. Carthy et al. (1999) examine trade-offs between fatal and non-fatal risks to indirectly estimate a WTP. This approach may make the task more manageable for the respondent, but the analyst should consider and evaluate the complexity of the additional steps and the indirect nature of the resulting estimates.

The typical value that is inferred from these methods is the so-called “value of a statistical life” (VSL). Even if the concept and underlying assumptions are still controversial and heavily debated in the literature, VSL has been used extensively by public authorities. However, given the data-intensive nature of the exercise, normally VSL cannot be calculated *ad hoc* for the purposes of an *ex ante* impact assessment: this is why many guidance documents around the world include a pre-assessment of the range and median values to be attributed to VSL in *ex ante* policy appraisal. It is, however, very important to provide full guidance to the officers in charge of *ex ante* IA before they can just transfer any generic VSL to the population affected by their policies: VSL is indeed a composite index that depends, *i.a.* on the average age and income of the population it refers to. Accordingly, unless a policy is likely to affect each and every European citizen, it would not be possible to use a single value for every policy proposal at hand.

In order to help countries implement cost-benefit analysis, the OECD has recently carried out a meta-analysis of all available mean VSL estimates from a very large number of stated preferences surveys made using environmental, health and traffic risk contexts. The main attempt was to explain the differences in existing VSL estimates and help countries draw on this analysis to do ‘benefits transfers’. This has finally produced a very simplified guide that could

⁸⁸ The assumption of a linear relationship between risk and willingness to pay (WTP) breaks down when the annual WTP becomes a substantial portion of annual income, so the assumption of a constant VSL is not appropriate for substantially larger risks.

be included in national and EU guidelines on Impact Assessment. Table 20 below shows the eight-stage procedure for the transfer of the base value to a given country or local level. This can be considered to be a starting point for a careful transfer of generic VSL values from the OECD to the national context: however, in individual IAs more adjustments might be needed to improve the accuracy of the estimates.

Table 20 – OECD Adjustment factors to transfer VSL values

Adjustment factor	Recommendation
Population Characteristics	
Income	No adjustment within a country or group of countries the policy analysis is conducted for (due to equity concerns). For transfers between countries VSL should be adjusted with the difference in Gross Domestic Product (GDP) per capita to the power of an income elasticity of VSL of 0.8, with a sensitivity analysis using 0.4.
Age	No adjustment for adults due to inconclusive evidence. Adjust if regulation is targeted on reducing children's risk. VSL for children should be a factor of 1.5 – 2.0 higher than adult VSL.
Health status of population and background risk	No adjustment (due to limited evidence)
Risk Characteristics	
Timing of risk (Latency)	No adjustment (due to limited evidence).
Risk perception (source or cause)	No adjustment (due to inconclusive evidence). Sensitivity analysis for lower values in the environment sector than in health and traffic.
Cancer or dread (Morbidity prior to death)	No adjustment if regulation is targeted on cancer risks and/or risks that are dreaded due to morbidity prior to death. Morbidity costs prior to death should be added separately.
Magnitude of risk change	No adjustment. However, since the magnitude of the risk change clearly affects the VSL, a sensitivity analysis based on VSL calculated from a risk change similar in magnitude to the policy context should be conducted. A risk change of 1 in 10 000 annually is suggested for calculating a VSL base value.
Other adjustments	
Altruism and Public vs. Private risk	No adjustment (due to limited evidence and unresolved issues). Use "Private risk" to calculate a VSL base value. Provide illustrative adjustments in sensitivity analysis.
Discount for hypothetical bias in SP studies	No adjustment (due to limited evidence).
Correction for inflation	Adjustment based on the national Consumer Price Index (CPI).
Correction for increased real income over time	Adjust VSL with same the percentage as the percentage increase in GDP per capita.

Source: OECD (2012), at 139, table 7.1.

Morbidity

Morbidity benefits consist of reductions in the risk of non-fatal health effects ranging from mild illnesses, such as headaches and nausea, to very serious illnesses such as cancer. Non-fatal health effects also include conditions such as birth defects or low birth weight. Non-fatal health effects differ with respect to the availability of existing value estimates. Values for reducing the risks of some of these health effects have been estimated multiple times using a variety of different methods, while others have been the subject of only a few or no valuation studies.

Also for what concerns morbidity, the measurement of WTP is the most common practice to infer individual preferences to reduce the risk of experiencing an illness. Following Freeman (2003), this measure consists of four components:

- “**Averting costs**” to reduce the risk of illness;
- “**Mitigating costs**” for treatments such as medical care and medication;
- **Indirect costs** such as lost time from paid work, maintaining a home, and pursuing leisure activities; and
- Less easily measured but equally real **costs of discomfort, anxiety, pain, and suffering**.

The three primary methods most often used to value morbidity in an environmental context are:

- Stated preference models and
- Averting behaviour models.

The most important methodological challenges of these methods, as recalled by the US Environmental Protection Agency, are problems in characterizing and measuring morbidity effects; and the risk of incomplete estimates of WTP.

In alternative to WTP-based measures, other consolidated methods exist in the regulatory practice, which do not lead to the monetization of benefits. These include the following.

- Cost of illness models in their most basic form, which does not include indirect costs and subjective perception of costs and risks⁸⁹.
- Risk-risk trade-offs, for example, do not directly estimate dollar values for risk reductions, but rather provide rankings of relative risks based on consumer preferences.
- Health-state indices, composite metrics that combine information on quality and quantity of life lived under various scenarios, are often used for cost-effectiveness or cost-utility analyses. These methods cannot be directly related to WTP estimates as the indices were developed using very different paradigms than those for WTP values. As such, they should not be used for deriving monetary estimates for use in BCA, although there is evidence that components of these indices may still be useful in a benefit-transfer context⁹⁰.

⁸⁹ EPA’s *Cost of Illness Handbook* (U.S. EPA 2007c) includes estimates for many cancers, developmental illnesses, disabilities, and other conditions. EPA analyses of regulations and policies, including EPA’s two comprehensive studies of the benefits and costs of the Clean Air Act (U.S. EPA 1997a and U.S. EPA 1999) draw upon a number of existing studies to obtain values for reductions of a variety of health effects. These sources describe how the central estimates were derived, and attempt to quantify the uncertainty associated with using the estimates.

⁹⁰ (Hammit 2003, Van Houtven et al. 2006). These include relying on estimates from previously completed studies, many of which can be found in the Tufts Cost Effectiveness Analysis (CEA) Registry (Thorat et al., 2012), using the benefits transfer process discussed earlier.¹⁶ A frequently used option is to apply one of several generic HRQL indices,

The most common alternative to WTP-based measures in valuing morbidity is the use of so-called cost utility analysis (CUA), which relies on the quality adjusted life years (QALYs) as a measure of benefits. QALYs incorporate two dimensions of health improvement: (i) the additional years of life and (ii) is quality of life during these years. On the basis of QALYs, policymakers can resort to least cost analysis by measuring the cost per QALY of various policy alternatives.

QALYs can be calculated on the basis of an index of the health-related quality of life (HRQL), which ranges from 0 (death) to 1 (full health)⁹¹. QALYs can be summed across health states to determine the total QALYs associated with a particular condition. The results can then be added across the health conditions and individuals affected by a policy to determine the total QALYs potentially gained or lost as a result of its implementation. For example, QALY gains can be summed across averted cases of chronic bronchitis, heart disease, asthma and other conditions, as well as premature mortality, to determine the total impact of a policy that would reduce air pollution. These steps are illustrated in Figure 16.

examples of which include the EQ-5D, the Health Utilities Index (HUI), and the Quality of Well-Being (QWB) scale.¹⁷ Each employs a classification system with several dimensions to describe health; e.g., in the case of the EQ-5D: mobility, self-care, usual activities, pain, and anxiety and depression. A particular health state is rated within each dimension; for example, as causing no, some, or extreme mobility problems. Each attribute of the health state (such as having “some” mobility problems) is then weighted based on a population survey developed especially for that index. These indices have the advantage of standardizing the approach for describing each health state and including pre-established preference weights for each attribute. The results will vary, however, depending on which index is applied, given differences in the attributes they include and how the attributes are weighted.

⁹¹ values > 1 are not possible but values < 0 are used for states that are judged to be worse than dead

Figure 16 – An example on the use of QALYs

Assume that, in the absence of the policy, the average individual is likely to survive for 10 more years with a health-related quality of life of 0.7. With the policy, assume that the average individual affected is likely to survive for 15 more years with a health status of 0.9.

Then the QALY gain attributable to the policy is the difference between 15 years with a health status of 0.9 (13.5 QALYs) and 10 years with a health status of 0.7 (7 QALYs), which equals 6.5 QALYs.

This gain can be described as having two components.

- The decreased morbidity during the 10-year survival period would lead to an average gain of 2.0 QALYs (moving from 0.7 to 0.9 provides an HRQL increase of 0.2, multiplied by 10 years).
- The individual would survive for an additional five years, with an HRQL of 0.9 over this time period. The increase in life expectancy leads to an additional gain of 4.5 QALYs (moving from 0 to 0.9 provides an HRQL increase of 0.9, multiplied by 5 years).

The total gain is thus 6.5 QALYs (2.0 QALYs plus 4.5 QALYs) for the average individual affected.

If the affected population includes 500 such individuals, then the total gain attributable to the regulation would be 3,250 QALYs (6.5 QALYs multiplied by 500 individuals).

Source: Robinson and Hammitt (2013)

QALY are conceived for quantitative use with no need for monetization. However, if one wants to apply this concept in cost-benefit analysis, it is necessary to assign them a monetary value. When WTP estimates are not available for morbidity, analysts simply multiply the gain by the VSLY. This approach, however, is not advisable since the QALY system is not entirely consistent with the framework for cost-benefit analysis (Hammit 2002). Also the assumption of constant values per QALY must be proven, as QUALYS might also be found to have more complex utility functions. Research that explicitly considers WTP per QALY indicates that this value is not a constant for reasons other than the age of those affected. Haninger and Hammitt (2011) find that the value depends on the magnitude of the expected QALY gain and the duration of the health effect.

Example: road safety in Norway

A typical application of various methods of benefit assessment, which incorporates also VSL and VSLY in addition to other preference-based methods and benefit transfer, is observable in the field of road safety. In Norway, a series of WTP-based valuations of various actions or assets have been pre-calculated for policy use, as shown in table 21 below.

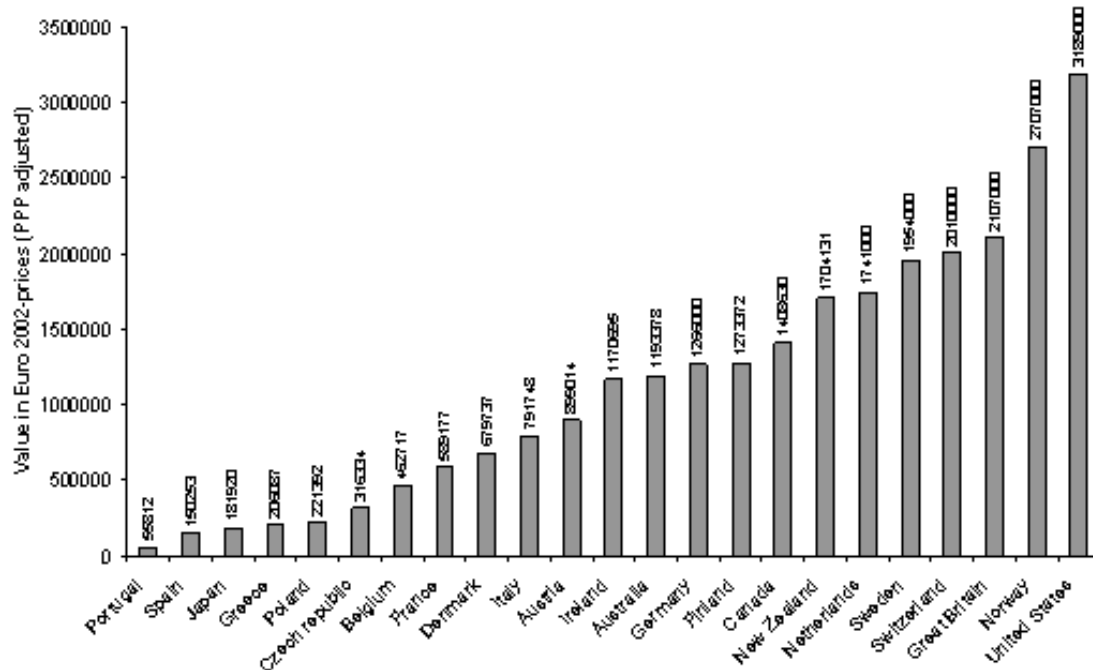
Table 21 – Monetary valuation of impacts of road transport projects in Norway

Main policy objective	Unit of valuation	Valuation per unit (NOK 2005 prices)
Road safety	1 fatality	26,500,000
	1 police reported serious injury (adjusted for incomplete reporting)	7,800,000
	1 police reported slight injury (adjusted for incomplete reporting)	800,000
Travel time	1 vehicle hour of travel by means of passenger car	125
	1 vehicle hour of travel by means of van	140
	1 vehicle hour of travel by means of freight truck	470
	1 vehicle hour of travel by means of bus (including passengers)	860
Vehicle operating costs	Vehicle operating cost per kilometre – car	1.30
	Vehicle operating cost per kilometre – heavy goods vehicle	4.44
	Vehicle operating cost – bus	4.82
Environmental impacts	Traffic noise, per vehicle km, large and medium sized towns	0.38
	Traffic noise, per vehicle km, rural areas	0.00
	Local air pollution, per vehicle kilometre, large towns	0.25
	Local air pollution, per vehicle kilometre, small towns	0.11
	Local air pollution, per vehicle kilometre, rural areas	0.02
	Global air pollution (carbon dioxide), per vehicle kilometre	0.12
Health impacts	Insecurity in crossing road, per crossing	1.00
	Insecurity in walking or cycling in mixed traffic, per kilometre	2.10
	Reduction of short term sick leave, walking 1 kilometre	2.90
	Reduction of short term sick leave, cycling 1 kilometre	1.50
	Reduction of serious illness, walking 1 kilometre	5.20
	Reduction of serious illness, cycling 1 kilometre	2.60

Source: Safetynet (2009)

In addition, many countries officially use a measure of VSL for road traffic fatalities, as shown in figure 17 below.

Figure 17 - Official monetary valuation of a road accident fatality in selected countries. Euro in 2002-prices.



Source: SafetyNet (2009), quoting various studies

Example: environmental policy

In environmental policy, there are a myriad of partial and general equilibrium models being used to help carrying out a comprehensive impact assessment. Only in the European Commission, at least 10-15 different models are being used; and in the recently developed (*beta*) LIAISE database of methods and models for cost-benefit analysis, already 86 models have been classified and described. Many of these models incorporate WTP-based valuations of given impacts, with specific respect to ecological impacts. As a matter of fact, IAs in the field of environmental policy almost all the techniques described above are actually used, often within the same impact assessment exercise. Table 22 below shows the variety of methods that are being used by the Environmental Protection Agency in the US for the monetization of various types of benefits.

Table 22 – Benefit categories and associated methodologies

Benefit Category	Examples	Commonly Used Valuation Methods
Human Health Improvements		
Mortality risk reductions	Reduced risk of: Cancer fatality Acute fatality	Averting behaviors Hedonics Stated preference
Morbidity risk reductions	Reduced risk of: Cancer Asthma Nausea	Averting behaviors Cost of illness Hedonics Stated preference
Ecological Improvements		
Market products	Harvests or extraction of: Food Fuel Fiber Timber Fur and Leather	Production function
Recreation activities and aesthetics	Wildlife viewing Fishing Boating Swimming Hiking Scenic views	Production function Averting behaviors Hedonics Recreation demand Stated preference
Valued ecosystem functions	Climate moderation Flood moderation Groundwater recharge Sediment trapping Soil retention Nutrient cycling Pollination by wild species Biodiversity, genetic library Water filtration Soil fertilization Pest control	Production function Averting behaviors Stated preference
Non-use values	Relevant species populations, communities, or ecosystems	Stated preference
Other Benefits		
Aesthetic improvements	Visibility Taste Odor	Averting behaviors Hedonics Stated preference
Reduced materials damages	Reduced soiling Reduced corrosion	Averting behaviors Production / cost functions

Note: “Stated preference” refers to all valuation studies based on hypothetical choices, as distinguished from “revealed preference,” which refers to valuation studies based on observations of actual choices.

Source: EPA(2011)

2.4 *Other assessment methods*

2.4.1 The “Benefit transfer” approach

The benefit transfer approach (also termed “value transfer” approach, since also costs can be transferred) entails that officers in charge of estimating a given benefit rely on the results of previous studies, taken as proxies for the value to be estimated. This method has been widely used in both the fields of health and environmental valuation: however, it must be taken with caution: analyst should review and assess the existing studies for their quality and applicability to the case under examination and determine whether the studies are suitable. It is important to see if adjustments can be made for any important differences between the circumstances of the existing studies and those of the situation now being evaluated. The following basic steps should be undertaken in selecting benefit transfer studies for use:

- The selected case studies should be of the same nature as the policy case in terms of the good or service in question and socio-economic conditions, including the size of population, demographic characteristics, economic conditions, value judgment, etc.;
- The selected studies should be based on their comprehensiveness and quality of data, sound theoretical concepts, and careful analysis of empirical results; and
- The welfare measures (WTP versus WTA) should be comparable to the policy case.

There are few detailed guidelines on value transfer. In the US there exist guides that cover the key aspects of conducting a value transfer, notably Desvousges et al. (1998) aimed at transfer for valuing environmental and health impacts of air pollution from electricity production. Box 14 below summarizes a number of existing databases collected by the Danish government.

Box 14: Available databases on benefit/value transfer

In the EU, the Danish government has compiled a very detailed guidance document on value transfer, which summarizes the main guidelines available at the international level and outlines the key values to be used for Denmark. Navrud (2011) summarizes the main database available internationally:

- **The Environmental Valuation Reference Inventory (EVRI)** is currently the most comprehensive database of valuation studies in terms of

the number of valuation studies worldwide. EVRI was originally constructed by Environment Canada, in co-operation with the US Protection Agency (EPA). Navrud and Vågnes (2000) evaluated the suitability of EVRI for European conditions. We concluded that overall the database worked well, but could learn from the Australian database ENVALUE to improve its search categories, and include more European valuation studies. At that time 56 studies or about 8 % of the 700 studies in EVRI were from Europe, while EVRI currently contains 1608 studies, out of which 370 (23%) are from Europe.

- **ENVALUE** is the principal database for environmental valuation studies (and hence benefit transfer) in Australia. Hosted by the New South Wales (NSW) Government, it contains over 400 studies, one third of which are Australian, covering nine different environmental goods. The aim of ENVALUE is to enhance decision-making by encouraging improved valuation of environmental resources, and improve the credibility of those valuations.
- **The Valuation Study Database for Environmental Change in Sweden (ValueBaseSWE)** was developed by Sundberg and Söderquist (2004) within a project funded by *Naturvårdsverket*. The database is the result of a survey of empirical economic valuation studies on environmental change in Sweden. ValueBaseSWE is a Microsoft Excel workbook with two spreadsheets.
- The **New Zealand Non Market Valuation Database (NZ NMVD)** is developed and managed by Lincoln University in Christchurch, NZ. It is an easily searchable database of all valuation studies and value transfers undertaken in New Zealand only (studies from other countries are excluded). The information about each study is, however, more limited than for e.g. EVRI and ENVALUE.
- **Review of Externality Data (RED)** was developed and managed by the Italian research institute ISIS (Institute of Studies for the Integration of Systems) for the EC DG Research. It is primarily a literature database, listing studies useful for environmental costing (from a life cycle perspective) of energy and other sectors, but contains too little details of each study to be used directly for value transfer.
- **The Benefits Table (BeTa)** database was created for European Commission DG Environment by Netcen (part of AEA Technology in the UK), to provide a simple ready tool for estimation of the external costs of air pollution. BeTa presents average default values for marginal external costs for different air pollutants in different geographical areas based on the damage function approach tool developed with the ExternE project series

(i.e. the Impact pathway approach and the Ecosense software). Value transfer in BeTA is based on unit value transfer.

- The UK Department of Environment, Food and Rural Affairs also has a bibliography of valuation studies; see **Environmental Valuation Source List for the UK**. It was published in 2000 and was last updated in September 2001. Thus, it does not contain UK valuation studies for the last four years.
- The **Natural Resource Conservation Service (NRCS)** of the US Department of Agriculture provides databases and lists of recreational unit day estimates for different activities.

2.4.2 The life satisfaction approach

Over the past decade, a new stream of research on evaluation techniques has emerged, which tries to overcome some of the traditional challenges of stated and revealed preference models. This approach tries to go back to the original intention of economists such as Jeremy Bentham, who theorized that the ultimate goal of public policy would be to promote people's happiness or satisfaction. As already recalled in the previous sections, economists have decided to use income as a proxy for satisfaction, and WTP or WTA as proxies for the intensity of preferences, mostly for methodological difficulties of directly measuring satisfaction, or – even worse – comparing it across individuals. However, recent studies that have applied cognitive psychology and behavioural economics to public policy seem to have opened new prospects for the measurement of life satisfaction. These studies include the seminal contributions of Daniel Kahneman and Amos Tversky, which led them to win the Nobel Prize in 2002; and specific research by Vernon Smith Clarke and Oswald (2002) and Bruno Frey (2004)⁹². This research has, over time, become so popular and accepted that the OECD decided to develop a brand new index, called the Better Life Index, and in July 2011 the UK government decided to amend its 2003 Green Book on Evaluation to include the “life satisfaction approach”, which had emerged from a review of valuation techniques for social cost-benefit analysis jointly commissioned by the Treasury and the Department for Work and Pensions (Fujiwara and Campbell, 2011). Lately, the OECD (2013)

⁹² One method to recently emerge is the life satisfaction approach (Frey et al. 2010). This approach has predominantly come out of the economics of happiness literature, which itself reflects a re-evaluation of the epistemological foundations of economics, as seen in 2002 by Daniel Kahneman (a psychologist) and Vernon Smith (the pioneer of experimental economics) together being awarded the Nobel Prize in economic sciences. A comprehensive review of life satisfaction or happiness in economics is provided by Frey and Stutzer (2002) and MacKerron (2012).

has further promoted this approach with a new set of Guidelines on Measuring Subjective Well-being, which emphasize the role of this approach in cost-benefit analysis, and in particular in the valuation of non-market goods.

The ambition behind the life satisfaction approach is to overcome some of the traditional difficulties of both revealed and (even more importantly) stated preference approaches, and in particular their focus on income as a proxy of GDP, and their reliance on individual rationality and the accuracy of people's prediction in expressing or following their preferences. The underlying idea is that the use of market-based approaches (both stated and revealed preference) does not guarantee any approximation of the underlying utility perceived by individuals in their current situation, or as a result of a policy change. The need to measure "utility" led to the development of models that look at people's reported life satisfaction in existing surveys, which can easily accommodate questions on respondents' subjective well-being. Also, this approach arguably reduces another recurrent problem of preference-based cost-benefit analysis: the underlying assumption that income features constant marginal returns, and that as such the value of money does not change along with the income endowment of individuals: in order to fully overcome this problem, however, one needs to believe that subjective well-being is a better measure of utility than income, something that is still subject to debate in current economic theory⁹³.

2.4.2.1 How does it work

Broadly speaking, the life satisfaction approach uses econometrics to estimate the life satisfaction provided by certain non-market goods, and translates this into a monetary figure by combining it with an estimate of the effect of income on life satisfaction. This means, *i.a.* that such an approach is best suited to establish values that can be applied at a later stage in *ex ante* impact assessment, rather than providing a tool to be used *ad hoc* during a cost-benefit analysis of a policy proposal⁹⁴.

The types of surveys used to capture the variables that determine life satisfaction and the corresponding values associated by individuals to given market and non-market goods imply the use of longitudinal data and require

⁹³ Fujiwara and Campbell (2011) discuss the extent to which preference and subjective well-being can be considered as good proxies for utility.

⁹⁴ The OECD guidelines confirm this assessment: "One further limitation is that the valuation technique based on subjective well-being is retrospective, i.e. it cannot be used to project the potential impact of something that does not yet exist – in contrast to the hypothetical scenarios on which stated preferences are based". This, in turn, means that if values from other communities will have to be transferred to the community subject to the IA exercise, the same problems encountered with the benefit transfer method might emerge, making the use of subjective well-being values more arbitrary and complex.

that people remember past experiences, such that they can evaluate to what extent their level of life satisfaction has risen or fallen as a result of a given change. For example, in the UK the Office of National Statistics has decided to include from April 2011 in its annual Integrated Household Survey (IHS) – which targets every year approximately 200,000 UK citizens – four questions related to their life satisfaction, which will become usable for policy purposes⁹⁵. The well-being module in the IHS includes a question on overall life satisfaction rated on an 11 point scale (0 - 10). Questions on happiness and life satisfaction are included also in other European and global surveys, as shown in table 23 below.

Table 23 – Surveys that capture life satisfaction or happiness

Survey	Variable	Question
General Social Survey	Happiness	Taken all together, how would you say things are these days would you say that you are very happy, pretty happy, or not too happy?
World Values Survey	Life sat.	All things considered, how satisfied are you with your life as a whole these days? Please use this card to help with your answer. [range of 1-10 with 1 labelled "Very Dissatisfied" and 10 labelled "Very Satisfied"]
European Survey	Social Happiness	Taking all things together, how happy would you say you are? Please use this card. [range of 0-10 with 0 labelled "Extremely unhappy", and 10 labelled "Extremely happy"]
European Survey	Social Life sat.	All things considered, how satisfied are you with your life as a whole nowadays? Please answer using this card, where 0 means extremely dissatisfied and 10 means extremely satisfied. [range of 0-10 with 0 labelled "Extremely dissatisfied" and 10 labelled "Extremely satisfied"]
European Quality of Life Survey	Quality Happiness	Taking all things together on a scale of 1 to 10, how happy would you say you are? Here 1 means you are very unhappy and 10 means you are very happy.
European Quality of Life Survey	Quality Life sat.	All things considered, how satisfied would you say you are with your life these days? Please tell me on a scale of 1 to 10, where 1 means very dissatisfied and 10 means very satisfied.
German Economic Panel	Socio-Life sat.	In conclusion, we would like to ask you about your satisfaction with your life in general. Please answer according to the following scale: 0 means 'completely dissatisfied', 10 means 'completely satisfied'. How satisfied are you with your life, all things considered?
British Household Panel Survey	Household Life sat.	How dissatisfied or satisfied are you with your life overall? [range of 1-7 with 1 labelled "Not satisfied at all" and 7 labelled "Completely satisfied".]

Source: Layard et al. (2008)

⁹⁵ These are the four questions: Overall, how happy did you feel yesterday? Overall, how satisfied are you with your life nowadays? Overall, how anxious did you feel yesterday? Overall, to what extent do you feel the things you do in your life are worthwhile?

Over the past, the literature has been able to associate monetary values to a number of life events and changes, which – if proven accurate – could become a good basis for use in monetary cost-benefit analysis. For example, as reported by the OECD, Clark and Oswald (2002) surveyed a group of 7,500 individuals with average income of £2,000 (at 1992 prices) and found that getting married produced the same impact as an additional £6,000 per month; widowhood was equated with a loss of £14,000 per month; becoming unemployed meant losing much more than the salary – the compensating variation needed reached £23,000; and moving down from “excellent” self-rated health to a “fair” self-rated health was equal to a perceived loss of GBP 41,000 per month. However, other studies such as Carroll et al. (2009) found completely different values for Australia, with marriage being evaluated as equal to an additional 47,000 Australian dollars per year; in the United States, Cohen (2008) estimated that going down from “good” to “fair” health would require a compensating variation of \$161,060 yearly; whereas going down from “good” to “poor” health would equal \$276,624 per year.

The life satisfaction approach has been extensively used in the valuation of individuals’ perception of safety and exposure to crime. For example, Moore (2006) uses European Social Survey data to estimate that moving from a neighbourhood where it is perceived to be ‘very unsafe’ to walk alone after dark to a neighbourhood where it is perceived to be ‘very safe’ is equivalent to gaining an additional per annum income of EUR 13,538.

Despite the great variance of the results obtained so far in the literature, the life satisfaction approach is gaining currency in evaluation techniques, mostly due to some important methodological advantages over stated and revealed preference approaches, including the following:

- It does not rely on housing markets being in equilibrium (an assumption underpinning the hedonic property pricing method);
- It does not ask individuals to directly value the intangible good (or bad) in question, as is the case in contingent valuation. Instead, individuals are asked to evaluate their general life satisfaction, which is perceived to be less cognitively demanding, as specific knowledge of the good is not required and respondents are not asked to perform the unfamiliar task of placing a monetary value on an intangible good.
- It avoids the problem of lexicographic preferences, where respondents to contingent valuation or choice modelling questionnaire demonstrate an unwillingness to trade off the intangible good for income (Spash and Hanley 1995).

- It reduces the risk of strategic behaviour or social desirability bias to influence valuations as we rely on individuals' assessment of their life satisfaction broadly, rather than a specific question.
- Finally, and importantly, the method can overcome a specific problem is often neglected in neoclassical economics: the issue of methodological individualism, *i.e.* the idea that individuals' well-being does not depend on the well-being of others. In the life satisfaction approach, this problem is overcome as individuals will incorporate their preferences for others' well-being in their perceived, subjective well-being⁹⁶.

The life satisfaction approach is still in its infancy, as also acknowledged by the OECD and the UK Green Book. Recent guidance by the UK DEFRA tries to find ways to incorporate subjective well-being measures into the practice of multi-criteria analysis used in many impact assessment exercises, especially when monetary and non-monetary values have to be compared. We will account for the possible use of this approach as a complement to preference-based benefit assessment in Section 2.6 below.

The life satisfaction approach, as recalled in Section 3.3 above, is still in its infancy. Below, we provide our assessment of its potential, rather than its current application.

2.4.3 Other methods and models

In the impact assessment practice, a number of methods and models are used to assess the impact of regulation. All these models can enable a more comprehensive coverage of Figure 3 above, but are also quite complex and difficult to use for non-skilled experts. We briefly list some of these methods and models below⁹⁷.

- *Perception surveys* can be used as a starting point to gather data on regulatory burdens. For example, The Danish Government used 'business panels' (surveys of firms and focus groups) to gauge *ex ante* the possible burdens of proposed regulations. The rule of thumb for determining whether a business panel was justified was simple: If the total administrative burden

⁹⁶ Proto and Rustichini (2012) from the ESRC Centre for Competitive Advantage in the Global Economy (CAGE) show that life satisfaction is reduced when a country's GDP (the Gross Domestic Product, measuring a country's economic activity) increases beyond a certain level. The optimal economic level for life satisfaction lies between \$26,000 and \$30,000 of GDP per capita – what the authors call the 'bliss point'. The figures are in 2005 US dollars value, adjusted for the different currencies' purchasing power.

⁹⁷ We also highlight the ongoing development of a very useful web portal, LIAISE, which will in the future act as a repository of methods and models that can be used to perform Impact Assessment. See <http://www.liaise-noe.eu/> and <http://beta.liaise-toolbox.eu/>.

across all firms was estimated to exceed 2,000 hours per year, a business panel would be conducted. So, if a regulation was proposed that would affect 100 firms, and they would have to spend one hour per week on administering the regulation (52 hours per year), the total administrative burden would be estimated at 5200 hours, and a business panel would proceed. Perception surveys are often used in Australia in Victoria and New South Wales⁹⁸.

- *Econometric models* can be used to test whether there is a mathematical relationship between two (or more) variables, what effect the variables have on each other, and the robustness of the relationship. They can be used to measure the marginal effect of changes in the independent variables on the dependent variable(s). Where an econometric model includes several independent variables (a multivariate analysis), the statistical techniques 'hold constant' all the variables except the one that represents the reform to provide an estimate of the direction and magnitude of the effect of the reform on the dependent variable. For example, it might be found that increasing a person's education level from year 11 to year 12 leads to an average 13 per cent increase in their earnings (compared with the counterfactual of a year 11 education). In the case of *ex ante* impact assessment, the choice of a dependent variable depends on the objectives of the proposal. For example, if the objective was to increase labour productivity in a particular industry, the dependent variable would be an indicator of labour productivity. If the objective was to reduce the incidence of workplace injuries, the dependent variable would be the incidence of accidents at firms affected by the reform or a suitable proxy.
- *Computable General Equilibrium (CGE) Models* are designed to analyse how changes in one industry, market or region lead to a reallocation of resources (across regions, industries and different time periods). They can be used to disaggregate the broader effects of reforms. The results of partial equilibrium modelling can be used as an input into a general equilibrium model to trace the broader distributional effects of a reform across the economy. Good examples of CGE models used are⁹⁹:
 - *Worldscan*, a recursively dynamic general equilibrium model for the world economy, developed for the analysis of long-term issues in international economics by CPB in the Netherlands. The model is used both as a tool to construct long-term scenarios and as an instrument for

⁹⁸ See Australian Government (2011), *Identifying and Evaluating Regulations Reform*, Appendix J, at http://www.pc.gov.au/data/assets/pdf_file/0004/114187/20-regulation-reforms-appendixj.pdf

⁹⁹ See Dixon and Jorgenson (2012), handbook of CGE.

policy impact assessments, e.g. in the fields of climate change, economic integration and trade.¹⁰⁰

- *The US Environmental Protection Agency* has used econometric models in several occasions in the analysis of environmental regulation. Examples include estimation of the costs of the Clean Air Act (CAA), the impacts of domestic and international policies for GHG abatement, and the potential for market-based mechanisms to reduce the costs of regulation. A CGE model may contain several hundred sectors or only a few, and may include a single “representative” consumer or multiple household types. It may focus on a single economy with a simple representation of foreign trade, or contain multiple countries and regions linked through an elaborate specification of global trade and investment.
- *The Monash Multi-Regional Forecasting (MMRF) model* is a multi-regional general equilibrium model developed by the Centre of Policy Studies (CoPS) at Monash University in Australia. Within the model each state and territory is treated as a separate region, and over 50 industry sectors are present in each jurisdiction. The model contains explicit representations of intra-regional, inter-regional and international trade flows based on regional input-output data developed at CoPS. It also includes detailed data on government budgets (state, territory and Commonwealth). Second round effects are determined on the basis of the model's input-output linkages, assumptions about the economic behaviour of firms and households, and resource constraints.
- *GEM-E3* (General Equilibrium Model for Economy-Energy-Environment) is an example of a successful CGE model developed with EU funds. It is an applied general equilibrium model for the EU Member States, taken individually or as a whole, which provides details on the macro-economy and its interaction with the environment and the energy system. The model is being used to evaluate policy issues for the European Commission. Applications of the model have been (or are currently being) carried out for several Directorate Generals of the European Commission (economic affairs, competition, environment, taxation, research)¹⁰¹.

¹⁰⁰ See the list included in the webpage of the project MODELS. MODELS is a specific targeted research project running from 2006 to 2009, co-funded by the European Commission and co-ordinated by E3MLab of Institute of Communication and Computer Systems (ICCS) at National Technical University of Athens, Greece. The project involved four major general equilibrium and macroeconomic models developed in Europe namely GEM-E3 (E3MLab), WorldScan (CPB), MIRAGE (CEPII), NEMESIS (ERASME).
http://www.ecmodels.eu/index_files/Page979.htm

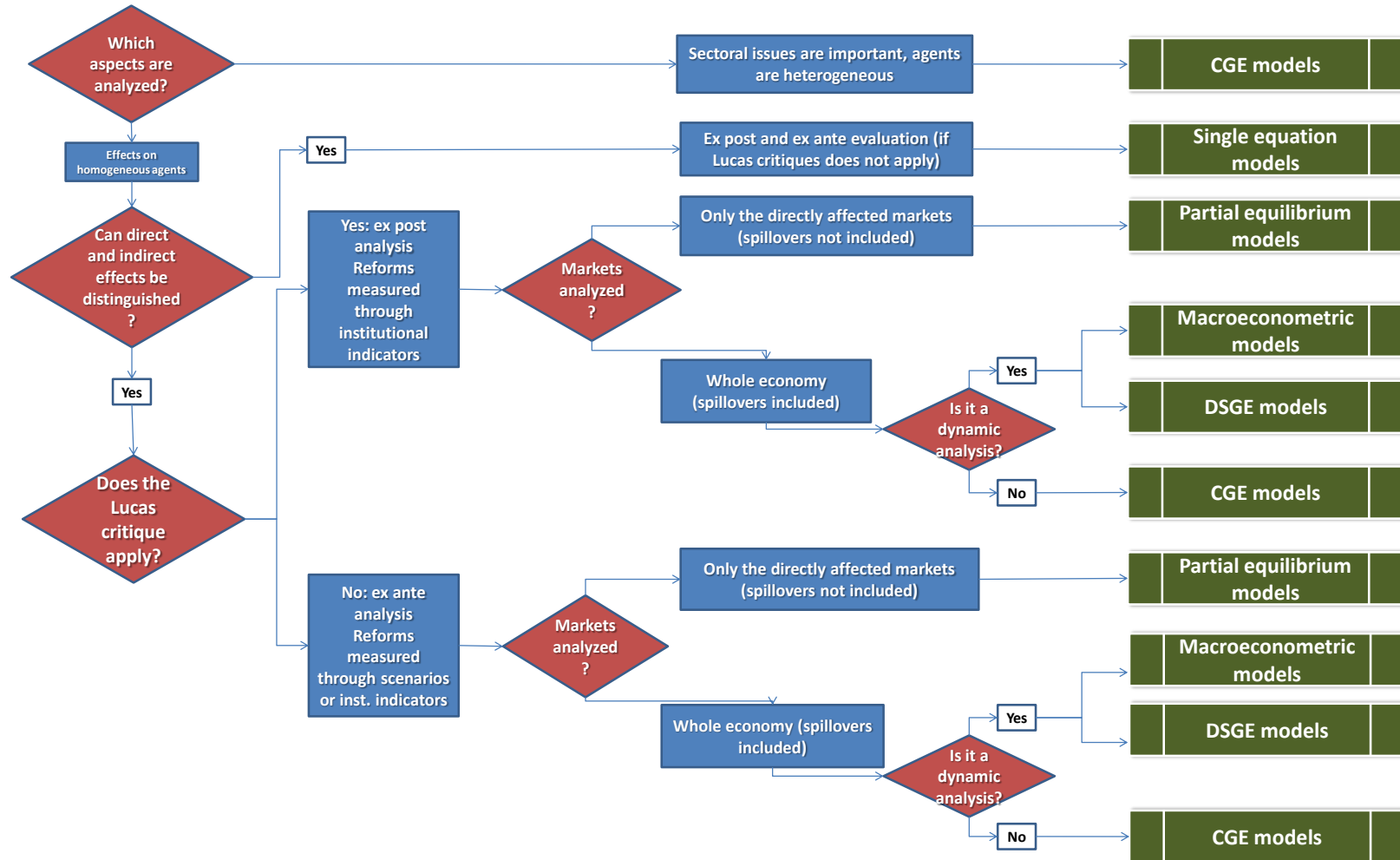
¹⁰¹ <http://147.102.23.135/e3mlab/GEM%20-%20E3%20Manual/Manual%20of%20GEM-E3.pdf>

- *Macroeconometric models and Dynamic Stochastic General Equilibrium models (DSGE)*. These models can be used for the study of the global effects of a wide range of policy measures ensuring a coherent framework for analysing inter-linkages between variables and countries. They consider agents' expectations (usually using a backward-looking approach) and are not subject to the "Lucas critique", i.e. , they cannot account for policy induced shifts in the parameters¹⁰². The specification of the decision behaviour of economic agents can be used to study welfare-relevant questions. They are usually used for ex-ante evaluation, but can present a number of problems: they are not easy to adapt to consider new policy questions, and fail to consider specific reforms affecting consumers' and firms' behaviour. These kinds of reforms are only considered through assumptions.

Figure 18 below shows the flow chart developed by Dreger et al. (2007) for the European Commission, DG ECFIN to explain the main turning points that need to be kept in mind in choosing which model to use to simulate the impact of policy reforms.

¹⁰² In 1976, Robert Lucas argued that the parameters of traditional macroeconometric models depended implicitly on agents' expectations of the policy process and were unlikely to remain stable as policymakers changed their behavior. See Lucas, Robert E. (1976), "Econometric Policy Evaluation: A Critique," Carnegie-Rochester Conference Series on Public Policy 1, 19-46.

Figure 18 – Flow chart for the choice of the most appropriate model to track effects of reforms



Source: Dreger et al. (2007)

2.5 Conclusion and summary tables

This section has surveyed a number of existing methods used to quantify some or all costs and benefits associated with regulatory proposals. Table 24 below illustrates our assessment of various methods.

Table 24 – Summary table of our scorecard analysis

	<i>Scope of application</i>	<i>Data-intensity</i>	<i>Easy to collect data</i>	<i>Uses pre-existing data</i>	<i>Accuracy</i>	<i>Applicable by desk officer</i>	<i>Compatible with other methods</i>	<i>Applicable in the EU IA system</i>
Compliance cost models								
<i>Standard Cost Model</i>	▲	▲▲▲	▲▲▲▲▲	▲▲▲▲	▲	▲▲▲▲	▲▲	▲▲
<i>NL Compliance cost</i>	▲▲	▲▲▲▲▲	▲▲▲	▲▲	▲▲▲	▲▲▲	▲▲	▲▲
<i>DE regulatory cost</i>	▲▲	▲▲▲▲	▲▲▲▲	▲▲▲▲▲	▲	▲▲▲▲	▲▲	▲▲
<i>France cost of delays</i>	▲	▲▲▲	▲▲▲	▲▲▲	▲▲▲▲	▲▲▲	▲▲▲▲▲	▲▲▲
Revealed preference models								
<i>Hedonic pricing method</i>	▲▲	▲▲▲▲	▲▲▲	▲▲▲▲	▲▲▲▲	▲▲	▲▲▲▲▲	▲▲▲
<i>Averting behaviour</i>	▲▲▲	▲▲	▲▲▲	▲▲▲	▲▲	▲▲	▲▲▲▲▲	▲▲▲
<i>Cost of illness method</i>	▲▲	▲▲▲	▲▲▲▲▲	▲▲▲▲▲	▲	▲▲▲▲	▲▲▲▲▲	▲▲▲▲▲
Stated preference models								
<i>Choice modelling</i>	▲▲▲▲▲	▲▲▲▲▲	▲	▲	▲▲▲▲	▲	▲▲▲▲	▲▲▲
Subjective well-being approach								
<i>Life satisfaction approach</i>	▲▲▲	▲▲	▲▲▲▲	▲▲▲▲▲	▲▲▲▲	▲	▲▲▲▲	▲

On this basis, table 25 below describes the extent to which the various methods analysed in this section can be used to quantify the types of costs identified our Section 1 above. Similarly, Table 26 shows the types of benefits assessment methods that are most appropriate, depending on the type of benefit to be measured. Both tables indicate the types of costs and benefits that would require a general equilibrium analysis to be properly quantified and monetized: this implies that, when these costs and benefits are very important in the assessment of impacts, and when their likely extent justifies the cost of using general equilibrium models, then general equilibrium analysis should be selected as the most appropriate approach for impact assessment (see also Section 3 below, at step 3).

Table 25 – What costs can be measured according to the approach

		Stakeholder affected					Compliance cost assessment			Models	
		CIT	CONS	BUS	ADMIN	TC	Standard Cost Model	NL Compliance cost	DE regulatory cost	Partial equilibrium	CGE modelling
Direct costs	Charges		●	●		●					
	Administrative burdens	●		●	●	●					
	Substantive compliance costs	●		●	●	●					
	Hassle costs	●		●	●	●					
Indirect costs	Indirect compliance costs		●	●		●					
	Offsetting		●	●							
	Reduced competition		●	●							
	Reduced mkt access		●	●		●					
	Reduced investment/innovation		●	●		●					
Enforcement costs	Information and monitoring	●		●	●						
	Inspections and sanctions			●	●						
	Complaint handling	●		●	●						
	Adjudication/litigation	●		●	●						

Table 26 – What benefits can be measured according to the approach

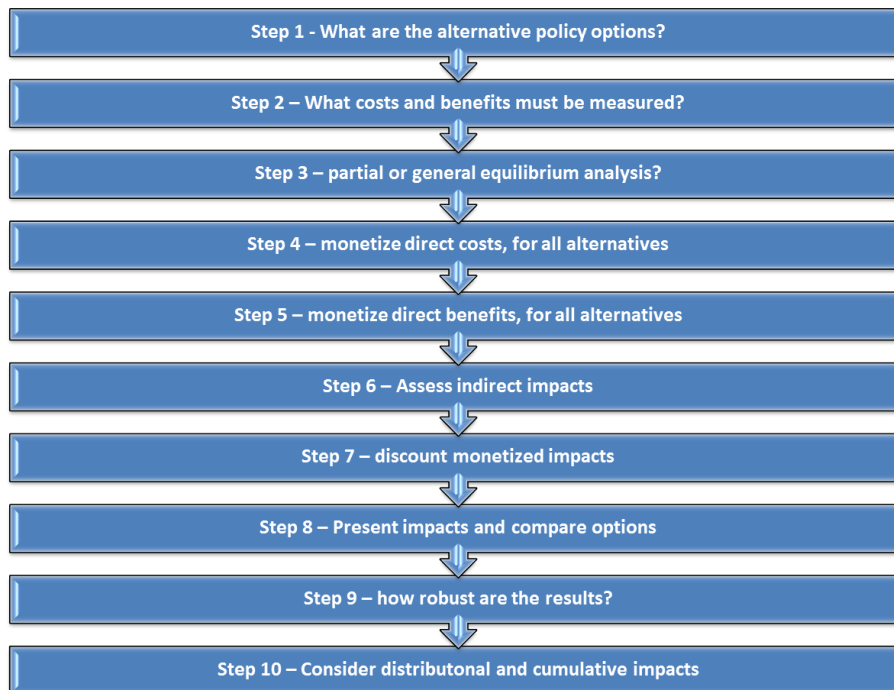
		Stakeholder affected					Revealed preference models				Stated preference		Well-being	General equilibrium
		CIT	CONS	BUS	ADMIN	TC	Travel cost method	Hedonic pricing method	Averting behaviour	Cost of illness method	Contingent valuation	Choice modelling	Life satisfaction approach	CGE modelling
Improved well-being	Health	●												
	Safety	●												
	Environment	●												
Improved market	Cost savings			●										
	Wider range of products/services		●											
	Improved information			●										
Indirect benefits	Indirect compliance benefits	●	●	●	●	●								
	Wider macroeconomics benefits	●				●								
	Other, non-monetizable benefits	●	●	●	●	●								

Legend: CIT: Citizens and society as a whole; CONS: consumers; BUS = businesses; ADMIN = public administrations; TC = third countries (i.e. non-EU countries).

3 WHY, HOW, AND WHEN: GUIDANCE ON COST-BENEFIT ANALYSIS

The techniques and methods explored in Section 2 of this report allow us to design a general framework that can help officers decide how to proceed in order to identify, quantify and monetize costs and benefits in an *ex ante* impact assessment. In what follows, we refer to an ideal desk officer of the European Commission in charge of an Impact Assessment, and advise him/her on how to complete a quantitative cost-benefit analysis as part of the Impact Assessment exercise. We start by illustrating the essential preconditions for carrying out cost-benefit analysis as part of an impact assessment – what we call “step zero” in this chapter. Then, we lead the desk officer through the process by dividing the cost-benefit analysis exercise into ten steps, shown in Figure 19 below.

Figure 19 – steps of a cost benefit analysis



Step 0 – when should you opt for cost-benefit analysis

As an officer of the European Commission, you are bound by the Impact Assessment Guidelines (2009), which mandate that Impact Assessment should primarily lead to the identification of the economic, social and environmental impacts of new legislative initiatives. This, of course, does not automatically mean that you should perform cost-benefit analysis. You have a number of alternative methodologies at hand, from which you can choose the most appropriate for the problem you are facing. These include:

- *Least cost analysis* implies that you only look at costs, in order to select the alternative option that entails the lowest cost. You should choose this method whenever benefits are fixed, and you only need to choose how to achieve them.
- *Cost-effectiveness analysis* (CEA) entails that you quantify (not monetize) the benefits that would be generated by one Euro of costs imposed on society. The typical method used to compare options is thus the so-called benefit-cost ratio, which means dividing the benefits by costs. This method is normally used to all expenditure programs, as it leads to identifying the “value for money” of various expenditure programs. A typical question that can be answered through cost-effectiveness analysis is “how many jobs will be created for every Euro invested in this option?”; or, “how many lives are saved by every Euro spent on this option?”¹⁰³
- *Cost-benefit analysis* (CBA) entails the monetization of all (or the most important) costs and benefits related to all viable alternatives at hand. In its most recurrent form, it disregards distributional impacts and only focuses on the selection of the regulatory alternative that exhibits the highest net benefit. Accordingly, the most common methodology in cost-benefit analysis is the “net benefits” calculation, which differs from the “benefit/cost ratio” method that is typically used in cost-effectiveness analysis (being benefit minus costs, rather than benefits divided by costs).
- *Multi-criteria analysis* allows a comparison of alternative policy options along a set of pre-determined criteria. For example, criteria chosen could include the impact on SMEs, the degree of protection of fundamental rights, consumer protection, etc. Multi-Criteria Analysis is particularly useful when Impact Assessment has to be reconciled with specific policy objectives, and as such is used as an instrument of policy coherence. This method is more

¹⁰³ A variant of the CEA is the so-called cost-utility analysis method (CUA), which measures the relative effectiveness of alternative interventions in achieving two or more given objectives.

likely to capture distributional impacts, although this crucially depends on the criteria chosen for evaluating options.

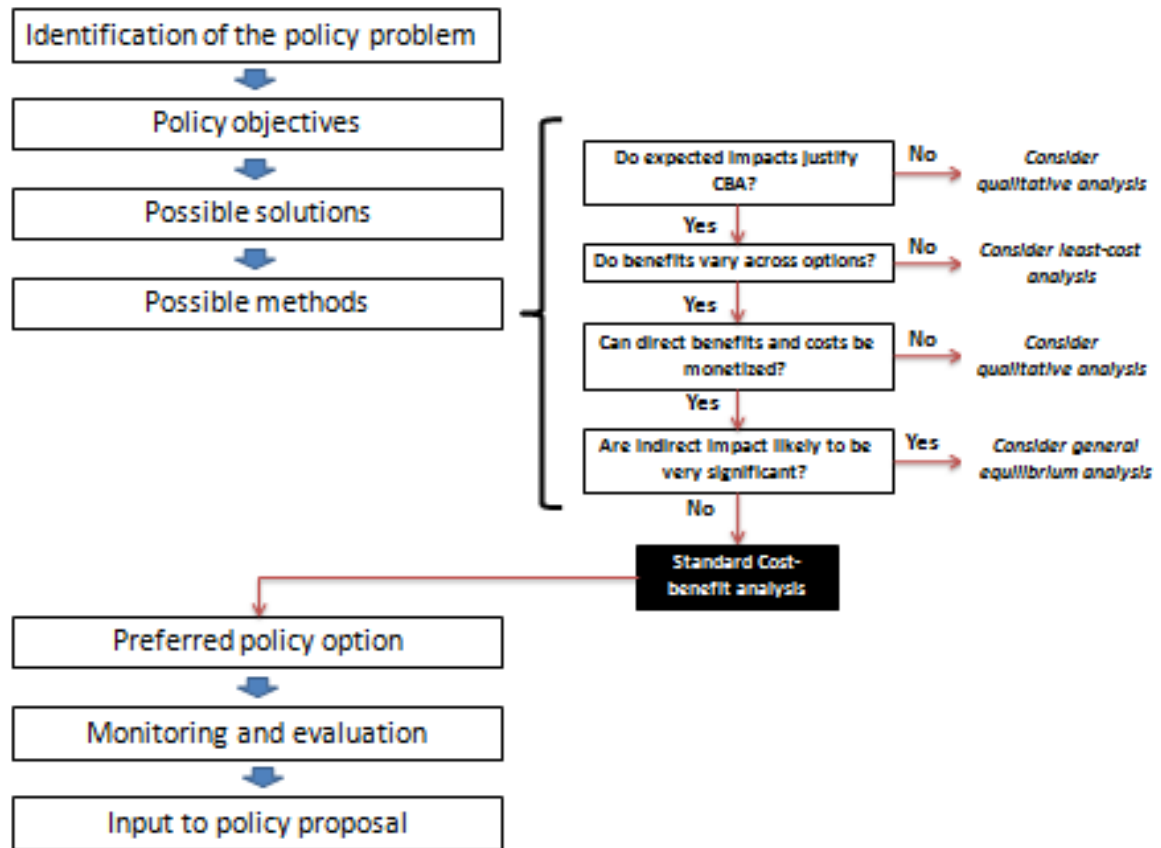
There are pros and cons of choosing CBA as the method to be used in comparing policy proposals. The pros mostly lie in the ability of CBA to use an objective unit of measurement (monetized values) to compare alternative options and choose the one that maximizes the “size of the pie”, i.e. societal welfare as described in mainstream economics. The shortcomings, however, are often quite critical for CBA, and mostly refer to the assumption that income can be a proxy for happiness or satisfaction, the fact that it willingly ignores distributional effects (despite some attempts to adjust the methodology to reflect them), and its lack of objectivity when it comes to the selection of certain parameters (e.g. the inter-temporal discount rate), which can tilt the balance in favour of certain regulatory options over others.

Based on these descriptions, you should choose cost-benefit analysis as the method to be used to compare alternative policy options if:

- ***Both benefits and costs vary*** depending on the regulatory alternative chosen (if not, consider least-cost analysis).
- ***At least all direct benefits and direct costs can be monetized***, covering where possible the economic, social and environmental impacts of the proposal at hand (if benefits can be quantified, but not monetized, consider cost-effectiveness analysis): this requires an assessment of data availability in order to understand whether CBA will be feasible within a reasonable time frame.
- ***The expected magnitude of impacts justifies the effort and time needed to perform CBA*** (as a full-fledged CBA is normally more time-consuming than other, more qualitative techniques). Similarly, the choice to perform cost-benefit analysis must be read also in light of the application of the principle of proportionate analysis, which means that the depth of the cost-benefit analysis exercise, as well as the time and the resources devoted to it, must be made dependent *i.a.* on the type of proposal at hand (e.g. whether binding or not binding, whether cross-cutting or narrow), as well as on the *prima facie* expected impact of the proposal.
- ***Distributional impacts are unlikely to be substantial*** (otherwise, consider multi-criteria analysis, or break down CBA by affected stakeholder without aggregating costs and benefits into a net benefits analysis).

Figure 20 below summarizes the factors to be considered before you decide to undertake cost-benefit analysis.

Figure 20 – Cost-benefit analysis within the Impact Assessment process



Step 1: define alternative policy options

As a preliminary *caveat*, you should consider that an essential precondition of any cost-benefit analysis is an accurate definition of the underlying policy problem. Although this falls outside the scope of this study, it is worth recalling that a thorough description of the underlying market or regulatory failure, as well as the precise identification of the drivers of the problem identified, is perhaps the most important step for an accurate definition of the costs and benefits that alternative regulatory options are likely to entail.

Once you have defined a given policy problem and its main drivers, you need to find out which alternative options you have to address the problem and possibly solve it. Policy alternatives can be defined based on alternative types of policy intervention. The IA guidelines, both in the main text and at Annex 7, specify the following types of options:

- The ‘no policy change’ baseline scenario;
- The ‘no EU action’ (e.g. discontinuing existing EU action where it exists);
- Where legislation already exists, improved implementation/ enforcement, perhaps with additional guidance;
- International standards where these exist;
- Self-regulation;
- Open method of co-ordination;
- Provide information and guidelines;
- Market-based instruments;
- Public sector direct financial interventions;
- Co-regulation and standards;
- Framework directives;
- Prescriptive regulatory actions.

Remember that you should always include the “no policy change” scenario in your analysis. It must be recalled, in this respect, that this option should be analyzed in a forward-looking manner, not as a static snapshot of the policy problem as it is today. This means that, if factors other than EU policy actions can change the policy problem as it is today, these factors have to be considered in the description of the scenario. They might include, *i.a.*, legislative action by Member States, technological change, changes in consumer preferences, action undertaken at the international level, private regulatory initiatives, etc.

Step 2. Identify costs and benefits to be measured

It is very important that you identify the full range of impacts connected to the selected policy options. Comparing options on the basis of a sub-set of relevant impacts may lead to fatal mistakes in the selection of the most viable alternative. As discussed above, it is important to identify the **incremental** costs and benefits for each option, relative to the base case of what would happen with current arrangements.

In this step of the analysis, **you should highlight the positive and negative impacts associated with each of the policy options.** You have to be aware of the fact that some of these impacts might be easier to monetize than others: this does not mean that you should select only the ones that are easy to monetize.

We suggest that you specify, for each option, which costs and benefits are likely to emerge. In this respect, you should bear in mind that **each of the selected options might generate different costs and benefits throughout the life of the rule.**

Below, we provide guidance on the costs and benefits that are most likely to emerge depending on the type of policy alternative. We select only key regulatory approaches, such as self-regulation, co-regulation, market-based instruments, performance-based standards and command and control (“prescriptive”) regulation. Table 27 below shows the types of costs that are more likely to emerge for each of these types of regulatory alternative.

Table 27 – Types of alternatives, types of recurrent costs

Type of regulatory alternative	Recurrent costs
Self-regulation	Monitoring costs Transaction costs Direct compliance cost
Co-regulation	Monitoring costs Enforcement costs Transaction costs Direct compliance cost
Market-based instruments	Transaction costs Charges Direct compliance costs Indirect compliance costs
Performance-based standards	Monitoring costs Direct compliance costs Indirect compliance costs
Command and control	Charges Administrative burdens Direct compliance costs Indirect compliance costs Monitoring costs Enforcement costs Adjudication

As shown in the table, *light-touch regulatory approaches such as self- and co-regulation* might entail less enforcement costs due to the lesser (or no) involvement of public administration in securing compliance. That said, in self- and co-regulatory arrangements parties might face transaction costs due to the need to coordinate their actions to address a given policy problem¹⁰⁴. And in case such approaches can generate more uncertainty compared to command and control regulation, litigation costs might be greater under these options than under more heavy-handed regulatory options¹⁰⁵.

Likewise, *market-based instruments* can lead to low administrative burdens, but high substantive compliance costs; significant indirect compliance costs when the cost of the instrument is passed on downstream to other industry players or end consumers; and also, high transaction costs. Among other examples, think about the auctions organized at national level to award

¹⁰⁴ As a matter of fact, the (few) cases in which self-regulation is considered as a policy alternative, this means that such alternative can possibly address the policy problem identified at the outset of the impact assessment. This means, in turn, that self-regulation would serve the public interest.

¹⁰⁵ Some co-regulatory approaches might also generate administrative burdens (for example, the binding corporate rules for the treatment of personal data by multinationals entail an often lengthy administrative clearance by national data protection authorities.

frequencies for 3G telephony some ten years ago: where badly designed, such options have generated costs that were likely passed on downstream to end consumers in the form of higher mobile phone tariffs, or as reduced investments in network maintenance and upgrade¹⁰⁶.

Performance-based standards possess many advantages over command and control regulation, especially since they specify the outcome of private production in terms of product performance, without mandating a specific production process or the use of given materials. This might lead to lower administrative burdens, but high compliance costs and monitoring costs on the side of public administrations.

Finally, *command and control regulation* often displays most cost categories: this does not mean that this option is generally more costly than other options: simply, all cost categories will have to be considered and summed up before you can conclude that one alternative is more costly than another.

Note. At this stage, as an optional addition, it is also advisable that you specify which stakeholders will be affected by which types of costs and benefits: although this phase is not required for a standard cost-benefit analysis (which does not look at distributional impacts), it might be useful to carry it out for two reasons: (i) it can increase transparency and help the desk officer avoid double-counting of impacts; and (ii) it can help, when needed, the *ex post* evaluation of the impacts of the proposed legislation on specific stakeholders, as well as the analysis of cumulative impacts (when appropriate).

A general template can be used here in order to facilitate the choice of the methods to be used to quantify the types of costs and benefits to be measured. Table 28 below illustrates the template¹⁰⁷. We suggest that you compile this table by specifying in the relevant cells which of the options are likely to generate that specific type of cost.

¹⁰⁶ Other examples: the use of market-based mechanisms in spectrum policy can lead to a low level of spectrum trading due to transaction costs, strategic and anticompetitive behavior, hold-up problems, etc. Similarly, trading of airport slots has proven to generate too high transaction costs. Another example is the cost of emission trading allowances for energy-intensive industries, which can be passed on downstream in the form of higher prices.

¹⁰⁷ Some of the options are already excluded in the table. This would become easier if these guide is translated into an online tool.

Table 28 – Identifying costs and benefits and affected stakeholders

		Stakeholder affected				
		CIT	CONS	BUS	ADMIN	TC
Direct costs	Charges					
	Administrative burdens					
	Substantive compliance costs					
	Hassle costs					
Indirect costs	Indirect compliance costs					
	Offsetting					
	Reduced competition					
	Reduced mkt access					
	Reduced investment/innovation					
Enforcement costs	Information and monitoring					
	Inspections and sanctions					
	Complaint handling					
	Adjudication/litigation					
Health improvements	Reduced mortality					
	Reduced morbidity					
Ecological improvements	Market products					
	Recreation activities and aesthetics					
	Valued ecosystem functions					
	Non-use values					
Improved efficiency	Cost reductions					
	Technological progress					
	Employment					
Indirect benefits	Indirect compliance benefits					
	Wider macroeconomics benefits					
	Other, non-monetizable benefits					

Step 3: Partial or general equilibrium analysis?

Before attempting to measure benefits and costs, you have to ask yourself what the likely extent of the impacts you are evaluating will be. This, where possible, can help preventing the use of excessively costly and time-consuming methods (e.g. stated preference methods, or ex novo CGE modeling) for narrow-scope initiatives or for certain policy initiatives with non-binding effects¹⁰⁸.

The decision you should take is whether to adopt a partial or a general equilibrium approach. In this respect, you have to answer the following questions.

- **Is the problem at hand likely to affect several markets and present significant cascading and cumulative effects?**
- **Are the selected regulatory alternatives likely to generate very significant impacts on the economy?**

If you have answered “yes” to both questions, you should opt for a general equilibrium approach. In this case, if you have no specific expertise in how to use general equilibrium models, you should refer to the Impact Assessment unit of your DG and possibly seek the help of expert staff or external consultants.

In all other cases, *i.e.* if the problem is likely to:

- Affect a limited number of markets/economic sectors, and/or
- Produce mostly direct effects on stakeholders, and/or
- Generate limited indirect, macroeconomic effects,

then you can address the problem and the related impact assessment through a partial equilibrium analysis.

Overall, we expect that in most cases partial equilibrium approaches will be selected by officers, but this very much depends on the problem at hand and also by the availability of macroeconomic or macro-econometric models¹⁰⁹.

¹⁰⁸ In general, we suggest that the choice remains open as to whether, for example, a White Paper deserves a very detailed impact assessment: based on past experience, the difficulty of the overall concept and the degree of clarity of the policy scenarios included in a White Paper might even suggest, in some cases, a more thorough modeling at that stage, compared to subsequent phases of the policy process. This is normally a case-by-case, dossier-by-dossier decision.

¹⁰⁹ DG ECFIN, MARKT, CLIMA, MOVE, ENER, and the JRC make frequent use of these models.

In case you opt for a partial equilibrium approach, please continue reading this guidance on how to perform cost benefit analysis. Otherwise, ask for help on general equilibrium modelling to your Impact Assessment unit.

Note. Summing up, in an Impact Assessment you should perform a partial equilibrium cost-benefit analysis when the following conditions are met:

- Both benefits and costs vary depending on the regulatory alternative chosen (if not, consider least-cost analysis).
- Data availability ensures that direct benefits and direct costs can be monetized;
- The expected magnitude of impacts is significant;
- Distributional impacts are unlikely to be substantial;
- The problem is likely to affect a limited number of markets/economic sectors, produce mostly direct effects on stakeholders, and/or generate limited indirect, macroeconomic effects.

Step 4. Monetize direct costs, for all alternatives

Depending on the costs and benefits that you are trying to quantify and monetize, you can choose the most appropriate method and proceed to the monetization of the related impacts.

4.1. Are the regulatory alternatives at hand likely to result in direct charges being imposed on any stakeholder/societal group?

If yes, you should follow a number of steps:

- Action 1.** Estimate the population of stakeholders that will have to comply with the obligation to pay charges;
- Action 2.** Estimate the frequency of the payment (1 = once a year; 2 = twice a year; 0.5 = once every two years, etc.)
- Action 3.** Estimate the unit cost (cost of the fee, license, permit).
- Action 4.** Multiply the three parameters.

For example, if you expect that 2,500 enterprises will have to pay a licence fee of €500 twice a year, your total on a yearly basis will be $(2,500 \times 500 \times 2) = \text{€}2.5$ million.

Note. You will have to assess, in step 9 below, two additional aspects of regulatory charges: (i) the expected compliance rate; and (ii) the degree of passing-on of these charges downstream. Keep note, already at this stage, of these additional questions, which are crucial in the assessment of the ultimate impact regulatory charges will exert on their addressees.

4.2. Are the regulatory alternatives at hand likely to increase compliance costs (including administrative burdens)?

If yes, please follow these steps¹¹⁰:

¹¹⁰ The measurement of substantive compliance costs and administrative burdens is addressed in one single step here due to complementarities and synergies in the creation of “case groups” as well as in data collection.

- Action 1.** *Identify the substantive duties (SDs)* generated by each of the policy alternatives you are comparing. Please distinguish between one-off and recurrent costs.
- Action 2.** *Identify the information obligations (IOs)* generated by each of the policy alternatives you are comparing. If useful and appropriate, you should break IOs down into data requirements (DRs) and administrative activities.
- Action 3.** *Estimate the population of stakeholders that have to comply with each of the SDs and IOs, for each of the alternative options.*
- Action 4.** *Estimate the mode of compliance with each SD and IO by a “normally efficient business”, an “ordinary citizen” or a “normally efficient administration”.* This might change depending on the regulatory alternative at hand, and will certainly change according to the different segment of the population you have identified. The concept of “normal efficiency” is needed in order not to factor into the analysis the inefficiency of some of the targeted companies: in order to assess *ex ante* how long would it take for businesses to comply. This means that you will have to assess the “reasonable” amount of time that it will take for businesses or citizens to comply with the obligations stemming from legal rules: this implies the assumption that regulated entities handle their administrative and substantive tasks neither better nor worse than may be reasonably expected.

Note. If you believe that the rules at hand will be enforced in different ways in different countries, you have to account for this difference in the assessment of enforcement costs in Section 4.4. below.

- Action 5.** *Estimate the “BAU” factor for each SD and each IO and each of the alternatives, based on direct assessment or empirical data.* The BAU factor is often obtained by consulting targeted stakeholders or experts: its estimation is often the result of assumptions as regards the share of costs that would not be avoided if the legislative measure containing the obligation were repealed. In some cases, the BAU factor can be estimated directly by looking at the share of costs associated with a substantive (or information) obligation that are borne by similar entities that are not targeted by specific legislative provisions: when this is the

case, you can observe the level of compliance costs for the “regulated” entities and the “unregulated” ones, and take the difference as the relevant portion of compliance costs to be considered in your CBA. You should be aware of the fact that the BAU factor might differ depending on the territory and the segments of the population you have identified.

Action 6. ***Consider segmenting the population by creating “case groups”*** differentiated according to size (micro, small, medium, large enterprises) or other dimensions (level of government for public administrations, availability of Internet connection for citizens, etc.). Of course, if different case groups can be established, you might consider adopting different notions of “normal efficiency” and BAU for each of the groups.

Note. You can segment the population both in terms of their characteristics, and in terms of their ability to comply. This will help you assess the likely mode of compliance and also perform the analysis of distributional impacts, which you will need to perform in Step 10 below.

Action 7. ***Estimate the compliance cost associated with each SD for each segment and each alternative***, by accounting for:

- **Operating and Maintenance Costs (OPEX)** include annual expenditures on salaries and wages, energy inputs, materials and supplies, purchased services, and maintenance of equipment. They are functionally equivalent to “variable costs”.
- **Financial costs**, *i.e.* costs related to the financing of investment (normally considered in relation to capital costs).
- **Capital Costs**, “annualized” over the period of the useful life of the equipment purchased.

Note. In case a regulation imposes the substitution of certain machines, compliance costs will include the purchase of new equipment. However, in assessing the cost associated with this investment you should take into account that existing equipment would have had to be replaced anyway: compliance costs thus represent, at least partially, an investment which sooner or later would have become necessary. You can, for simplicity, assume that half of the investments would have been made anyway. In case of replacement investments, **50% of the purchase costs are**

therefore regarded as compliance costs, while the remaining costs are considered to be BAU costs, unless a different share of business-as-usual costs cannot be substantiated.

Action 8. ***Estimate the administrative burden of each IO for each segment and each alternative***, by accounting for:

- the *time* needed to comply with the obligation;
- the expected frequency of the IO;
- the *average salary* of the person(s) in charge of performing the underlying administrative activities;
- any *external cost* required both in terms of experts services or counselling, or acquisitions.

Note. In many cases data are already available for these variables: Annex 10 of the Impact Assessment Guidelines points you at existing sources, including the administrative burden calculator.

Action 9. ***Assess whether compliance costs are likely to change over the life of the proposed legislation***. In particular, you should assess whether, as a result of entry/exit of businesses, technological innovation, “learning by doing” or any other relevant factor, the impact of the costs identified is likely to change over time. For example, assume your analysis today leads to establishing two case groups depending on whether an IO is complied with through e-government solutions (20% of the population) rather than paperwork (80%). The percentage of businesses that rely on e-government solutions is likely to change over time, such that the percentages in 5 years from now might even be reversed. This must be taken into account in a prospective analysis or regulatory costs, and – if possible – coupled with sensitivity analysis on the assumptions behind the evolution of costs over time.

Action 10. ***Sum up and extrapolate all compliance costs*** to reach a total estimate for each of the alternative options considered. For extrapolation of administrative burdens, a first suggestion is to use basic parameters such as country distribution lists relative to administrative burdens as prepared by Kox (2005) or available in the EU Administrative Burdens database. Otherwise, if you have data only for some countries, you should first find appropriate parameters for extrapolation:

- *Example 1:* you have data on administrative burdens generated by a piece of legislation that is identically implemented by enterprises in the Member States, with no reason to assume difference in information obligations, timing of administrative activities, etc. Then, you should extrapolate data from the countries you have analyzed to the EU28 by accounting for (i) the population of enterprises in the same sector; and (ii) the relative labour costs and wage levels in the EU28. Eurostat has data on both, divided by sector (NACE codes) and by type of job profile.
- *Example 2:* you have data on administrative burdens generated by a piece of legislation that is implemented in the Member States in a different way: while in country X (for which you have data) 80% of businesses comply by using e-government tools, in the other countries the average is only 40%. In addition, the breakdown of targeted firms in terms of size (large, medium, small) is different in different countries. Then, in addition to the parameters used in Example 1, you could use (i) indicators related to the use of e-government tools when interacting with the public administration (available in the Digital Agenda scoreboards, per country); and indicators on the size of businesses in different countries (available in Eurostat's structural business statistics).

Note. When collecting data with any of those methods, please make sure you:

- coordinate this data collection with data collection on **indirect compliance costs** when appropriate;
- collect information on **hassle/irritation burdens**, to be represented qualitatively in the Impact Assessment and/or used for future legislative initiatives. These burdens are normally collected directly by surveying targeted stakeholders, and could be done directly during the consultation that normally precedes the drafting of the impact assessment¹¹¹.
- Use the **standard reporting sheet** included at Annex 10 of the Impact Assessment Guidelines.

¹¹¹ See e.g. the Danish Maritime Authority's Report on administrative burdens borne by shipowners, 2012, Table 3. The Danish administration asked directly to ship owners: "How do you perceive the level of irritation from this administrative task?" Respondents could rank this level between 1 and 5.

4.3. Are the regulatory alternatives at hand likely to create enforcement costs?

Enforcement costs are all those costs borne by public administrations in the application of the legal provision, including most notably the monitoring of compliance, inspections and imposition of administrative sanctions, complaint handling, litigation and adjudication. Whenever a regulatory option is likely to entail changes in the amount or type of litigation, the addition or removal of administrative procedures or procedural requirements, or changes in the way regulatees' behaviour is monitored, then enforcement costs have to be taken into account.

Note that, depending on the regulatory alternative at hand, enforcement costs might differ substantially: if you do not take them into account, you risk making fatal mistakes in your cost-benefit analysis.

That said, accounting for enforcement costs is often very difficult in ex ante impact assessment at the EU level, due to the fact that legal rules are most often implemented and enforced at the national, regional or even local level, with different modes, cost levels, productivity, etc. This is why you will need to estimate the cost for a “normally efficient administration” in the performance of specific administrative activities related to enforcement¹¹². Also, **you should clarify in the text that your assessment of enforcement costs can be considered only as a tentative measurement**, which will have to be tested during monitoring and evaluation, as well as in the ex post evaluation phase. Again, a tentative measurement (coupled with the needed *caveats*) is always better than “no” measurement at all.

More specifically, you should follow these steps:

Action 1. Assess how the various regulatory alternatives will be enforced. This means considering all modes of enforcement where appropriate, ranging from private enforcement in courts (and associated likelihood of settlement before trial); public enforcement by administrative or independent authorities; alternative dispute resolution mechanisms such as ombudsmen, complaint handling mechanisms set up by private regulators, etc.

Action 2. Assess at what level of government will enforcement take place. This includes specifying whether enforcement is left to the EU, national, regional and/or local level. Activities covered under

¹¹² Below, we offer guidance for the performance of this part of the cost-benefit analysis, but recognize that further work would be needed in order to make your life easier in the quantification and monetization exercise.

enforcement, such as monitoring, information gathering, inspections, imposition of sanctions, adjudication/litigation can of course take place at different levels.

Action 3. Assess the optimal monitoring and inspection activity associated with each of the alternative policy options. For example, in case a given behaviour must be deterred, you should estimate what combination of sanctions and monitoring costs are likely to emerge at national level. This exercise should ideally be inspired by the idea of “optimal deterrence”: this means that potential infringers should face a combination of expected sanction and likelihood of being caught that makes a violation of the law too costly to be convenient. This also means that, when enforcement is left to Member States, the expected enforcement costs could vary depending on the specific features of public administration at the national level. For example, differences in the IT resources available to the police can lead to lower additional costs of enforcing certain rules (e.g. street cameras already installed on most motorways); the adoption of a risk-based inspection model might lead to a greater effectiveness of enforcement due to better targeting of premises to be inspected. Ideally, the result of this analysis would be an estimate of both the CAPEX and the OPEX associated with “efficient” enforcement activities.

Action 4. Assess costs associated with monitoring and inspections. You should, in particular, try to answer the following questions:

- Is any of the alternatives at hand likely to require additional capital expenditure by public administrations? If yes, the related costs (depreciated) should be included in the analysis as parts of enforcement costs, for the share allocated to the specific activity considered.
- Is any of the alternatives likely to require additional operating expenditures, such as personnel costs, etc.? If yes, the additional costs have to be computed in the analysis.

Action 5. Assessment of the likely changes in the quantity and duration of litigation. This means anticipating, where relevant and proportionate, the additional costs that certain regulatory alternatives might generate in terms of additional court cases and additional out-of-court settlements for public administrations as well as private parties such as citizens and businesses. Absent specific data, you can rely on:

- available estimates related to the average duration of trial in Member States¹¹³;
- estimates that lawyers' fees total 10-20% of the total value of trial (in civil cases);
- estimates that the opportunity cost of litigation for firm employees average 70%-80% of lawyers' fees;
- estimates that court fees (representative of the cost of the use of the legal system) average 4-6% of the disputed value at trial.

Action 6. Sum up all enforcement costs. The sum of all incremental costs related to enforcement activities will lead to an estimate of the total enforcement costs for each alternative.

Note: When the analysis described above proves too difficult either due to limited availability of data, or time constraints, you should at least try to follow these steps to avoid making important mistakes in your overall cost-benefit analysis:

- Assess whether some or all of the related policy options would require the creation of new enforcement mechanisms, or whether they would rely on existing enforcement mechanisms;
- Describe whether enforcement costs are likely to vary significantly across different policy options;
- Assess whether the magnitude of enforcement costs is so significant that it might tilt the balance in favour of one policy option over other alternatives;
- If this is the case, assess what factors would be essential in determining the magnitude of enforcement costs (e.g. monitoring costs, adjudication costs, inspection costs, etc.) and provide comments on the critical nature of enforcement costs in the choice of the preferred alternative. These comments would be useful for policymakers in making an informed choice.

4.4. Calculate total direct costs

Total direct costs are the result of compliance costs (charges, substantive compliance costs, administrative burdens), hassle/irritation costs where

¹¹³ http://ec.europa.eu/justice/effective-justice/files/cepej_study_justice_scoreboard_en.pdf, See Section 2.2.

applicable, and enforcement costs. Although not necessary, it is advisable that you present them in a disaggregated way, distinguishing between affected stakeholders. In addition, **it is essential that total direct costs are presented for each of the policy options under scrutiny.**

Step 5. Monetize direct benefits, for all alternatives

The technique to be used to monetize direct benefits is often very specific to the proposal under scrutiny. Below, we provide you with basic guidance on how to approach this complex task. We start with cost savings and then explore the rather more complex issue of the valuation of non-market goods.

5.1. Dealing with cost savings

You should be aware of the fact that, contrary to what happens for many categories of costs, in the case of benefits monetization is often hampered by the fact that benefit items might not be subject to a market exchange. As a matter of fact, benefits are easier to quantify and monetize whenever they emerge in the form of cost savings. Accordingly, for all types of cost savings, you should use the same methodology illustrated in Step 4 above. More in detail:

- **Whenever a policy option leads to a reduction in regulatory charges**, you should follow the same approach as in Step 4, Section 4.1 to estimate the value of the reduction.
- **Whenever a policy option leads to a reduction in compliance costs** (both substantive compliance costs and administrative burdens), you should follow the same approach as in Step 4, Section 4.2 to estimate the value of the reduction.
- **Whenever a policy option leads to a reduction in enforcement costs** (both substantive compliance costs and administrative burdens), you should follow the same approach as in Step 4, Section 4.3 to estimate the value of the reduction.

You will need to monetize those benefits, especially for all those cases in which the proposed legislative act aims at achieving a degree of simplification or cost reduction¹¹⁴.

¹¹⁴ One easy, automatic way to address additional costs and cost savings in one unified framework is to consider all types of costs associated with all alternative policy options, *including the baseline option*. If the alternative options entail cost savings compared to the baseline, the calculation of compliance costs or enforcement costs for those alternatives will yield a lower value than the one associated to the baseline, thus leading to an easy assessment of the benefit at hand.

Note: A specific case of savings can occur whenever you are dealing with options that have an impact on the Single Market, especially when such options entail the harmonization of national legislation. Savings might emerge whenever national legislation is fragmented and inconsistent and EU legislation is adopted to harmonize it. This is due to the fact that when legislation in Member States is fragmented, companies wishing to engage in cross-border trade have to incur “adaptation costs”, such as:

- ***Having to change contracts or other practices to comply with national legislation.*** Monetizing these costs is normally possible. One way of doing it is to collect data directly from companies and validated them with experts. For example, in the case of national rules that are stricter than Article 102 TFEU (a study conducted by the College of Europe and CEPS for DG COMP), legal costs were estimated by some companies in the range between €12,000 and €20,000 although some other surveyed companies more generally referred to “tens of thousands of Euros” (per country, per company).
- ***Having to modify standards or equipment, or train personnel to deal with national legislative requirements.*** These costs are easily monetized by referring to market prices, and (in the case of equipment) depreciating these assets over time (for example, over five years).
- ***Incur additional administrative burdens due to the fact that national legislation contains different information obligations,*** which have to be complied with and which would not be incurred if the company refrained from entering the national market. In this case, you have to estimate the time that would be spent complying with the additional information obligations, and convert this into a monetary value by using data on labour costs for the specific country you are looking at (normally available at Eurostat), for the job profile of the person that would have to perform the relevant administrative activities.

A number of *caveats* must be kept in mind when performing these calculations. First, adaptation costs might not be incurred by companies if they keep internal compliance programs that apply to one or more countries: for example, if a company adopts an internal antitrust compliance program that is tailored to the most restrictive country, this will automatically mean that the company also complies with legislation in less strict countries. Also, the magnitude of administrative burdens must be gauged against the so-called “BAU” factor, *i.e.* the extent to which the activities performed to comply with national legislation would be performed anyway even if they would not be required by law.

Finally, cost savings are only one category of benefits one has to deal with when looking at harmonization of legislation. In Section 5.2. below, we illustrate possible market efficiency impacts.

5.2. Monetizing improved market efficiency

Besides cost savings, a policy option can also lead to enhanced market efficiency by stimulating innovation and technological progress, promoting the production of certain goods or improving the information available to market players. When this happens, benefits take the form of increased social welfare in the form of producer and consumer surplus. Estimating these benefits is normally not prohibitively difficult, but for accurate monetization you need to collect data on the demand and supply functions, including data on the elasticity of demand¹¹⁵.

For example, assume a new policy removes restrictions on access to EU markets of certain non-EU products. Although this policy might have negative effects for EU businesses, there might be benefits for EU consumers in terms of enhanced product variety, competition and lower prices. The extent to which this will happen, of course, depends on the heterogeneity of the products, the future share of the market that will be occupied by the non-EU products and the resulting outcomes in terms of market output and price levels. If effects will be significant, more consumers will have access to these products, and the overall social welfare will increase.

At the same time, technological progress can lead to important cost reductions and thus increased efficiency for businesses. For example, a regulatory proposal that boosts the adoption of cloud computing throughout Europe can lead to a 80% of European Companies to achieve 10%-20% reductions in their IT costs¹¹⁶. This reduction might end up increasing profits for these SMEs, and partly also to enhanced consumer surplus due to lower overall market prices.

¹¹⁵ In the US, dedicated databases are available, which make it easier to estimate the response of supply and demand curves to a given change in price or in the quality of products. See, for example, <http://www.ers.usda.gov/data-products.aspx#.UnUkoZTk-Es> and in particular the section on commodities and food elasticities. In the economics literature, several estimates of elasticity are available, which could be collected into a single dataset made available to the desk officers wishing to perform CBA – see *i.a.* http://www.iata.org/whatwedo/Documents/economics/Intervistas_Elasticity_Study_2007.pdf for air transport.

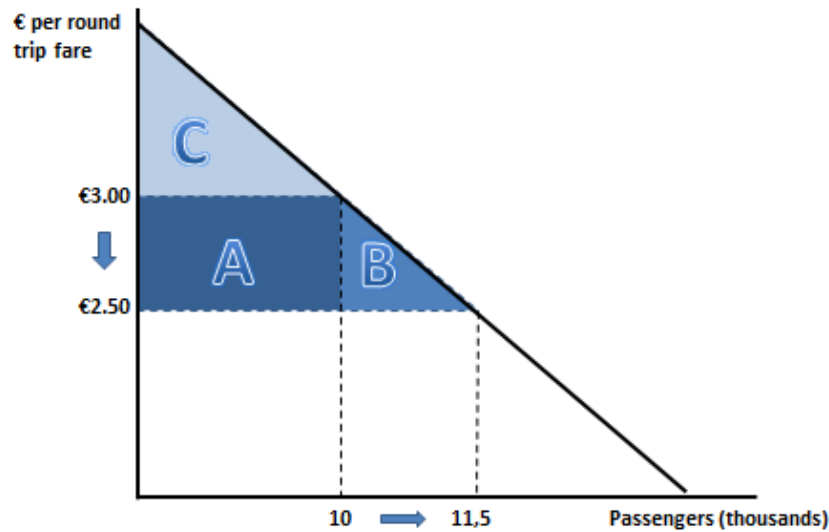
¹¹⁶ IDC (2012) “Quantitative Estimates of the Demand for Cloud Computing in Europe and the Likely Barriers to Take-up”, report for the European Commission, available at http://ec.europa.eu/information_society/activities/cloudcomputing/docs/quantitative_estimates.pdf.

Finally, regulatory measures that lead to enhanced quality or reliability of market products can also lead to an outward shift in the demand curve, thus expanding producer and/or consumer surplus.

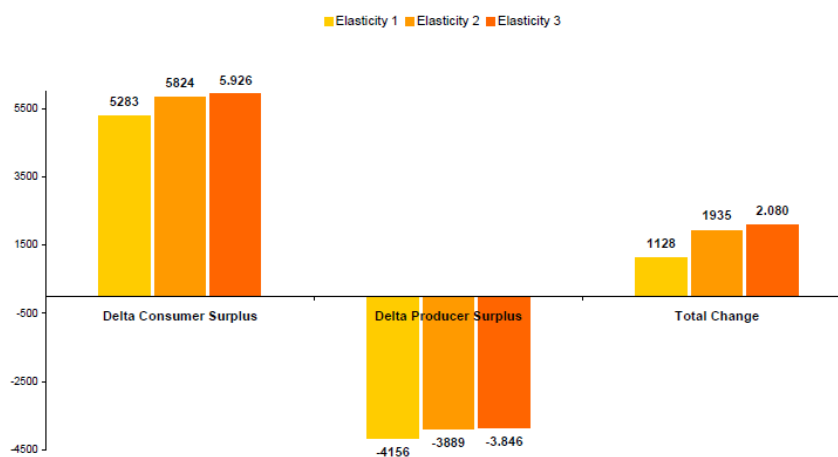
The three most important variables that must be taken into account in order to assess the impact of a future regulation on market efficiency are thus the following:

- **Consumer surplus** is the extent to which consumers gain from the possibility to buy the product: it is also measured as the difference between what consumers would have been willing to pay to buy a certain good, and what they actually pay (i.e. the market price). Consumer surplus and price are inversely related – all else equal, a higher price reduces consumer surplus.
- **Producer surplus** measures what sellers gain out of the sale of a given product, and represents the difference between the actual price and the minimum acceptable price for the producer. Graphically, this area is the area above the supply curve, and below the price level.
- **Deadweight loss**: this is the part that you should be mostly concerned about: if markets do not work efficiently, the output produced might be less than optimal, due to the fact that prices are too high above cost, and some consumers (who value the good at hand more than the cost of producing it) find the good too costly to buy. The value that would have been created by an efficient market can be represented as the consumer surplus that would be generated, were the market at hand functioning more efficiently.

Figure 21 below shows an example taken from the Australian cost-benefit analysis handbook, which assumes the entry of a more efficient bus line in a given market, which brings down prices from €3 to €2.50. The decrease in price leads to an increase in output (1,500 additional passengers now have access to the market). The overall effect is that old passengers gain (area A), and new consumer welfare is created (area B). This adds to the consumer surplus already enjoyed by old passengers (area C).

Figure 21 – Net benefits from enhanced market efficiency

A good example of a similar analysis performed by the European Commission in the past is provided by the first Roaming regulation adopted by the EU in 2006. In the proposal for a roaming regulation [SEC(2006)925]. In the Impact Assessment, the Commission shows the potential impact of various policy options, from the *status quo* option to the adoption of the European Home Market Approach, the regulation at wholesale level only, and the finally retained option (regulation at wholesale and retail level). For each of the options, the main questions to be answered were essentially: (i) to what extent would producers lose revenues as a result of the regulatory option? (ii) to what extent will consumption of roaming services increase as a result of the regulatory measure? (iii) To what extent would consumer surplus increase? Figure 22 below reports graphically the Commission's conclusions for the retained policy option.

Figure 22 – net benefits of retail and wholesale capping

Source: Commission Impact Assessment, SEC (2006) 925, 12 July 2006

In order to reach the estimates in Figure 22, the Commission decided to use three different assumptions as regards the price elasticity of demand for roaming services, in order to reach a more robust estimate of the extent to which consumption of roaming would increase following the regulation. The resulting cost benefit analysis helped the Commission reach a decision on the most preferred policy option.

Note: Efficiency improvements can emerge when you are dealing with options that strengthen the Single Market. These normally include the following:

- **Increased consumer surplus:** this can occur whenever strengthening the Single Market can lead to entry of new players and stronger competition for incumbent players at the national level – this, in turn, leads to lower prices and more participation to the market by consumers, which means greater consumer surplus. In addition, when adaptation costs are reduced due to harmonization of legislation (see Note in Section 5.1 above), prices might also fall, which again leads to a greater consumer surplus (as in Figure 22 above). These benefits can be measured directly through a partial equilibrium analysis, by estimating demand elasticity and thus the potential for new entry to lead to lower prices: this in turn, leads to greater consumer surplus (a reduction of the deadweight loss from non.
- **Economies of scale:** when national legislation is harmonized or barriers to cross-border operations are removed, companies can acquire the economies of scale they need to fully compete on a global scale. For example, the current discussion on the Digital Single Market implies, *i.a.*, that larger mobile telecom operators can negotiate better conditions with very powerful application providers such as Google or Apple, thus securing a larger share of revenues.
- **Increased innovation:** in certain cases, standardization and the removal of cross-border investment barriers created by legal fragmentation can help companies innovate: for example, the GSM standard has helped companies plan their investment knowing that a single frequency would be used for the whole EU; similarly, common rules on data protection, the Single European Payment Area or online copyright can lead to greater legal certainty, a larger prospective market, increased economies of scale and more incentives to invest in future technologies. The recent creation of a unitary patent for Europe is a good example of legislation that can create all these effects.

At the same time, you must also keep in mind that more harmonization might, under certain circumstances, also create costs that have to be weighed together with benefits. In particular:

- In case a single set of rules requires important adaptation for some Member States, *e.g.* due to the fact that their legal traditions and existing rules are very far from the newly introduced legislative measures, one-off harmonization costs might emerge: these are often difficult to quantify, since they might affect businesses, citizens, but also courts, lawyers, and other intermediaries. An estimate of compliance costs (as in the Note under Section 5.1 above) can help you monetize these costs for all these categories, by requiring estimates in terms of upfront costs and/or time spent getting familiar with the new rules.
- When legislation is not harmonized Member States could engage in competition between legal systems, which in turn can create a “race to the top” due to mutual learning and circulation of best practices. A single set of legal rules for the EU28 cannot count on this learning opportunity. However, it must be recalled that depending on the circumstances, competition between legal systems can also generate a “race to the bottom”, as in the famous case of corporate law in the US, where the less transparent state (Delaware) ends up attracting most corporate registrations due to a rather favourable legal environment. Whether a race to the bottom or a race to the top are most likely, is ultimately an empirical question that deserves a case-by-case analysis: as a first, rough criterion, it is useful to remind that legislation that is enforced where the impact of business conduct takes place (*lex loci* as in tort law) is more likely to generate a race to the top, whereas legislation based on where a company is registered (*e.g.* corporate law) most likely lead to a race to the bottom.

5.3. Impacts on health, safety and the environment

Many legislative acts aim at providing European citizens with improved living conditions. These take the form of improved health, safety and environmental impacts, which are typically very difficult to quantify and monetize. Below, we offer you a quick guide to the techniques available to monetize these impacts.

In policy evaluation, benefits associated with non-market impacts, and in particular with improved well-being, are typically assessed with reference to individuals’ willingness to pay (WTP) to achieve a future benefit. WTP can be estimated in two ways:

- By observing what individuals actually pay to achieve a given outcome (so-called ***revealed preferences***). Revealed preference methods include the following:
 - *Travel cost models*: for example, the value of a given monument or a national park to a group of citizens can be approximated by looking at

how much individuals in that group are willing to spend to travel and visit that site.

- *Hedonic models* use statistical methods to measure the contribution of a good's characteristics to its price. Hedonic pricing are very frequently used in the labour market and in real estate markets: for example, if you wish to estimate the benefit of reducing the exposure to noise of a given neighbourhood, hedonic models can help you single out the contribution of "noise exposure" to the value of the real estate by comparing real estate prices in different neighbourhoods.
- *Averting behaviour models* look at actions undertaken by individuals in order not to incur certain risks. For example, the value of a given risk for an individual can be approximated by looking at how much that individual is willing to pay for insurance against that risk. This technique has many applications in many areas, including safety and the environment: although the first applications of the method were directed toward values for benefits of reduced soiling of materials from environmental quality changes, recent research has primarily focused on health risk changes. In any event, the averting behaviour method can provide WTP estimates for a variety of other benefits such as damages to ecological systems and materials.
- *Cost of Illness methods* infer benefits by estimating the reduced financial burden of an illness based on the combined value of saved direct and indirect costs associated with the illness. More specifically, direct costs considered by this method represent the expenditures associated with diagnosis, treatment, rehabilitation, and accommodation; indirect costs represent the value of illness-related lost income, productivity, and leisure time. Most existing COI studies estimate saved indirect costs based on the typical hours lost from a work schedule or home production, evaluated at an average hourly wage. This also means that other costs, such as pain and suffering, are not accounted for. Direct medical costs of illness are generally derived by using a database of actual costs incurred for patients with the illness.
- By asking directly individuals how much they would be willing to pay to achieve a given outcome in the future (so-called ***stated preferences*** method). Typical stated preference models include the following:
 - *Contingent valuation methods* rely on the idea that individuals can directly state what their WTP is with respect to a future benefit. For example, the value of building a new bridge in a given city could be measured by asking directly to citizens what their WTP would be for

such a bridge, and then summing up all the money that citizens would be willing to pay in order to have the bridge in place.

- *Choice Modelling and conjoint analysis* are survey-based methodologies for modelling preferences for goods where goods are expressed in terms of their attributes and the categories of these attributes. Respondents are asked to make a choice of a good based on the preferences for the types and levels of the attributes associated with the good. The amount of WTP can be estimated indirectly from the prices of the relevant attributes of the good being valued.

Finally, benefits can also be estimated, under rather exceptional circumstances, by referring to existing studies, provided that the conditions, assumptions, objective and methods used allow the “transfer” of the results of these studies to the case at hand (so-called ***benefit transfer method***). As this method must be used with caution, we advise you to seek help from the Impact Assessment unit in your DG for the values that you can transfer from previous studies to the case you are dealing with.

Table 29 below provides you with quick guidance on what type of method can be used to assess specific types of benefits, together with an indication of the relative difficulty of using the method, and the associated pros and cons. **Note that you can use this table also in deciding which analysis should be performed by external experts**, if you believe that a given methodology is appropriate, but too technical for you to carry out.

Table 29 – benefit assessment methods

Method	Impacts	Difficulty	Strengths	Weaknesses
Revealed preferences				
Travel cost	<ul style="list-style-type: none"> • Recreation demand, “use value” of natural resources or monuments 	Low	<ul style="list-style-type: none"> • Clarity of scope • Real behaviour, not stated preferences • Ease of data collection • Assumptions clearly stated 	<ul style="list-style-type: none"> • Multiple-purpose trips and multi-site trips make it difficult to apply • Difficult to assess the real cost • Does not include the non-use (option or existence) value of the good to be assessed • Does not break down into specific features of the asset or good to be assessed
Hedonic pricing	<ul style="list-style-type: none"> • Mortality and morbidity risk reductions • Improvements in labour and real estate markets • Improved product characteristics • Improved aesthetics • Recreation demand 	Medium	<ul style="list-style-type: none"> • Use real market data • Map real consumer preferences • Relative ease of data collection • Assumptions clearly stated 	<ul style="list-style-type: none"> • Assume markets in perfect equilibrium • Incorporate market imperfections and bounded rationality of consumers • Multi-collinearity • Can estimate use values alone, not option or existence values • Requires extensive house market data • Assume instant adaptation to price changes • Current evidence suggests it is not suitable for use in benefits transfer
Averting behaviour	<ul style="list-style-type: none"> • Mortality and morbidity risk reductions • Improved aesthetics • Valued ecosystem functions 	Medium	<ul style="list-style-type: none"> • Do not require extensive data • Use real market data 	<ul style="list-style-type: none"> • Incorporate bounded rationality of consumers • can estimate use values only • problem of multiple averting expenditures • problem of benefits of averting expenditure • problem of non-continuous, irreversible choices • requires past data
Cost of illness	<ul style="list-style-type: none"> • Morbidity risk reductions 	Low	<ul style="list-style-type: none"> • Do not require extensive data • Use real market data 	<ul style="list-style-type: none"> • Scope is too narrow, often does not include indirect costs and pain and suffering • Decisions on health are normally mediated • Changes in treatment not easily observable
Stated preferences				
Contingent valuation	<ul style="list-style-type: none"> • Mortality and morbidity risk reductions • Improved aesthetics • Valued ecosystem functions • Non-use values (e.g. in environment) 	Medium	<ul style="list-style-type: none"> • The only method that can measure non-use values • Based in economic utility theory and can produce reliable estimates. • Most biases can be eliminated by careful survey design and implementation. • Widely used and researched: it is being constantly improved to make the methodology more reliable 	<ul style="list-style-type: none"> • Costly and time-consuming • Estimates of non-use values are difficult to validate externally. • Stated intentions of willingness to pay may exceed true feelings. • Several potential biases to control for
Choice modelling	<ul style="list-style-type: none"> • Mortality and morbidity risk reductions • Improved aesthetics • Valued ecosystem functions • Non-use values (e.g. in environment) 	High	<ul style="list-style-type: none"> • Can deal with situations where changes are multi-dimensional • Possibility to use multiple choices • Users can express their preference for a valued good over a range of payment amounts • Relying on ratings, rankings and choices to infer WTP can overcome some problems of the Contingent Valuation Method. 	<ul style="list-style-type: none"> • Respondents might find problems in dealing with multiple complex choices or rankings • Inefficiency in deriving values for a sequence of elements implemented by a policy or project. • WTP estimate very sensitive to study design.

Note. Please take into account, when using stated or revealed preference techniques, that WTP cannot always be a good proxy for the assessment of benefits. The main reasons are that:

- Income is not a good proxy for utility and happiness;
- It is rather the “ability to pay”, not the “willingness to pay”, that dictates market choices: people face income constraints that cost benefit analysis often neglects;
- People’s happiness depends also on what other individuals are endowed with;
- People sometimes tends to underrate the value of long-term impacts, especially if they are weighed against shorter term ones, due to a lack of inter-generational altruism or simple shortsightedness;
- People make mistakes for what concerns their WTP (bounded rationality and rational ignorance arguments);
- People make mistakes for what concerns the real value associated with their actions;
- People value differently gains and losses due to the “endowment effect”.

The latter critique has led economists to focus also on another proxy for the intensity of individual preferences, *i.e.* WTA. WTA compensation is the minimum amount of money an individual is willing to accept for not receiving a given improvement, or for being deprived of resources or assets they used to possess before¹¹⁷. The two measures can substantially diverge. The main reason is that, when we possess something and consider it to be part of our “normal” endowment, we are normally more reluctant to get rid of it than when we have never possessed that good.

¹¹⁷ Part of the literature uses also the terms “equivalent variation” and “compensating variation” to denote the value underlying the concepts of WTP and WTA. See, also, the UK Green Book on evaluation, Section 2.1., at http://www.hm-treasury.gov.uk/d/green_book_valuationtechniques_250711.pdf.

Step 6. Assess indirect impacts

6.1. Are alternative policy options likely to generate significant indirect costs?

Most of indirect impacts are difficult to monetize. That said, you should do your best to answer the following questions:

- ***Does any of the alternative policy options create indirect compliance costs (“a negative externality”)?***

This occurs whenever direct compliance costs imposed by the alternative option at hand would lead to restrictions of output, higher downstream prices or any other additional cost for economic agents other than those targeted by the regulation;

- ***Does any of the alternative policy options lead to substitution effects?***

In particular:

- Would citizens or businesses other than the regulated entities shift to alternative sources of supply?
- Would citizens or businesses other than the regulated entities shift to alternative modes of consumption?

If this is the case, you should try to monetize those benefits by estimating the opportunity cost of the induced behaviour, *i.e.* the value or surplus foregone by those individuals or businesses that have been induced to engage in the substitute behaviour.

- ***Does any of the alternative policy options lead to increased transaction costs?***

Transaction costs are normally very difficult to estimate: to the extent possible, you should limit yourself to answering the following questions.

- *Would any of the alternatives increase:*
 - The cost of negotiations between parties, *e.g.* to adopt collective decisions;
 - The cost of information gathering for private parties;
 - The cost of looking for a contractual counter-party;
 - The likelihood of strategic behaviour between private parties;

- The cost of monitoring a counterparty's behaviour;
 - *Would these costs harm the likely efficiency of the alternative option at hand?*
- ***Does any of the alternative policy options lead to a reduction of competition?***

More specifically, you have to answer the following questions:

- Would any of the alternative options make it more difficult for new businesses to enter the market at hand?
- Would any of the alternative options prevent firms from competing aggressively in the relevant market?
- Would any of the alternative options make it more likely that firms collude in the relevant market, to the detriment of consumers?

Note. In case of collusion, the economic literature observes that the average overcharge from a price-fixing cartel is approximately 15-20%¹¹⁸.

In all those cases, you should try to attach a monetary value to the likely loss of consumer surplus due to reduced competition. This is inevitably a case-by-case exercise. You can refer, *i.a.* to the recent “practical guide” adopted by the European Commission on estimating damages in antitrust cases¹¹⁹.

- ***Does any of the alternative policy options lead to reduced market access?***

A way to assess this indirect cost would be to estimate the lost consumer surplus (for individual consumers), or the lost profit (for businesses) that would occur due to the impossibility to gain access to a given market due to regulatory restrictions or to costs imposed by the regulation on upstream market players.

- ***Does any of the alternative policy options lead to reduced investment or innovation?***

Common indicators are the number of patents produced, the volume of R&D investment, the amount of technology transfer etc. You can refer to the check-list on innovation impacts already included in the European Commission Impact Assessment Guidelines, at Annex 8.

¹¹⁸ It would be possible to include in this guidance selected elasticities for the demand and the supply of specific products. See *i.a.* [here](#). This would need to be coordinated with COMP.

¹¹⁹ http://ec.europa.eu/competition/antitrust/actionsdamages/quantification_guide_en.pdf

6.2. Are alternative policy options likely to generate significant indirect benefits?

Most of indirect benefits are difficult to monetize. That said, you should do your best to answer the following questions:

- ***Does any of the alternative policy options create indirect compliance benefits (“a positive externality”)?***

In particular, you should try to assess whether the policy option leads to savings or improved efficiency due to the fact that the addressees of the proposed regulation will have to comply with the new rules. These second-order effects can be very important in some cases: for example, the fact that a common standard is imposed in a given industry might generate important savings for downstream players; legislation that imposed interoperability between standard interfaces for applications installed on smartphones might reduce development costs for app developers; etc. these benefits have to be assessed and, where possible, monetized.

- ***Does any of the alternative policy options create wider macroeconomic benefits?***

You should try, where possible, to assess whether macroeconomic benefits might emerge as a result of the implementation of the policy option at hand. While in partial equilibrium analysis these wider impacts are normally not contemplated by the results of the assessment, occasionally it might be possible to use standardized multiplier to assess the likely macroeconomic benefits, e.g. in terms of GDP increase. For example, A 25% reduction of administrative burdens has been estimated to trigger a GDP increase of up to 1.5% in the Netherlands, 1% in the UK and 1.4% at the EU level (Kox 2005; EC 2007); and according to recent estimates, a 10% increase in broadband penetration yields an additional 1.21% of GDP growth in high income countries, which rises to 1.38% in low and middle income countries. Similarly, doubling the broadband speed was found to increase an economy's GDP by 0.3% (Qiang and Rossotto 2009 Bohlin et al. 2012). If you decide to rely on any of those (or similar) multipliers, it is of utmost importance that you carefully review the scientific evidence backing these figures, possibly giving an indicative lists of some publications where these types of studies are more frequently found (if at all possible).

Note. If you believe that macroeconomic impacts will be very significant, and spread across many sectors of the economy, then you should revert to Step 3 above and consider general equilibrium analysis.

- ***Does any of the alternative policy options create other, non-monetizable benefits?***

You should try to answer these questions:

- Does the policy option deter infringements of legal rules?
- Does the policy option increase legal certainty?
- Do policy options differ in terms of protection of fundamental rights?

Step 7: Locate impacts along the life of the proposal, and discount monetized impacts

After you have monetized all (direct) impacts for all alternative policy options, you should calculate the “net present value” for each of the options. The reason why discounting is needed is straightforward: you often need to compare alternatives that produce costs and benefits at different moments in time. An option that generates, say, €50 million of benefits tomorrow cannot be considered equivalent to an option that generates the same amount of benefits, but only in ten years from now. To make costs and benefits comparable, a discount rate should be applied to future cash flows, in order to represent their value today.

If the discount rate were constant at ‘ r ’ per cent per year, a benefit of ‘ B_t ’ Euros received in ‘ t ’ years is worth $B_t/(1+r)^t$ now. Similarly, a cost of ‘ C_t ’ Euros received in ‘ t ’ years is worth $C_t/(1+r)^t$ today. If you assume the discount rate remains constant over the years, the formula for calculating the value of the difference between benefits and costs today (the so-called “net present value”, NPV) becomes the following:

$$\sum_{t=0}^T \text{NPV} = (B_t - C_t)/(1+r)^t$$

Following the current Impact Assessment Guidelines, the “default” discount rate to be applied in cost-benefit analysis is 4%. This is very different from the discount rate used in other parts of the world: the value of 7% is chosen in Australia and the United States, with sensitivity analyses being mandate for different values (3% and 10% in the US).

The choice of the inter-temporal discount rate is a crucial one, when you have monetized both benefits and costs. As a matter of fact, most policies generate costs sooner than benefits: this means that the higher the discount rate, the smaller the present value of long-term benefits would be, and the more likely that less costly alternative will prevail over more costly ones. As a result, policies that look at long term benefits might appear inefficient in cost-benefit terms. The current value chosen by the Impact Assessment guidelines, 4%, appears very balanced when it comes to recognizing long-term benefits. However, in some cases you might want to test the robustness of your results by choosing different rates, *e.g.* 2% and 7%. Once you have identified the occurrence of costs and benefits along the life of the proposal, you should develop a scheme like the

one reported at table 30 below, for each of the alternative options. The table shows how the NPV value changes depending on the discount rate chosen¹²⁰.

Table 30 – Net Present Value – individual option

Years	Costs	Benefits	Annual net benefit (Bt–Ct)					
	€m	€m	no discount	2%	4%	5%	7%	10%
0	5		-5	-5	-5	-5	-5	-5
1	1	3	2	1,96	1,92	1,90	1,87	1,82
2	1	0	-1	-0,96	-0,92	-0,91	-0,87	-0,83
3	1	3	2	1,88	1,78	1,73	1,63	1,50
4	1	3	2	1,85	1,71	1,65	1,53	1,37
5	0,5	4	3,5	3,17	2,88	2,74	2,50	2,17
6	0,5	4	3,5	3,11	2,77	2,61	2,33	1,98
7	0,5	4	3,5	3,05	2,66	2,49	2,18	1,80
NPV	10,50	21,00	10,50	9,06	7,79	7,21	6,16	4,81

¹²⁰ A pre-compiled excel file can be made available to the officer for this calculation.

Step 8: Present impacts and compare options

After you have monetized all (monetizable) impacts, have collected information to quantify or assess qualitatively indirect impacts, and applied the discount rate to future costs and benefits for each of the alternative policy options, it is time to present the (almost) final results of your cost-benefit analysis. Please make sure that you present clearly the different types of costs and benefits you have monetized, and add qualitative information on those impacts that you could not monetize. You can use the template reported below in Table 31¹²¹.

This table allows for the comparison of options in several respect:

- In terms of various cost and benefits categories;
- In terms of net benefits and net present value;
- In terms of impact on specific categories of stakeholders (see Step 10 below).

[illegible]

¹²¹ Here too, an excel file can be made available to desk officers.

Table 31 – Template for presentation of preliminary results

	Baseline						Option 1						Option 2					
	CIT	CONS	BUS	ADMIN	TC	TOTAL	CIT	CONS	BUS	ADMIN	TC	TOTAL	CIT	CONS	BUS	ADMIN	TC	TOTAL
Direct costs (DC)																		
<i>Charges</i>																		
<i>Administrative burdens</i>																		
<i>Substantive compliance costs</i>																		
<i>Hassle costs</i>																		
Indirect costs (IC)																		
<i>Indirect compliance costs</i>																		
<i>Substitution effects</i>																		
<i>Reduced competition</i>																		
<i>Reduced investment/ innovation</i>																		
Enforcement costs (EC)																		
<i>Information and monitoring</i>																		
<i>Inspections</i>																		
<i>Complaint handling</i>																		
<i>Adjudication/litigation</i>																		
Non-monetizable costs*																		
Total costs (DC+IC+EC)																		
Direct benefits (DB)																		
<i>Mortality</i>																		
<i>Morbidity</i>																		
<i>Environmental</i>																		
<i>Market efficiency</i>																		
<i>Cost reductions</i>																		
<i>Other direct benefits</i>																		
Indirect benefits (IB)																		
<i>Indirect compliance benefits</i>																		
<i>Wider macroeconomic benefits</i>																		
Non-monetizable benefits*																		
Total benefits (DB+IB)																		
Net benefits																		
<i>Discount rate = 4%</i>																		
NPV																		

* Please indicate the intensity of non-monetizable costs and benefits using a range between 0 (lowest) and 5 (highest)

The scorecard analysis is a powerful instrument to compare options and exclude those options that are clearly dominated by others. One example of scorecard analysis is reported in Table 32 below. There, options are analyzed in terms of their (direct, indirect and enforcement) costs and (direct and indirect) benefits: however, in this case we assume that a full monetization of all costs and benefits was not possible, such that only some (or even none) of those impacts could be expressed in a monetary value. Even in this case, it is possible to assign a score to each impact for each option, for example in the range between 0 (lowest) and 5 (highest) to describe the intensity of each impact: then, it is possible to exclude from the analysis those options that are dominated by one of the other alternatives. For example, in Table 32 Option 3 can be excluded from the comparative analysis since it bears more direct costs than Option 2, more indirect costs and also higher enforcement costs; at the same time, the benefits are scored as high as those of Option 2. Accordingly, it is possible to say that Option 2 dominates Option 3, and as such only the former should be retained for further analysis. Similarly, the baseline option is dominated by all other options on the table. It is important to recall that this exercise can also be broken down by type of stakeholder, by using a scheme similar to that in Table 31 above.

Note that when running a scorecard analysis, you should avoid the following mistakes:

- ***It does not make any sense to sum up the various scores for each option:*** as different scores might refer to different magnitudes of impacts, summing up the scores given to various impacts is meaningless and potentially dangerous: for example, imagine that for a given proposal a score of 3 for direct costs broadly represents a cost of €3 million, and a score of 4 a cost of €5 million. Assume, further, that a score of 3 for indirect costs refers to a magnitude of approximately €200 million, and a score of 4 approximately €280 million. Then, assume that Option X scores 4 for direct costs and 3 for indirect costs, whereas Option Y scores 3 for direct costs and 4 for indirect costs. The two options would score a total of 7, and might then look equal: however, as the magnitude of the impacts is very different, option Y is way more preferable than option X.
- ***Scores must be justified in a consistent and detailed manner,*** otherwise this analysis would lend itself to arbitrariness and spurious accuracy. In the text of the IA, you should always devote adequate space to the (qualitative or even quantitative) explanation of why certain scores were given to specific impacts, and why does one option score better or worse than others based on the score given to it.
- ***The scorecard exercise should be used to exclude options, not to identify the preferred choice between options that do not***

dominate each other. While, on the one hand, quantitative cost-benefit analysis leads to the identification of the option that maximizes net benefits, this type of scorecard analysis seldom leads to identifying one option that dominates all others. In all other cases, the analyst should indicate the pros and cons of the retained options, and leave it to the political decision-maker to decide which of the selected options should become a legislative proposal. This could be due to the fact that, in the example of our Table 32, option 2 is preferable to option 1 in terms of direct benefits, and the policymaker attributes specific importance to those benefits; or, when the analysis is broken down by type of affected stakeholders, the decision could be based on the extent to which a given category (e.g. SMEs, consumers, etc.) benefits from any of the alternative options.

Table 32 – Excluding options via a scorecard analysis

Impacts	Baseline	Option 1	Option 2	Option 3
Costs				
Direct costs	5	2	3	4
Indirect Costs	4	3	2	4
Enforcement costs	1	1	2	3
Benefits				
Direct benefits	1	3	4	4
Indirect benefits	2	2	3	3

Step 9. How robust are the results?

This phase of the analysis is crucial. You should check the robustness of your results in at least five main ways:

Action 1. *Change the discount rate.* As explained above, you should perform a sensitivity analysis by using different discount rates in your calculation of the net present value. If, even with discount rates of 2% and 6-7%, your preferred policy option remains the same, this indicates robustness of your results.

Action 2. *Check for typical pitfalls in cost-benefit analysis.* In particular, you should make sure you avoid the following mistakes:

- a. *Double counting.* This can occur in many ways in a cost-benefit analysis. For example, if you have monetized direct compliance costs, but failed to account for partial passing-on of those costs to end consumers, then adding indirect costs for end consumers might lead to double counting. Similarly, if you have monetized benefits in the form of saved commuting time for households that will be served by a new high-speed rail, you should not add other benefits based on hedonic estimates of the additional value of their real estate (which is another way to approximate the same effect). More generally, you should avoid using estimates from two different techniques, but related to the same impact.
- b. *Confusing the baseline with the status quo.* The baseline is a dynamic, forward-looking scenario that includes the likely evolution of the policy problem absent further policy measures at the EU level. Incremental costs and benefits should be assessed against such a dynamic scenario, not merely relative to the *status quo*. The same occurs whenever other EU policies have been already adopted, which will partly affect the evolution of the policy problem (e.g. measures within the digital agenda might lead to a reduction of administrative burdens due to greater penetration of broadband in the coming years).
- c. *Inconsistent base currency.* If the discount rate is real, flows in the same currency base should be estimated and presented. If a comparison is made to similar estimations in other countries, particularly if benefits are consumption based,

estimates should be performed at purchasing power parity (PPP).

- d. *Spurious accuracy*. When the assumptions behind monetized values are too acrobatic, failing to explain the degree of volatility of the results might lead reader with a sense of false accuracy. It is important that you always specify the *caveats* that apply to the results of your analysis, and couple them with careful sensitivity analysis.

Action 3. Perform sensitivity analysis on key variables. The variables that should be allowed to vary to test the robustness of the final data should be linked to the drivers of the problem identified in the problem definition. Possible ways to approach the problem of sensitivity analysis are:

- *Worst/best case scenario analysis*: this requires adopting all the most conservative and all the least conservative values for variables used in the calculation of the NPV, and showing a lower bound estimate and an upper bound estimate for the resulting NPVs for each option.
- *Partial sensitivity analysis* (i.e. changing only some of the assumptions, but not other) should be selectively used, for those key risk factors and underlying assumptions that are expected to tilt the balance in favor of one policy option. This is often the case of variables such as the compliance rate, the evolution of consumer demand, etc.
- *Monte Carlo sensitivity analysis* is a more sophisticated technique that entails the creation of a distribution of net benefits by drawing key assumptions or parameter values from a probability distribution¹²². While this is a more robust approach to sensitivity analysis, care needs to be taken in adopting reasonable and justified assumptions about the probability distributions which have been assumed. This type of analysis normally takes the form of a random sampling process to approximate the expected values and the variability inherent in the assumptions which are expressed as probability distributions for the most sensitive and uncertain parameters (risk variables). It is a computer-aided methodology through which many possible project scenarios are generated through a random

¹²² see Boardman et al. (2006) for more details

selection of input values from the specified probability distributions.

If the robustness of your basic assumptions cannot be examined numerically, a qualitative discussion on the appropriateness of each assumption can help readers to gauge the reliability of the results. The outcome of the sensitivity analysis should not be presented as a true, holistic measure of the uncertainty in the results, since there will be many assumptions that are not examined in the sensitivity analysis. Therefore the numerical results of the sensitivity analysis should be presented side-by-side with a discussion of the underlying assumptions that cannot be numerically examined.

Action 4. *Assess the likelihood and patterns of compliance.* This implies that you reflect on the following effects.

- *Lack of deterrence, lack of compliance.* The choice to comply with a legal rule can be framed as a rational process. Individuals or businesses that are targeted by a legal rule might decide not to comply with it if the cost of compliance is greater than the likelihood of being prosecuted for having infringed the legal rule at hand. Accordingly, the more difficult it is for enforcers to track non-compliance, the lower the sanction, the less effective the work of enforcers and inspectors, and the greater the benefit from non-compliance, the more likely it will be that the compliance rate will be lower than 100%. This is particularly relevant for all those methods that assume 100% compliance rates, such as the Standard Cost Model.
- *Behavioural responses to legal rules.* Beyond rational non-compliance, the effectiveness of a given policy alternative might be negatively affected by cognitive effects. The assessment of costs and benefits might be distorted if you fail to account for possible behavioral responses by individuals. These include cognitive problems (over-optimism, excess risk aversion, and more generally bounded rationality and rational ignorance); and offsetting behaviour (e.g. individuals drive faster if they have safer cars, such as cars equipped with airbags and electronic stability systems, such that the additional safety benefits expected from this equipment is compensated by the higher speed). If you are comparing “passive safety” measures

(which do not require actions by the driver) and “active safety” measures (which depend on the driver’s behaviour), the existence of offsetting behavior can tilt the balance in favour of the former.

Action 5. Assess interactive effects. You should assess the interdependency between costs and benefits. For example, if you are looking for a reduction of direct compliance costs, remember that sometimes this can lead at the same time to an increase in enforcement costs, or a decrease in regulatory benefits.

Step 10. Consider distributional and cumulative impacts (optional)

Standard cost-benefit analysis disregards, throughout its application, the analysis of which groups gain or lose if any of the policy options is implemented. This makes the analysis simpler and more tractable. In reality, however, economists widely agree that the allocation of the resources matters for overall welfare: accordingly, knowing who will stand to win or lose from the application of a policy option is essential.

If you have completed the previous nine steps, you are also able to undertake an analysis of the distributional impacts of the policy options at hand. Accordingly, you should present the results of your analysis by breaking down costs and benefits according to different groups of stakeholders. This will make it easier for the political decision-maker to understand whether certain impacts should be given more weight than others. Where possible, it would also be useful if you could break down impacts based on the following characteristics:

- The impact on Member States (if territorial impacts lead some countries to lose, and others to gain);
- Impact on future generations, the young and the elderly;
- Impact on richer and poorer citizens;
- Impact on large, small and micro enterprises.

Another good reason for disaggregating impacts based on the affected stakeholders is that this allows, over time, an analysis of the cumulative impacts of EU policy on different stakeholders. For example, SMEs in a given industry sector might be harmed by a given regulatory option to an extent that they would go bankrupt in many member states: this might not be apparent to you, unless you consider the impact already exerted by other policy measures in the same field.

Note. Distributional impacts include both net social impacts, i.e. net additions to, or reductions of, social welfare; and transfers between categories of stakeholders. Counting both in your cost-benefit analysis without clearly distinguishing net impacts from transfers may cause you to double-count costs or benefits. It is therefore advisable that you first assess the overall costs and benefits from a specific regulatory option, and then inquire on the likely distributional impact by breaking down costs and benefits according to the affected stakeholder.

4 CONCLUSION: OPPORTUNITIES AND CHALLENGES OF USING COST-BENEFIT ANALYSIS AT THE EU LEVEL

This study contains a discussion of the main costs and benefits of regulation and provides an introduction to cost-benefit analysis, with a view to its use at the EU level, by desk officers of the European Commission. Throughout the study, we have tried to use simple language and avoid unnecessary complexity, under the assumption that, where sophisticated skills and modelling competences and tools are needed, desk officers should seek the help of dedicated structures inside the European Commission, where these competences are located.

Several main messages should be kept in mind when reading this study.

First, in general terms **cost-benefit analysis is one of many methodologies that can be used in impact assessment**, and especially in the EU Impact Assessment system, as will be clarified below. Other methods, such as cost-effectiveness analysis, least cost analysis and various forms of multi-criteria analysis, both in quantitative and qualitative terms, can prove more appropriate depending on the case at hand (see Step 0 in Chapter 3, page 155, for more details). We have clarified in this study that cost-benefit analysis should be chosen only when officers expect both benefits and costs to vary depending on the regulatory alternative chosen, when at least all direct benefits and direct costs can be monetized; the expected magnitude of impacts is significant; and distributional impacts are unlikely to be substantial.

Second, this **study has also highlighted that cost-benefit analysis has a significant potential to inspire efficient regulatory choices, but is subject to several critiques**, related to its relative ignorance of distributional impacts, its reliance on income as a proxy for utility and happiness, and a number of other underlying assumptions, which can prove fatal for the accuracy of the whole exercise.

Third, an important message to be spelled out is that in addition to existing difficulties, which have triggered a hectic debate at national level in several countries, **cost-benefit analysis is more challenging when conducted at the EU level**, for the following reasons:

- *The EU impact assessment system applies to a wide variety of legislative initiatives*, including white papers and communications, other soft law documents, cross-cutting binding initiatives, narrow initiatives, expenditure

programmes, etc. This is a much wider range of instruments compared with the ones to which cost-benefit analysis is applied in other jurisdictions. For example, in the US Regulatory Impact Analysis is essentially based on cost-benefit analysis and with limited attention for distributional impacts (despite greater emphasis placed on the latter by the Obama administration): however, in the US RIA is mandatory only for secondary legislation, mostly of technical nature, and not for primary legislation. This means that all legislation passed by Congress or by independent regulatory agencies is not subject to RIA: as an example, the well-known Affordable Care Act in the US was never subject to a RIA, but its technical implementation measures are.

That said, the use of cost-benefit analysis in the EU context is likely to face more problems when applied to non-binding initiatives (e.g. White Papers) – in which policy options might not be fully detailed and as such difficult to analyse in terms of costs and benefits; and also to cross-cutting legislative initiatives, which feature significant distributional impacts and, as such, are better analysed through multi-criteria analysis. As a result, it must be clarified that cost-benefit analysis at the EU level is unlikely to have the same frequency of application at the EU level than it has in the US or in other systems.

- *The need to reconcile CBA with the requirement for an integrated assessment of economic, social and environmental impacts.* As a corollary of the above-mentioned wider scope of the EU system compared to systems in place in other jurisdictions, it must be observed that monetizing some of the impacts listed in the IA guidelines, such as respect for fundamental rights, would be a meaningless exercise, and as such should not be undertaken. Rather, multi-criteria analysis (which falls outside the scope of this study) should be used in order to provide policymakers with a basis for informed decisions.
- *The multi-institution, multi-level nature of EU policymaking makes it very difficult to reach a sufficient level of accuracy in the analysis of certain costs and benefits.* As shown in table 24, the applicability to the EU IA system of the methods being applied at the national level is generally low. In addition, we have explained in the text that predicting the mode of enforcement and the related costs for public administrations at the national level is almost impossible at the *ex ante* stage, unless rather extreme assumptions are formulated (this is why we offer a simplified treatment of this issue in Step 4 of our guidance document); this also means that compliance costs will be more difficult to predict and measure, as they partly depend on enforcement patterns. In this respect, having more information on national implementation plans, and an organized database of indicators

of enforcement effectiveness and costs at the national level would facilitate enormously the work of the desk officer: the alternative, ignoring enforcement costs, would be highly undesirable for the accuracy of the exercise, and in particular for a meaningful comparison of alternative policy options.

- *A related problem is the greater difficulty to perform cost-benefit analysis due to problems of data availability.* The need to collect data from all Member States or, alternatively, to extrapolate data collected for some Member States to the EU28 makes the performance of cost-benefit analysis much more difficult at the EU level. Estimating costs and benefits would be of course easier at the EU level if a dedicated service could be established (possibly at Eurostat) to collect data in a form that is usable by desk officers for cost-benefit analysis - one example being the German Statistical Office's dedicated service (www.destatis.de/webskm) and the LIAISE toolbox still under development (see footnote 94 above). However, the amount of new staff that would be needed would impose on the EU a prohibitive cost, which makes this possibility almost impossible to realize in practice.

The most important gaps to be filled before the desk officers of the European Commission will be put in the best condition to perform, where appropriate, cost-benefit analysis of their legislative proposals are therefore adequate exchange of information with other EU institutions and Member States for what concerns implementation and enforcement plans and patterns; and adequate guidance on existing data that can be used to attach monetary values to specific impacts and, possibly, also existing indicators and estimates to be used to measure indirect impacts of alternative regulatory options.

GLOSSARY OF TERMS AND CONCEPTS

Average cost	Total cost divided by the quantity of output.
Benefit-cost ratio	This summary measure directly compares benefits and costs. To calculate, divide total discounted benefits by total discounted costs. A BCR greater than 1 means the benefits outweigh the costs and the investment should be considered. If the ratio is less than 1, the costs outweigh the benefits. If the BCR is equal to 1, the benefits equal the costs.
Capital costs	The cost of purchasing and/or developing tangible property, including durable goods, equipment, buildings, installations, and land. This cost includes any interest paid on the funds borrowed to finance a capital expense.
Consumer Surplus	The maximum sum of money a consumer would be willing to pay to consume a given amount of a good, less the amount actually paid. It is represented graphically by the area between the demand curve and the price line in a diagram representing the consumer's demand for the good as a function of its price.
Contingent valuation	A method that uses surveys to estimate the monetary value of something that is not commonly traded in the marketplace, such as environmental preservation or crime reduction. For example, a contingent-valuation survey might ask individuals what they are willing to pay for a reduction in crime.
Cost-benefit analysis	A type of economic analysis which provides a complete accounting of the costs related to a given policy or program. It requires the monetization of all costs and benefits of alternative policy options, which in turn allows the identification of those options that exhibit the highest net benefits.
Cost-effectiveness analysis	A type of economic analysis that entails the quantification (not monetization) of the benefits that would be generated by one Euro of costs imposed on society. The typical method used to compare options is thus the benefit-cost ratio. This method is normally used to all expenditure programs, as it leads to identifying the “value for money” of various expenditure programs.
Cost-of-Illness (COI)	A method that measures tangible costs, such as medical costs and lost earnings, using information from hospital databases and typical salary rates.
Direct costs	Costs that are directly related to a specific activity. General categories of direct costs include but are not limited to salaries and wages, fringe benefits, supplies, contractual services, travel and

	communication, equipment, and computer use.
Discount rate	The interest rate used in calculating the present value of expected yearly benefits and costs.
Discounting	A technique that translates future costs and benefits into present-day values to account for the time value of money (see also Net Present Value below).
Existence value	The value placed by people on the continued existence of an asset for the benefit of present or future generations.
Hedonic valuation	A technique to estimate the dollar value of items that are not commonly traded in the marketplace by measuring their impact on the prices of other goods and services.
Indirect costs	Costs incurred in related markets or experienced by consumers, government agencies or other stakeholders that are not under the direct scope of the regulation. (note that in accounting, indirect costs are given a different meaning, i.e. overhead).
Infra-marginal benefits and costs	Consumers would generally be willing to pay more than the market price rather than go entirely without a good they consume. The economist's concept of consumer surplus measures the extra value consumers derive from their consumption compared with the value measured at market prices. When it can be determined, consumer surplus provides the best measure of the total benefit to society from a government program or project. Consumer surplus can sometimes be calculated by using econometric methods to estimate consumer demand.
Interactive effects	Possible interactions between the benefits and costs being analysed and other government activities should be considered. For example, policies affecting agricultural output should reflect real economic values, as opposed to subsidized prices.
Least-cost analysis	A type of economic analysis that looks only at costs, in order to select the alternative option that entails the lowest cost. This method should be chosen whenever benefits are fixed, and the only issue that matters for policy appraisal is minimizing costs.
Marginal cost	The cost of producing an additional unit of a given product or service.
Market failure	An imperfection in the market mechanism that prevents the achievement of economic efficiency.
Monte Carlo analysis	A type of sensitivity analysis that can examine multiple variables simultaneously and simulate thousands of scenarios, resulting in a range of possible outcomes and the probabilities that they will occur.
Multi-criteria analysis	A type of analysis that allows a comparison of alternative policy options along a set of pre-determined criteria. Multi-Criteria

Analysis is particularly useful when Impact Assessment has to be reconciled with specific policy objectives, and as such is used as an instrument of policy coherence. This method is more likely to capture distributional impacts, although this crucially depends on the criteria chosen for evaluating options.

Net benefits	Total benefits minus total costs. The net benefit is a common means of reporting cost-benefit analysis results.
Net Present Value	This summary measure reports the net benefits of a project in monetary (Euro) terms. To calculate, subtract the total discounted costs from the total discounted benefits. A positive NPV means that benefits outweigh costs and the investment should be considered. A negative NPV means that the costs outweigh the benefits. An NPV of zero means the benefits are equal to the costs.
Optimism bias	The demonstrated systematic tendency for appraisers to be over-optimistic about key project parameters, including capital costs, operating costs, works duration and benefits delivery.
Option value	The value of the availability of the option of using an environmental or other asset (which in this context is usually non-marketed) at some future date.
Real Interest Rate	An interest rate that has been adjusted to remove the effect of expected or actual inflation. Real interest rates can be approximated by subtracting the expected or actual inflation rate from a nominal interest rate.
Regression analysis	A statistical technique used to model how changes in one or more variables, called independent variables, affect changes in a variable of interest, called the dependent variable. In cost-benefit analysis, this technique can be used to estimate marginal costs.
Return on investment (ROI)	This summary measure compares the net benefit to costs and indicates how much of an investment policymakers can expect to receive as a benefit. If the ROI is positive, the benefits exceed the costs and the investment should be considered. A negative ROI means that the costs outweigh the benefits. An ROI of 0 means the benefits equal the costs.
Sensitivity analysis	Sensitivity analysis examines how cost-benefit analysis (CBA) results change when inputs and assumptions are modified. If the results change considerably, the CBA is considered sensitive to variations in its assumptions. If the results do not change considerably, the analysis is said to be robust.
Total Economic Value	The sum of the use, option and existence value of a good: a term used primarily in environmental economics.
Transfers	There are no economic gains from a pure transfer payment because the benefits to those who receive such a transfer are matched by the costs borne by those who pay for it. Therefore, transfers should be excluded from the calculation of net present value. Transfers that

arise as a result of the program or project being analysed should be identified as such, however, and their distributional effects discussed. It should also be recognized that a transfer program may have benefits that are less than the program's real economic costs due to inefficiencies that can arise in the program's delivery of benefits and financing.

Use Value

Value of something which is non-marketed provided by people's actual use of it.

Willingness To Accept (WTA)

The maximum amount an individual would be willing to accept as compensation for being deprived of a good or service.

Willingness To Pay (WTP)

The maximum amount an individual would be willing to give up in order to secure a change in the provision of a good or service.

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