

# **Annexe G**

## **Economic value and detriment analysis**

**December 2006**

A report prepared for the Office of Fair Trading  
by DotEcon Ltd

OFT861g

© **Crown copyright 2006**

This publication (excluding the OFT logo) may be reproduced free of charge in any format or medium provided that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright and the title of the publication specified.

## CONTENTS

<i>Chapter</i>		<i>Page</i>
1	CUPI economic value and detriment summary	1
2	Introduction	10
3	Measuring economic value of PSI	18
4	Detriment analysis	44
 <i>Appendix</i>		
A	International case study	65
B	BT price control and access charges case study	69
C	Innovation in in-car satellite navigation systems	72
D	Sensitivity analysis	76



# 1 CUPI ECONOMIC VALUE AND DETRIMENT SUMMARY

- 1.1 As part of its market study into the commercial use of public information, the Office of Fair Trading (OFT) commissioned DotEcon to:
- assess the economic value of public sector information (PSI) in the UK, and
  - estimate the possible consumer detriment that may be caused as a result of the current PSI framework and the behaviour of public sector information holders (PSIHs).
- 1.2 Both issues are complicated by lack of data on the current and potential use of PSI. Therefore, we need to make reasonable assumptions where data is limited, which we detail. We consider a broad range of sensitivities to explore the impact of modifying these assumptions.

## Background

- 1.3 PSI in its various forms generates significant revenues both from public and private sector users. A survey of Public Sector Information Holders (PSIHs) conducted by the OFT as part of the Commercial Use of Public Information (CUPI) market study has estimated that, in 2005, the income from the supply, sale or licensing of information amounted to some £390m.<sup>1</sup> This income arises not just from direct sales to individual end-users (for example, the use of a printed map by a hiker), but also from the sale or licensing of PSI as an input into other information-based products

---

<sup>1</sup> Source: OFT (2006), 'CUPI market study survey'. In addition, an HM Treasury review noted that the total income from the release of Crown copyright information was around £340m in 1998/99 (HMT (2000), 'HMT cross cutting review on the knowledge economy').

and services (for example, digital maps used within in-car navigation systems).

1.4 The overall economic benefits of PSI far exceed these revenues. PSI may be used within Government without an explicit payment occurring and in some cases is made available for free. Even where consumers pay for PSI or products or services derived from it, they enjoy significant benefits in excess of the revenues – so-called consumer surplus.

1.5 Given the economic importance of PSI, access to and the use of PSI has been the subject of recent legislative change across Europe. An EU Directive<sup>2</sup> on the re-use of PSI has been implemented in the UK by the Re-use of Public Sector Information Regulations 2005<sup>3</sup> which came into force in July 2005. The aim of the regulations is:

'...to encourage the re-use of public sector information by removing obstacles that stand in the way of (its) re-use. The main themes are improving transparency, fairness and consistency. In doing so it will help stimulate the development of innovative new information products and services across Europe, so boosting the information industry.'<sup>4</sup>

1.6 PSIHs can include, amongst others, government ministerial departments, agencies of government and non-departmental public bodies (NDPBs). A number of PSIHs are also designated quasi-commercial bodies known as Trading Funds. What distinguishes

---

<sup>2</sup> Directive 2003/98/EC.

<sup>3</sup> SI 2005/1515.

<sup>4</sup> Website of the Office of Public Sector Information (OPSI) [www.opsi.gov.uk](http://www.opsi.gov.uk)

these PSIHs from other private sector collectors and disseminators of information is that these bodies fulfil a public function (whether or not this is made explicit), in many cases also relying on some level of funding from taxation to pay for their activities.

- 1.7 By their very nature, PSIHs may hold unrefined information that is difficult or even impossible to source elsewhere, and as such may be monopoly providers in their respective information markets. Where private sector providers are able to offer directly competing products, competition can be expected to protect end-users from any potentially exploitative behaviour on the part of the PSIHs. However, often many of the activities of PSIHs are not easily replicable by the private sector. In particular, there may be concerns that PSIHs have an unfair advantage when competing with private-sector refined information providers who are reliant on the PSIH's unrefined data as an input into their own products and services. Where unrefined data is being turned into refined information, the pricing of the unrefined data and terms for accessing it have the potential to affect competition in subsequent refined information markets.

## **Our approach and analysis**

- 1.8 There are a number of practical difficulties in undertaking an exercise of this nature. The most significant problem is limited availability of information. We have relied on data from a survey conducted by the OFT<sup>5</sup> (the OFT survey of PSIHs), and data publicly

---

<sup>5</sup> Survey undertaken as part of the OFT market study in the Commercial Use of Public Information. The results used for the purposes of this report were those as provided to DotEcon on 23 May 2006. These results from the survey do not include data held by Local Authorities and NHS bodies, as these were added to the scope of the study after the initial PSIH survey was undertaken. Consequently, this study does not include analysis of such bodies either.

available from the Office of Public Sector Information (OPSI), individual PSIHS and existing literature relating to the use of PSI.<sup>6</sup> Other difficulties arise in assessing the potential usage of services reliant on PSI or the level of innovation that may result from wider exploitation of information, especially for refined information products. As a result, our approach throughout has been to develop order of magnitude estimates based on available data and reasonable, conservative assumptions where that is lacking. We have buttressed these with sensitivity analysis to show the effects of alternative assumptions.

1.9 The results are broken down by three strata of PSIHS as used in the OFT survey of PSIHS:

- stratum 1 - the delegated authority and voluntarily IFTS accredited group: 'mainly based on a list of organisations that HMSO and OPSI indicated license the re-use of material they originate under delegated authority from the controller of HMSO, additionally including two important information holders (Environment Agency and the British Geological Survey) that have undergone IFTS accreditation on a voluntary basis.' This group includes Trading Funds such as OS
- stratum 2 - the OPSI group: 'major government departments and agencies that license data for re-use under the authority of OPSI. This list is predominantly made up of ministerial departments but also includes many of the largest executive agencies and non ministerial departments'. This group typical licences PSI for reuse for free through click-use agreements
- stratum 3 - the other group: 'all remaining public bodies not included above'. Often, these are smaller PSIHS, many of which do not currently make information available for commercial use.

---

<sup>6</sup> Sourced from various corresponding websites.

## Economic value

- 1.10 There are a number of ways in which the economic contribution of PSI can be calculated. Various studies have tried to identify that part of value added in the economy that might be due to PSI – effectively a top-down approach focusing on the value added in sectors using PSI as an input. However, estimates derived using such an approach often overstate the economic value derived from PSI.<sup>7</sup> In particular, such studies often fail to identify where there are reasonable substitutes available to users of PSI.
- 1.11 Instead, we have developed a bottom-up approach considering the economic value today associated with current PSI products and services. We consider the net economic value of PSI as the difference between the willingness to pay for PSI minus the cost of supplying it. This can be estimated from:
- the current net consumer surplus from PSI, that is, the amount that customers might be prepared to pay over and above that which they do currently to have access to the product, and
  - the total producer surplus that arises from the provision of PSI by PSIHs, that is, the extent to which revenues exceed the costs of supplying the product or service.
- 1.12 Adding these two estimates gives the net economic value of PSI.
- 1.13 A key assumption in our assessment of consumer surplus concerns how the demand for PSI may change as its price changes – the so-called price elasticity. Where demand is more elastic, the economic value is likely to be lower, as customers may be able to readily

---

<sup>7</sup> For instance, a study on the BGS found that as much as eight per cent of GDP could be linked to information provided by the BGS, whilst a study undertaken by PIRA also generated significant figures in relation to the total value of PSI in the UK.

switch over to other sources of information where the price of PSI rises. Conversely, where there are few alternatives to using PSI, demand may not be very price sensitive, as consumers would continue to rely heavily on PSI even in the face of price increases; in this case, the consumer surplus associated with PSI would be greater.

- 1.14 We have used existing studies and qualitative information to gauge the likely price elasticity of different types of PSI and so estimate consumer surplus. Although there are major uncertainties, this approach is useful in obtaining order of magnitude estimates. It is less likely to produce gross overestimates of the economic value of PSI than the top-down approach, as the potential for substitutes to PSI is taken into account.
- 1.15 In order to estimate producer surplus, we have considered the profits earned by PSIHs in Stratum 1, who typically have target rates of return imposed on them by government. Profits are typically small or non-measurable for the other strata.
- 1.16 Using this approach, our analysis of the economic value of PSI suggests that the current economic value is of the order of £0.5bn.

### **Detriment**

- 1.17 In order to assess the potential for detriment we have considered:
- the various types of detriment that could limit use of PSI
  - the likelihood that each type of detriment might occur for different PSIH groups, and
  - the potential magnitude of detriment where we consider it likely to occur.

- 1.18 To inform this assessment, we have considered economic analysis already undertaken at an international level on PSI.
- 1.19 We classify detriment into three types:
- Type A – unduly high pricing: The primary concern here is that prices to customers may be unduly high. In particular, if a PSIH has market power, then it may be in a position to charge prices above cost to its customers, who would not have any real alternative in purchasing the information. Prices above cost may be manifested in producer surplus or dissipated through excessive costs
  - Type B – distortion of downstream competition: Where a PSIH held a strong position in the provision of PSI in an upstream market (for example, collection of the information), it may be able to leverage off its position limiting access to downstream competitors that might rely on the PSIH as key inputs. Such types of detriment might include for example a refusal to supply information, discrimination across different access seekers or restrictions on the use of the PSI. Such behaviour could be motivated by the desire of a public body to expand its range of activities, rather than any attempt to earn excess profits
  - Type C – failure to exploit PSI: Although not specifically a competition concern, some PSIHs may fail to commercially exploit the information that they hold in the first place. This may be a particular feature of smaller PSIHs or those that do not regard their information as valuable to make their information publicly available.
- 1.20 Competitive conditions both upstream and downstream are relevant for determining the type of detriment that may emerge. Where there is competition in the upstream market and third parties can replicate

the activities of the PSIH, it is unlikely that there is any Type A detriment – unduly high pricing.<sup>8</sup>

- 1.21 We consider that Type B detriment - distortion of downstream competition - is most relevant for Strata 1 and 3. Where competition upstream is limited and there is no form of quasi-regulation on the pricing of unrefined PSI supplied as inputs to refined information providers, there may be scope for Type B detriment. For this reason, this problem is unlikely to affect PSIHs in Stratum 2, as these provide unrefined PSI free of charge and on an unrestricted access basis.
- 1.22 On the other hand, Trading Funds – which lie in Stratum 1 – may be prone to this type of detriment, in that they may have incentives to internalise growth in the development of refined information services. PSIHs in Stratum 3 – smaller PSIHs – may also be subject to this type of detriment, as they may consider that the PSI they hold may be of little commercial interest to third parties and thus limit access to the downstream market by only offering downstream products and not offering wholesale products at all.
- 1.23 The incentives and structure of the PSIH are also relevant in considering the potential for Type C detriment – a failure to exploit PSI held. In particular, Trading Funds are likely to have a clear motive to exploit PSI commercially, so this type of detriment is less likely for them. As noted above, this type of detriment is more likely in the case of smaller PSIHs (or those that may have limited guidance on PSI in their sector) that fall into Stratum 3, where the revenues from commercial exploitation of PSI may be relatively small.

---

<sup>8</sup> Detriment A results in unduly high profits, and hence in our assessment we only considered this type of detriment for Stratum 1 PSIHs on which we had profit data (data on target and actual ROCE).

- 1.24 Finally, it is also conceivable that lack of access to PSI may have led to innovative products from refined information providers being delayed to market or not being supplied to customers at all. Clearly it is difficult to judge how important lack of innovation might be, as we do not see an alternative outcome against which to compare. Nevertheless, lack of innovation would increase the magnitude of detriment. For example, where innovation in costs is hindered, this would suggest greater scope for detriment A; where innovation in the provision of refined information products and services is hindered, this would suggest a greater scope for Type B and C detriment.
- 1.25 Taking our base case elasticity of demand, our analysis suggests detriment of the order of £20m for Type A, £130m for Type B and £360m for Type C. An illustrative example of hindering innovation suggests that the magnitude of detriment might be substantially larger.

## Summary results

- 1.26 Table 1.1 below sets out a summary of our main results in relation to both the economic value of PSI and the four different types of detriment. The table also sets out our resulting view on the potential value of PSI in the absence of such detriment. Our results suggest that the potential value of PSI could be higher on the assumption that innovation is currently being hindered.

**Table 1.1: Summary of economic value and detriment assessment**

£m (base case elasticity)	Estimated revenues from PSI sales and licensing <sup>a</sup>	Current Economic Value	Detriment			Total potential value of PSI  = Economic Value + A + B + C
			Type A	Type B	Type C	
Stratum 1	340	500 <sup>b</sup>	20	100	-	620
Stratum 2	1	20	-	-	-	20

Stratum 3	60	70	-	40	360	470
<b>Total</b>	<b>400</b>	<b>590</b>	<b>20</b>	<b>140</b>	<b>360</b>	<b>1,110</b>

Source: OFT data and DotEcon analysis

Note (a): revenues as estimated by the OFT as part of the OFT survey of PSIHs, stated to two significant figures.

Note (b): out of which approximately £65m is accounted for by producer surplus.

## 2 INTRODUCTION

- 2.1 As part of its market study on the Commercial Use of Public Information (CUPI), the OFT commissioned DotEcon to assess the economic value of Public Sector Information (PSI) in the UK and to estimate the consumer detriment that may be being caused as a result of the current PSI framework and the behaviour of public sector information holders (PSIHs).

### Background

#### Economic value

- 2.2 PSI in its various forms generates significant revenues both from public and private sector users. The OFT's survey of PSIHs estimated that, in 2005, the revenues from the sale of public information amounted to some £390m.<sup>9</sup> In addition, HM Treasury's

---

<sup>9</sup> Annexe A Survey of PSIHs

review noted that the total income from the release of Crown copyright information in 1998-99 was around £340m.<sup>10</sup>

2.3 PSI not only provides value through direct sales to individual end-users (for example, the use of a printed map by a hiker), but also as an input into other information-based products and services (for example, digital maps used within in-car navigation systems). Various studies conducted by individual PSIHs have valued the income generated by the use (and subsequent re-use) of their data to be far in excess of the revenues they earned.

2.4 Evidence from international markets suggests that the UK information market has scope to grow yet further. For this reason, access to and the use of PSI has been the subject of recent legislative change across Europe, resulting in a Directive<sup>11</sup> on the re-use of PSI. In the UK, this led to the Re-use of Public Sector Information Regulations 2005,<sup>12</sup> which was implemented in July 2005. Its aim is:

'...to encourage the re-use of public sector information by removing obstacles that stand in the way of (its) re-use. The main themes are improving transparency, fairness and consistency. In doing so it will help stimulate the development of innovative new information products and services across Europe, so boosting the information industry.'<sup>13</sup>

2.5 In informing decisions to modify the legislative framework governing the use of public sector information, the EC commissioned a study

---

<sup>10</sup> HMT (2000), 'HMT Cross-cutting Review of the Knowledge Economy'.

<sup>11</sup> Directive 2003/98/EC.

<sup>12</sup> SI 2005/1515.

<sup>13</sup> Website of the Office of Public Sector Information (OPSI): [www.opsi.gov.uk](http://www.opsi.gov.uk)

to quantify the value of public sector information. This study was undertaken by PIRA International, and estimated the national income attributable to economic activities based on the exploitation of PSI at over €68bn in 2000. This estimate represents nearly one per cent of the EU GDP. The corresponding value for the UK was considered to be approximately €11.2bn (with low and high estimates of €4bn and €21.8bn respectively).<sup>14</sup> These estimates sought to quantify the income generated from the use of PSI not only from direct revenues from the supply of unrefined PSI, but also through income generated by refined information products that use PSI as an input. PIRA concluded that there is scope for considerable growth in the economic activities related to the commercial use of PSI in the EU, based on evidence suggesting that the income generated from the use of PSI in the US is two to five times greater than in the EU.

2.6 Other studies of the economic value of PSI in the UK undertaken for specific providers of information or types of information have followed similar approaches. For example, Ordnance Survey (OS) commissioned a study by OXERA that sought to assess the economic contribution of OS to Great Britain. OXERA estimated this contribution to range from 12 per cent to 20 per cent of gross value added in 1996, amounting to some £79bn to £136bn.<sup>15</sup> Likewise, the British Geological Survey (BGS) commissioned a study by consultants Roger Tym & Partners to assess the contribution of the BGS to the UK economy. The study estimated the economic

---

<sup>14</sup> 'Commercial exploitation of Europe's public sector information', PIRA International, 2000. A summary of the findings of PIRA is set out in Appendix A. It should also be noted that the estimates presented in this report adopt a different approach to that done so PIRA to calculate the economic value of PSI.

<sup>15</sup> 'The economic contribution of Ordnance Survey GB', Oxera 1999.

contribution of the BGS for 2001 lay in the range of £34bn to £61bn.<sup>16</sup>

- 2.7 These two studies have estimated very large economic contributions from the use of PSI. Part of the difficulty lies in identifying what part of the value added by users of PSI is in fact due to the PSI itself. In practice, even heavy users of PSI may have alternatives, so it is not reasonable to suppose that all of the value added in sectors that use PSI is due to PSI.
- 2.8 Although PSI may currently underpin a large proportion of products and services, customers would not necessarily be curtailed in their activities or the use of certain refined products from the absence of the PSI (for example, ramblers would be likely to continue to explore the countryside without the use of OS generated maps and would instead rely on alternative sources of information). Not all of the value added in sectors that use PSI derives entirely from PSI itself. Even if PSI represents, say, half of the cost-base of a sector, this does not mean that half of the value added in that sector is attributable to PSI.
- 2.9 Therefore, we have not used a top-down approach because of the potential for overestimating benefits. Instead, we have focussed on estimating consumer surplus from PSI. Although our approach requires assumptions about the nature of consumer demand, it is usually possible to obtain order of magnitude estimates even with limited information. The risk of grossly overestimating the economic contribution of PSI is much less than with the top-down approach.

## **Detriment**

- 2.10 PSIHs can include, amongst others, government ministerial departments, agencies of government and non-departmental public

---

<sup>16</sup> 'The economic benefit of the BGS', Roger Tym & Partners, 2003.

bodies (NDPBs). What distinguishes PSIHS from other private sector collectors and disseminators of information is that PSIHS typically fulfil a public policy objective function (whether or not this is made explicit) and rely in many cases on some degree of funding from taxation for their activities. Some PSIHS have statutory requirements to collect (and possibly to disseminate) information, others collect and store valuable information in order to support their various public activities.

2.11 Recognising the potential commercial value of the activities of some public bodies, the Trading Funds Act 1973<sup>17</sup> paved the way for the provision of a number of traded services – including information – through designated quasi-commercial bodies known as Trading Funds. These Funds, while still publicly owned, meet specific criteria and are designed and incentivised to act in a commercial manner, selling information to private and business users and other public bodies. Many of the Trading Funds have thus extended their operations beyond their core duties<sup>18</sup> and are competing with private sector providers of information products.

2.12 In the event that barriers to entry are low or that scale economies are weak in creating PSI, there is potential for private sector competitors that can offer products and services competing with those offered by PSIHS, potentially both for unrefined and refined information. In such situations, competition would be expected to protect end-users from any exploitative behaviour. However, by its nature, PSI is likely to exhibit natural monopoly characteristics,

---

<sup>17</sup> As amended by the Government Trading Act 1990 and the Finance Acts 1991, 1993 and 2001.

<sup>18</sup> It is considered that 'most of the material originated [by trading funds] does not fall within the scope of material which is seen as being central to the process of government' OPSI (June 2005), 'RIA: Regulations implementing in England, Wales, Scotland and Northern Ireland A Directive of the European Parliament and of the Council on the Re-use of Public Information'.

principally in gathering or creating the underlying information assets.

- 2.13 As a result, there may be concerns that PSIHs have an unfair advantage when competing with private-sector companies that rely on the PSIH's unrefined information as an input into their own products and services. By their very nature, PSIHs may hold unrefined information that is difficult or uneconomical to source elsewhere, and as such may be monopoly providers of certain unrefined information. Even where this information is supplied to competitors, its pricing and the terms for accessing it have the potential to affect competition in subsequent refined information markets.
- 2.14 Where there are limitations on competition, there is scope for consumer detriment resulting from the supply of PSI and products and services derived from PSI being restricted. This might be motivated by the desire to boost profits where the PSIH has a strong commercial objective – the standard behaviour of a monopolist. However, in the case of public bodies, there may be a variety of motivations other than maximising profits that might also lead to detriment in various ways. For example, an organisation might have an objective of growth and so might internalise the development of refined information services, rather than let a business develop these on an independently. Alternatively, the complication of defining and marketing unrefined PSI products to refined information providers might be considered too onerous even if profitable. Therefore, problems can arise just as much from the profit motive being weak as well as from exploiting market power.
- 2.15 However, there have been very few quantitative or qualitative assessments of the extent of such detriment and its causes. In the UK, one of the few assessments was undertaken by the Cabinet Office in 2005, as part of its work in implementing the European Directive on the re-use of public sector information in the UK. The regulatory impact assessment accompanying the transposing

legislation in the UK noted that there were risks associated with leaving the regulatory regime unchanged, the main concern being:

'(t)he risk ...that without an improvement in the conditions for the re-use of public sector information, there will be a considerable loss in the economic development of products and services based on this information. This will be a loss both to the businesses involved and to the end-users of the information and the refined information products that might have been built upon it'.<sup>19</sup>

- 2.16 In essence, this relates to the potential lack of exploitation of PSI from potentially unfavourable conditions for the use and re-use of information by businesses. In this assessment, the Cabinet Office concluded that the quantification of benefits to the industry was very difficult, noting that:

'It is possible to point to the ways in which transparency of terms of re-use would be beneficial for re-users, and how this could be translated into cost savings. Much of the benefit of the new regime would be in the potential it would open up for the development of new refined information products and this would benefit both the businesses who develop and supply the information products and the customers for these products.'<sup>20</sup>

- 2.17 There have been no specific assessments of the detriment caused by the potentially socially inefficient behaviour of PSIHs. We consider such behaviour to possibly include: the exploitation of market power that the PSIH may hold in the collection, storage or primary dissemination of the information (for example, by way of

---

<sup>19</sup> 'Regulatory impact assessment: Regulations implementing in England and Wales, Scotland and Northern Ireland a Directive of the European Parliament and of the Council on the re-use of public sector information', Cabinet Office 2005.

<sup>20</sup> Ibid.

unduly high pricing), and the potential harm caused to competition, particularly in the downstream market, where access to the information from which refined information products can be created is restricted in some way by the PSIH.

## Scope of this report

2.18 The issues above are the focus of this report. In particular, we have sought to assess:

- the current economic value generated by the use of PSI for commercial and government use (as distinct from the value that government might derive from the *availability* of PSI collected to fulfil public functions), and
- the potential detriment that could result from the socially inefficient use of PSI that could result from the lack of competition in the provision of PSI and derived commercial products and services.

2.19 There are a number of practical difficulties in undertaking an exercise of this nature. The first of these is the limited availability of information necessary to assess the precise value of PSI and the prevalence of detrimental behaviour. As a result, our intention throughout is to derive an order of magnitude estimate of the current economic value and potential detriment, based on the available literature (for example, in relation to customer behaviour and price sensitivities). Throughout, cognisant of the uncertainty inherent in such an exercise, where assumptions are necessary we have tried to make them conservative, yet reasonable. We have undertaken sensitivity analysis on all the key assumptions.

2.20 Even greater difficulties arise in assessing the degree of innovation that may result from wider exploitation of PSI and the value that such new (and thus currently unavailable) refined information products or services might generate. By definition these are products and services for which there is currently no market data. For this reason, our assessment of detriment due to the potential

lack of innovation should be considered as indicative, rather than a reliable quantitative estimate.

- 2.21 For conducting our assessment, we have relied on data from a survey conducted by the OFT<sup>21</sup> (the OFT survey of PSIHs) and data publicly available from the Office of Public Sector Information (OPSI), individual PSIHs and literature relating to the use of PSI.<sup>22</sup>

## Structure of this report

- 2.22 The structure of the remainder of this document is as follows. In Chapter 3, we present our assessment of the economic value resulting from current use of PSI. The analysis and assessment of the detriment from potentially socially inefficient provision of PSI is presented in Chapter 4.

## 3 MEASURING ECONOMIC VALUE OF PSI

- 3.1 In this chapter we present our assessment of the current economic value of PSI. First, we explain our approach to measuring economic value. We then present our assessment of demand for PSI, which underpins both the assessment of economic value generated from PSI at present and our assessment of the detriment resulting from inefficient provision of PSI. Finally, we present our estimates for the economic value.

---

<sup>21</sup> Annexe A Survey of PSIHs. The results used for the purposes of this report were those as provided to DotEcon on 23 May 2006. These results from the survey do not include data held by local authorities and NHS bodies. Consequently, this study does not include analysis of such bodies either.

<sup>22</sup> Sourced from various corresponding websites.

## Our approach to modelling economic value

3.2 There are a number of ways in which the economic contribution of PSI can be defined and calculated. Various studies have tried to identify the part of income in the economy that might depend on PSI – effectively a top-down approach. For instance, a study on the BGS found that as much as eight per cent of GDP could be linked to information provided by the BGS, which appears implausible as an estimate of the economic value of the BGS's products and services. The study undertaken by PIRA (referenced above) also resulted in substantial figures for the total value of PSI in the UK, estimated at 0.8 per cent of GNP. However, we do not consider that such top-down approaches are particularly informative in determining the economic value of PSI because of two reasons:

- The top-down approach typically aims to identify the part of national income from and related to the provision and use of PSI. Such figures provide a lower bound for the gross value that consumers place on PSI and derived products. However, this is a poor indicator for the value of a product. For example, consider two products (A and B) with equal price and consumption, which thus generate the same contribution to national income. Now suppose that product A can be sourced at zero cost, and that consumers would be willing to pay up to five times its current market price. In contrast, product B is priced at cost, and consumers would not be purchasing the product if its price raised a single penny beyond its current market price. It seems reasonable to establish that product A provides greater value than product B, however, under the proposed top-down methodology, both products would be considered to provide the same value.
- Even where the economic value from PSI is defined as the part of income that depends on PSI, figures using a top-down approach tend to overstate this. Studies using this approach typically fail to identify reasonable substitutes available to users of PSI, and thus use unrealistically high assumptions about the proportion of value from

refined products that is critically dependent on, and hence should be attributed to, PSI. In other words, although PSI may currently underpin a large proportion of products and services, customers would not necessarily be limited in their activities or use of certain refined products in the absence of the PSI (for example, ramblers would be likely to continue to explore the countryside without the use of OS generated maps and would rely on alternative sources of information).

- 3.3 For these reasons, we do not follow the top-down approach used by preceding studies. Instead, we define the economic value of PSI as the **net surplus** generated by the provision of PSI, measured as the difference between the willingness to pay for PSI minus the cost of supplying it. We calculate this as the sum of:
- net consumer surplus from PSI (that is, the amount customers would be prepared to pay over and above the current price paid)
  - producer surplus that arises from the provision of PSI, (that is, the extent to which suppliers might be able to obtain revenues in excess of the cost of supplying the product or service).
- 3.4 Based on this definition, we measure the economic value following a bottom-up approach. First, we conduct an assessment of the demand for PSI, particularly how demand may change as price changes (the price elasticity). Second, based on our assessment of the demand for PSI and current revenue figures, we calculate consumer and producer surplus, which we then aggregate over all UK PSIHS.
- 3.5 We apply this approach to all services provided by PSIHS, including both unrefined and refined information products. This approach implicitly takes account of benefits that consumers enjoy from products and services derived from PSI. Provided that the downstream refined information activities are sufficiently

competitive, the demand for unrefined information products already reflects the consumer surplus that the ultimate end user obtains from refined products bought from private sector suppliers using unrefined PSI as an input. The demand for unrefined products from private sector downstream refined information providers also reflects the degree of substitutability between unrefined PSI and alternative products as an input for the refined product.

- 3.6 We judge that this approach is more likely to produce realistic estimates than trying to identify the value added by PSI in downstream sectors, which depends critically on the substitutes available to using PSI and can easily result in unrealistically large estimates of the economic contribution of PSI.
- 3.7 The majority of PSIHs are public sector bodies that do not have commercial incentives. In these cases, producer surplus is unlikely to be substantial. However, Trading Funds are designed and incentivised to act in a commercial manner in their commercialisation of PSI, and may potentially enjoy producer surplus. Trading Funds are charged with making returns on their assets, which for the purpose of our assessment we consider to be the cost of capital (imposed on them by government). Therefore, we consider producer surplus to be the returns that PSIHs may be earning over and above the targets imposed on them.
- 3.8 The main limitation in our analysis is the lack of data. Where data were not available, we based our analysis on a number of plausible assumptions.

## **Assessment of demand**

- 3.9 Throughout the study, we model demand as being linear in price, and calibrate it using current market data on revenues and elasticity estimates. Available empirical information provides very little basis for choosing one formulation of demand over another. Given this, we have adopted the assumption of linearity in part as it allows for

a significant simplification of our calculations. Also, there are good arguments to suppose that linear demand is likely to lead to an underestimate of consumer surplus relative to the true demand relationship, as most observed empirical demand relationships are convex (that is, demand drops faster than linearly as price increases).<sup>23</sup>

- 3.10 Ideally, elasticity estimates would be estimated from market data on usage and (varying) prices of PSI. However, such an approach has not been possible due to the scarcity of data on prices and usage of PSI. For this reason, we draw on a number of assumptions about the demand for PSI, based on a qualitative assessment of the value and market conditions of PSI, and on estimates of the elasticity of demand available from the literature. This approach is adequate for the purposes of constructing an order of magnitude estimate of consumer surplus, but clearly care should be taken not to imbue these results with spurious precision.

### **Categorisation of PSIHs**

- 3.11 Available data on PSIHs is patchy. Therefore, we group PSIHs that are likely to face similar characteristics of demand for their PSI.
- 3.12 We cannot reasonably expect the drivers of demand to be similar across all types of PSI, and therefore it would not be appropriate to use the same demand elasticity assumptions for all PSIHs. For example, we might expect PSIHs that have a registry function (such as Companies House or HM Courts Service) to have relatively few substitutes, whereas other PSIHs (such as the Met Office) already face a fringe of competition and so users may have access to substitutes.

---

<sup>23</sup> See J.A. Hausman, 'Valuing the Effect of Regulation on New Services in Telecommunications', Brookings Papers on Economic Activity, Microeconomics, 1997.

3.13 However, we can identify certain groups of PSIHS that are likely to face similar demand characteristics, for which it is reasonable to apply the same demand elasticity assumptions. For example, the degree of competition and the availability of substitutes are likely to be closely related to the terms on which PSI is supplied. Similarly, the gross value of information to users is likely to depend on its nature. Therefore, we group PSIHS depending on the likely terms under which they supply information and the nature of the information they provide.

3.14 In order to classify PSIHS according to the likely terms under which they supply PSI we have divided PSIHS into three strata, following the classification used by the OFT for their survey of PSIHS in the UK:

- **Stratum 1** - the delegated authority and voluntarily IFTS accredited group: 'mainly based on a list of organisations that HMSO and OPSI indicated license the re-use of material they originate under delegated authority from the controller of HMSO, additionally including two important information holders (Environment Agency and the British Geological Survey) that have undergone IFTS accreditation on a voluntary basis. PSIHS in this group typically have commercial incentives in the supply of PSI.
- **Stratum 2** (The OPSI group): 'major government departments and agencies that license data for re-use under the authority of the Office for Public Sector Information. This list is predominantly made up of ministerial departments but also includes many of the largest executive agencies and non ministerial departments'. PSIHS in this group typically offer unrefined PSI free-of-charge.
- **Stratum 3** (The other group): 'all remaining public bodies not included above'. PSIHS in this group hold PSI in order to support their activities, but typically consider such information to be of limited value to third parties and do not regard the supply of PSI as one of their main tasks.

3.15 The following table sets out the total sample to which the OFT survey of PSIHs questionnaire was sent, the number of returns from that group, the corresponding rate of response and the revenue from the sale of information products accounted for by each group (the OFT has scaled up its survey information to reflect in its view the revenues for all UK PSIHs).

**Table 3.1: Strata frequencies and OFT survey of PSIHs sample sizes, and revenue from PSI sales/licensing by strata**

Stratum	Population	Sample size	Estimated revenues from PSI sales/licensing (£m)
<b>1 Delegated authority + voluntarily IFTS accredited</b>	18	17	338.5
<b>2 OPSI</b>	48	16	0.8
<b>3 Others</b>	336	130	54.6
<b>All</b>	402	164	394

Source: Annexe A Survey of PSIHs

3.16 The delegated authority and voluntarily IFTS accredited group (Stratum1) accounts for the largest proportion of revenues, and thus one can expect this to be potentially the most relevant group both in terms of the economic value generated and in terms of the potential detriment from inefficient exploitation of PSI. Given the relatively small number of PSIHs in this group, we have been able to conduct a more detailed analysis at the level of the individual PSIH, including the assessment of profitability and likely demand

characteristics faced by each PSIH in this stratum. Details of the individual PSIHs in this group are discussed further below.

3.17 In contrast, the OPSI group raises limited revenues, as most of the information they supply is offered free-of-charge. This group can potentially generate considerable economic value, however, given that PSI is offered free of charge and that supply of PSI seems to be relatively widespread within the group, it is unlikely for this group to be the source of any substantial detriment from inefficient exploitation of PSI.

3.18 We have further sub-classified PSIHs in Strata 1 and 3 by the type of information held by the PSIH, which is likely to affect the value of its PSI to customers, following the classification:

- A. predominantly economic, business and legal information holders
- B. predominantly geographical information holders
- C. predominantly environmental and scientific information holders
- D. other information holders.

3.19 The frequencies arising for each of the group are set out below:

**Table 3.2: Number of PSIHs by category**

	<b>A</b> <i>Ec./Bus./Leg.</i>	<b>B</b> <i>Geog.</i>	<b>C</b> <i>Env./Sci.</i>	<b>D</b> <i>Other</i>	<b>Total</b>
<b>Stratum 1</b>	5	3	6	4	<b>18</b>
<b>Stratum 2</b>	N/A	N/A	N/A	N/A	<b>48</b>
<b>Stratum 3</b>	63	10	90	178	<b>341</b>
<b>Total</b>					<b>407</b>

- 3.20 Given that underlying data for the OPSI group is available only in aggregate (from the OPSI website),<sup>24</sup> and the potentially small relevance of this group as a source of detriment, we considered all the PSIHs in Stratum 2 as a single group, pooling over the different information types.

### **Elasticity of demand**

- 3.21 As noted above, we have not been able to estimate elasticities of demand from market data. Therefore, we have relied on a range of assumptions based on elasticity estimates, drawing on available literature and a qualitative assessment of the existence of substitutes for the information held in each group and on the type of users that may benefit from the data. In order to do this, we first conduct a qualitative assessment of whether the elasticity of demand for PSI in each group was likely to be Low, Moderate or High. We then assign values to Low, Moderate and High elasticities based on available information about elasticities in PSI and comparable markets. These values are used in order to perform our assessment of the economic value generated by each PSIH group.
- 3.22 In our assessment we are interested in the assessment of the value of PSI to customers. Therefore, we are interested in the long-run elasticities reflecting the ability of consumers to switch to alternatives over a long time period, rather than short-run elasticities that are typically lower in absolute value reflecting potential short run impediments to using substitutes.
- 3.23 The demand elasticity depends on the benefit that users currently enjoy from PSI as compared with what they would do if the PSI were unavailable or more expensive. This elasticity is likely to be affected by a number of factors, including:

---

<sup>24</sup> [www.opsi.gov.uk](http://www.opsi.gov.uk)

- The type of information being considered, due to differences in how information currently benefits users. For example, environmental warning information is likely to be highly valuable and thus demand for this information may be inelastic. Similar conclusions probably apply to other time-critical safety of life and security of property applications of PSI. On the other hand, historic map information is likely to have a smaller value to users and is not time-critical, and thus the demand for this information may be more elastic.
- The proximity of substitutes. The existence of close substitutes increases the elasticity of demand for the information under consideration, as users can switch between substitute products in response to relative price changes. For example, credit reference agencies have noted they would substitute to other predictive tools if county court judgment (CCJ) information became too expensive. On the other hand, basic information held by Companies House as a register (for example, details of Directors of Limited Companies) has no close substitutes. The proximity of substitutes will be more difficult where the information good has become a standard to which users' systems conform (for example, the property information held by the Land Registry is a widely used and highly standardised product).
- Where the information good is an input to refined information users, the cost of the information good relative to other inputs. The smaller the proportion of total cost of the refined information product that can be attributed to an input, the more inelastic we can expect the demand for such input to be. For example, the cost of a geographic map of a property is a small proportion of an estate agent's costs for selling the property, and thus the demand for geographic maps from estate agents can be expected to be relatively inelastic.<sup>25</sup> Incentives to switch to alternatives are relatively weak, as the PSI constitutes a

---

<sup>25</sup> An explanation of this can be found in HMT 2000 'Cross-cutting Review of the Knowledge Economy': 'The demand for information should be price inelastic because it is an input into a

small proportion of the overall cost base. Moreover, the impact of an increase in the cost of PSI on final good prices is likely to be small (often negligible), so there is unlikely to be a significant reduction in end-user demand leading in turn to a reduction in demand for PSI.

- 3.24 We have conducted the assessment of these three factors for the information held by PSIHs, and then concluded whether the elasticity of demand for PSI in the group is likely to be High, Moderate or Low. Given the importance of Stratum 1 in terms of total revenues from PSI and the small size of the group, we have conducted a detailed assessment of the elasticities of individual PSIHs in this stratum, presented in Table 3.3. In some cases, there is specific information available from other studies on likely demand elasticities for particular types of PSI. For Strata 2 and 3, we have undertaken an assessment on a group level, presented in Table 3.4.

---

production process and a small proportion of production costs. Suppose the price elasticity of demand for a product was -2 and information costs were as high as 10 per cent of total costs. Then a good approximation to the derived demand elasticity for the information input into this product is  $(10 \text{ per cent} \times -2 =) -0.2$  '.

**Table 2.3: Qualitative assessment of factors affecting elasticity of demand for PSI for stratum 1 PSIHs<sup>26</sup>**

Group	PSIH	Income from PSI (£000)	Competition upstream	Competition downstream	Assumed elasticity
A	HM LAND REGISTRY	29,412	No	Potentially competitive in refined	L
	ROYAL MINT	-	?	?	?
	REGISTERS OF SCOTLAND	6,900	No	Potentially competitive in refined	L
	COMPANIES HOUSE	14,200	No	Competition in refined	L
	CENTRAL OFFICE OF INFORMATION	14	No	Competition in refined	?
B	ORDNANCE SURVEY	100,000	Limited	Moderate competition in refined	M
	UK HYDROGRAPHIC OFFICE	57,200	No	Moderate competition in refined	L
	ORDNANCE SURVEY OF NORTHERN IRELAND	7,381	Limited	Moderate competition in refined	M
C	FIRE SERVICE COLLEGE	1	?	Potentially competitive in refined	?
	NATURAL ENVIRONMENT RESEARCH COUNCIL	4,000	Limited	Competition in refined	M
	ENVIRONMENT AGENCY	3,000	No	Competition in refined	M
	THE MET OFFICE	90,336	Yes (international)	Competition in refined	H

<sup>26</sup> Concerning the two blank rows in table 2.3, the Royal Mint does not earn income from its information, while the Medicines and Healthcare Products and Regulatory Agency did not respond to the OFT's survey.

	MEDICINES AND HEALTHCARE PRODUCTS AND REGULATORY AGENCY	.	?	?	?
	DEFENCE SCIENCE AND TECHNOLOGY LABORATORY	.	No	No	L
D	DEFENCE PROCUREMENT AGENCY	.	No	No	L
	DRIVER AND VEHICLE LICENSING AGENCY	1,900	No	Competitive in refined	H
	DRIVING STANDARDS AGENCY	398	No	Competitive in refined	H
	DEFENCE AVIATION REPAIR AGENCY	-	No	No	L

**Table 3.4: Qualitative assessment of factors affecting elasticity of demand for PSI for Strata 2 and 3 PSIH groups**

	<b>A</b> <i>Ec./Bus./ Leg.</i>	<b>B</b> <i>Geog.</i>	<b>C</b> <i>Env./Sci.</i>	<b>D</b> <i>Other</i>	
<b>Stratum 2</b>	<i>Value to users</i>	High			
	<i>Substitutability</i>	Low			
	<i>Cost importance</i>	Low			
	<i>Elasticity</i>	<b>Low</b>			
<b>Stratum 3</b>	<i>Value to users</i>	High	High	High	Moderate
	<i>Substitutability</i>	Moderate	Moderate	Moderate	High
	<i>Cost importance</i>	Low	Moderate	Low	Low
	<i>Elasticity</i>	<b>Low</b>	<b>Moderate</b>	<b>Low</b>	<b>High</b>

3.25 In order to conduct our quantitative assessments we need to assign values to these elasticity categories. Although information about elasticity of demand for PSI in the existing economic literature is limited, some estimates are relevant for our study:

- HMT suggests that the demand for information is likely to be inelastic when this is an input for refined information users, suggesting that even when the elasticity of the demand for the final refined information products is relatively high this translates into low elasticity for information as an input (see footnote 25).

- James B. Davies and Al Slivinski<sup>27</sup> conclude from evidence provided by Lazo and Chestnut<sup>28</sup> and data given by Rollins and Shaykewich<sup>29</sup> that the elasticity of demand for weather forecasts is likely to be around -0.3.
- Longhorn and Blakemore quote evidence from New Zealand on the effects of raising prices that suggest an elasticity of around -0.3 for mapping data.<sup>30</sup>
- When conducting a cost benefit analysis regarding directory enquiries, Oftel assumes that the demand for information via directory enquiries has an elasticity of around -0.2, whilst running sensitivities assuming elasticities of -0.1 and -0.3.<sup>31</sup>
- A study for Ravi Bedrijvenplatform claims that 'lowering the price of public sector geographic data by 60 per cent would lead to a 40 per

---

<sup>27</sup> James B. Davies and Al Slivinski, 2005, 'The Public Role in Provision of Scientific Information: An Economic Approach', RBC Financial Group Economic Policy Research Institute EPRI Working Paper Series.

<sup>28</sup> Lazo, Jeffrey K., and Lauraine G. Chestnut, 2002, 'Economic Value of Current and Improved Weather Forecasts in the U.S. Household Sector', report prepared for the National Oceanic and Atmospheric Administration. Stratus Consulting Inc. Boulder, Colorado.

<sup>29</sup> National Research Council, 2003, 'Fair Weather: Effective Partnerships in Weather and Climate Services, Committee on Partnerships in Weather and Climate Services', The National Academies Press, U.S.

<sup>30</sup> Roger Longhorn and Michael Blakemore (2003), Re-visiting the Valuing and Pricing of Digital Geographic Information, available from:  
<http://jodi.tamu.edu/Articles/v04/i02/Longhorn/longhorn.pdf>

<sup>31</sup> Oftel, 'Access codes for directory enquiry services', Nov 2000.

cent annual turnover growth', which would imply an elasticity of demand of around -1.7.<sup>32</sup>

3.26 These estimates suggest that the elasticity of demand for PSI is relatively low. However, estimates of the total economic value from the use of PSI increase the more inelastic we assume that demand to be. For this reason, we have tended to assume relatively higher elasticities in order to provide us with conservative estimates of the economic value. Based on the above elasticity assumptions, our estimate is likely to be a lower bound for the economic value of PSI.

3.27 Table 3.5 summarises our assumptions on the elasticity of PSI. We use a base case set of assumptions, but also consider a more conservative set of higher elasticities (resulting in lower estimates of consumer surplus).

**Table 3.5: Elasticity assumptions**

Case	Base assumption	Alternative assumption
Low	-0.3	-0.5
Medium	-0.8	-1.2
High	-1.5	-2.0

### Assessment of consumer surplus

3.28 For any given assumption about the relationship between price and demand (that is, the demand curve), there is a one-to-one relationship between revenue and consumer surplus. Therefore,

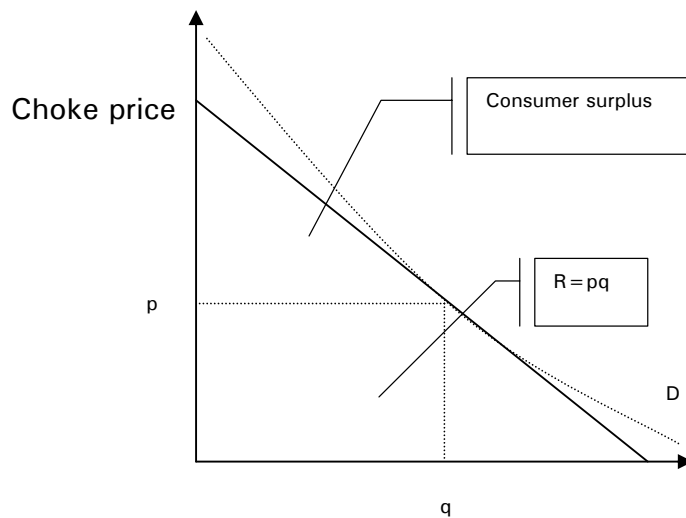
---

<sup>32</sup> 'Economische effecten van laagdrempelige beschikbaarstelling van overheidsinformatie' (2000) for the 'Ravi Bedrijvenplatform' (private sector members of the Dutch Geographic Data Committee), Publication 00-02.

consumer surplus can be estimated from information on revenue and price elasticity (that is, the demand response to changes in prices, starting from current levels).<sup>33</sup>

3.29 The typical relationship between revenue and consumer surplus is shown in the diagram below.

**Figure 3.1: Consumer surplus and PSIH revenue**



3.30 The consumer surplus can be estimated from knowledge of revenue and the price elasticity. Assuming that demand is linear in price, consumer surplus is simply:

---

<sup>33</sup> This approach is based on estimating the value that users of PSIHs derive from their services. This would not include valuing the contribution of PSI to the public sector that derives from the availability of data where these are not purchased by users (for example, the value of records to the PSI H collecting the data where this is not accounted for with internal prices, or where the government may place a value on the availability of data even where these are not used or purchased).

$$\frac{1}{2} \cdot \frac{\text{Revenue}}{\text{Price elasticity}}$$

- 3.31 While in practice demand curves may not be linear, assuming a linear demand can reasonably be argued to give a lower bound on consumer surplus, as real-world demand curves are often convex (as shown in the dotted line) and thus result in a greater difference between willingness to pay and costs.<sup>34</sup> With more complex specifications of demand, this formula is more complex, but there is still a one-to-one relationship between revenue and consumer surplus.
- 3.32 Following this approach, we can derive consumer surplus from revenue and elasticity estimates for each group. However, this approach is not appropriate where PSI is offered at no charge. In these cases, we need to estimate consumer surplus using volumes instead of revenues. Fortunately, this problem mainly applies to the OPSI group, for which OPSI provide aggregate data on the number of licences issued, which we use as a proxy for usage. We explain the approach in detail below.

## Estimates of economic value

### Consumer surplus from revenue-originating PSI

- 3.33 The OFT Survey of PSIHs includes information on income earned from the supply of PSI, from which we can aggregate the revenues earned by sample PSIHs in each group. In addition, the OFT

---

<sup>34</sup> See Hausman, Jerry A. (1997) Valuing the effect of regulation on new services in telecommunications. Brookings Papers on Economic Activity: Microeconomics Vol. 1997 1-38.

provides estimates for the total revenue for each stratum, including PSIHs which were not in the sample.<sup>35</sup>

- 3.34 We estimate revenues for each group (including PSIHs for which we do not have sample data) as the sample proportion of revenue accounted by each information type group within a stratum, multiplied by the OFT estimate of revenue for each stratum. The income from PSI reported by PSIHs in the sample for each group and the adjusted revenues for the whole PSIH group are presented in Table 3.6. For Stratum 1, we use revenues at an individual PSIH level, and then scale results up in order to reflect the OFT's adjustment for revenues not reported in the sample.

**Table 3.6: Revenue (£m) from PSI by PSIH category: estimated population revenues (aggregate sample revenues)**

	<b>A</b> <i>Ec./Bus./Leg.</i>	<b>B</b> <i>Geog.</i>	<b>C</b> <i>Env./Sci.</i>	<b>D</b> <i>Other</i>	<b>Total</b>
<b>Stratum 1</b>	54.3 (50.5)	177.0 (164.6)	104.7 (97.3)	2.5 (2.3)	<b>338.5</b> <b>(314.7)</b>
<b>Stratum 2</b>	N/A	N/A	N/A	N/A	<b>0.5</b> <b>(0.8)</b>
<b>Stratum 3</b>	11.9 (4.7)	0.1 (0.0)	26.0 (10.2)	16.6 (6.6)	<b>54.6</b> <b>(21.5)</b>
<b>Total</b>					<b>393.6</b> <b>(337.1)</b>

Source: Analysis of OFT Survey of PSIHs

<sup>35</sup> Annexe A Survey of PSIHs

3.35 Combining these revenue figures with our elasticity assumptions allows us to calculate the net consumer surplus from revenue-generating PSI.<sup>36</sup> These (using both our base case and high elasticity assumptions) are presented in Table 3.7.

**Table 3.7 : Estimated net consumer surplus (£m) from revenue-generating PSI: base case elasticity assumptions estimates (high elasticity assumptions estimates)**

	A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	Total
<b>Stratum 1</b>	90.6 (54.3)	174.7 (109.6)	166.6 (100.3)	0.8 (0.6)	<b>432.7</b> <b>(264.9)</b>
<b>Stratum 2</b>	N/A	N/A	N/A	N/A	<b>0.8</b> <b>(0.5)</b>
<b>Stratum 3</b>	19.8 (11.9)	0.0 (0.0)	43.3 (26.0)	5.5 (4.2)	<b>68.7</b> <b>(42.1)</b>
<b>Total</b>					<b>502.3</b> <b>(307.5)</b>

### Consumer surplus from free PSI

3.36 A number of PSIHS, and in particular the OPSI group (Stratum 2), supply unrefined information free of charge. Charges may, however, apply where the information is refined, for example collecting together and commenting on data otherwise available for free.

---

<sup>36</sup> For Stratum 1, net consumer surplus is estimated at an individual PSIH level, and then aggregated over our PSIH categories.

3.37 The economic value from free-of-charge PSI cannot be estimated based on revenues as there are none. In addition, there is little data on the use of free-of-charge PSI and its value to customers. Therefore our assessment of the economic value of PSI relies heavily on conservative assumptions and is likely to understate the true economic value substantially. However, although the economic value generated by free-of-charge PSI is potentially large, we anticipate the potential for detriment due to its inefficient exploitation to be small, as there are no significant impediments or costs for accessing this data or re-using in refined information products and services. Thus the use and value of PSI provided free-of-charge by this group have little relevance to our assessment of detriment.

3.38 In order to derive the economic value from free-of-charge PSI, we need to first estimate the value that consumers place on the data, that is, the demand for this PSI. We focus our assessment on the OPSI group. There are other PSIHS that offer free-of-charge PSI in other strata (for example, the Royal Mint). However, we have ignored the economic value of free-of-charge PSI in other strata, as so many modelling assumptions and conjectures are required to overcome the lack of data and, in any case, we can expect the potential detriment to be small.

3.39 According to the information available from OPSI:<sup>37</sup>

- charges are only levied for value-added PSI
- such value-added licences will typically bring together PSI from different sources, which is then analysed or commented on, and

---

<sup>37</sup> For further details, see Click-Use licence definitions available from OPSI's website [www.opsi.gov.uk](http://www.opsi.gov.uk). The terms raw and value added are used in reference to the OPSI website.

- there is usually competition from the private sector in the provision of such value-added data products.
- 3.40 This final point suggests that it is reasonable to assume that value-added products and services are competitively priced at cost, especially given the fact that the unrefined PSI data needed as an input for value-added services is available at no cost and thus PSIHs do not leverage their dominance in the upstream market to downstream markets.
- 3.41 In our analysis, we have used information about usage, revenues and the revenue of value-added data supplied by the OPSI group in order to inform our assessment of the value of free-of-charge PSI. Our methodology is as follows.
- 3.42 We estimate usage of free-of-charge PSI relative to usage of value-added PSI from the OPSI group using information available from the OPSI website on the licence-holders for both core and parliamentary (free of charge) licences and value-added (for which charges are levied) licences.<sup>38</sup> Here we take the number of licences as the measure of usage. Assuming that the usage of data by free-of-charge PSI licence-holders is on average equal to the usage of data by value-added licence-holders, we use the ratio of free-of-charge licence-holders to value-added licence-holders as a proxy for the ratio of free-of-charge PSI data usage to value-added PSI data usage. The number of licence-holders in each list is available from the OPSI website, and reproduced in Table 3.8 below. In summary, we assume that there is about 19 times more use of free-of-charge PSI data than use of value-added PSI data supplied by OPSI.

---

<sup>38</sup> Although the list of licence-holders is not complete in accordance with the data protection act, the total number of licence holders in the core and parliamentary licence lists is very similar to the aggregate figure reported by OPSI. We therefore assume that the number of value added licence-holders in the list will be similarly close to the actual aggregate number of licence-holders and use the number of entries in each list as a proxy for the actual number of licence-holders.

**Table 3.8: Number of entries in OPSI licence-holders lists, June 2006**

Value Added licences	Core licences	Parliamentary licences
442	8,159	299

Source: OPSI website

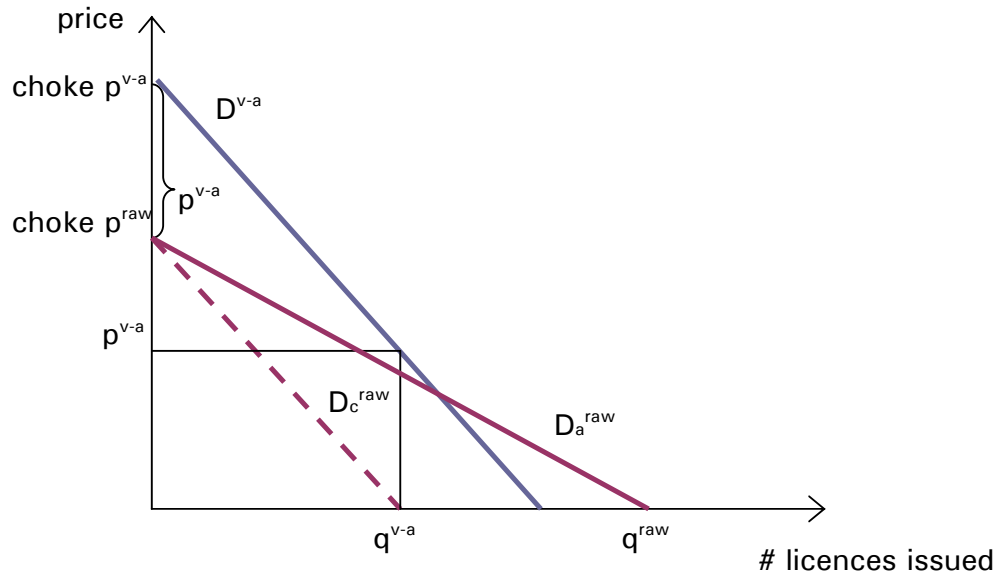
3.43 We then assume that the choke price for raw PSI (that is, the maximum amount that any customer is prepared to pay) is equal to:

- the choke price of value-added PSI, **minus**
- current price of value-added PSI, which should approximately equal the cost of providing this data, given that value-added activities are competitive and the raw data is available free.

3.44 It is reasonable to believe that this is a lower bound for the choke price of raw data. Given the competitive nature of value-added products we would not expect the willingness to pay for value-added products to exceed the willingness to pay for raw data plus the cost of value-added features, as otherwise the purchaser (or an alternative provider) would be better off to obtain raw data and add the value-added features itself.

3.45 This situation is represented graphically in Figure 3.2, where the difference between the choke price for value-added products (choke  $p^{v-a}$ ) and the choke price for raw products (choke  $p^{raw}$ ) is equal to the price of value-added products ( $p^{v-a}$ ).

**Figure 3.2: Demand for value-added and raw data OPSI licences**



- 3.46 Given our assumption on the difference in choke prices, if we expected the demand for raw products to have the same slope as the demand for value-added products, we would then expect to observe the same number of raw and value-added licences. This is shown in Figure 3.2, where  $D^{v-a}$  represents the demand for value-added products. The dotted line (labelled as  $D_c^{raw}$ ) shows demand for raw products if it had the same slope as demand for value-added products. By construction, given that raw data licences are offered free of charge, the number of raw data licences issued would to be equal to the number of value-added licences issued (shown as  $q^{v-a}$ ). However, our inspection of the lists of licence-holder of each type available from OPSI suggest that the number of raw data licences issued is about 19 times the number of value-added licences used, which suggests that the addressable market for raw products is greater than the addressable market for value-added products. This

would imply a flatter demand for raw products,<sup>39</sup> illustrated in Figure as  $D_a^{\text{raw}}$ .

- 3.47 Based on this approach, we can calculate the consumer surplus from usage of raw data as the area under the demand curve for raw products (obtained as described above) and above the market price (which is equal to zero given that raw data licences are offered free of charge). We estimate that the economic value of free-of-charge PSI supplied by PSIHs in Stratum 2 is **at least** £15.7 million (£9.4 million if we use our alternative high elasticity assumptions).
- 3.48 This estimate relies heavily on our assumptions. In particular, it is conceivable that usage per licence varies for free-of-charge and value-added licences. However, we have no indication as regard to the difference in usage per licence, or even with regard to which one is likely to be greater. For this reason, it would be difficult to justify any alternative assumption other than similar usage for the two types of licence. Nevertheless, as noted above, this is unlikely to affect our conclusions on detriment materially, given that we believe there is little scope for detriment where PSIHs offer the information they hold free of charge.

## Assessment of producer surplus

- 3.49 In order to estimate the producer surplus or loss, we would require estimates on the costs of collecting and supplying the data and then compare this to revenue. However, estimates on the costs of supplying PSI data for each group are not readily available.

---

<sup>39</sup> We note that a flatter demand curve could suggest a greater price-response for the demand of raw products, which might be counter-intuitive given the greater degree of substitutability of raw products, however to the extent that there might be more potential consumers of raw products than value added products one can expect price changes to have a greater impact on the number of users. In addition, this result is based on a lower bound for the choke price.

3.50 In addition, many of the costs of data collection and processing may not be related to the supply of PSI to the private sector, but might result from other public policy objectives that already take such costs into account. For this reason, we do not include such costs in our calculation of the economic value of PSI. We assume that:

- where PSIHs do not report a target rate of return on capital employed (ROCE), any losses or profits are already accounted for in the setting of public policy objectives and thus can be left out of our assessment, and
- where PSIHs do report a target ROCE, this reflects the cost of capital as taken into account when setting of public policy objectives for the PSIH. In this case, we estimate producer surplus as the difference between actual and target ROCE (unless actual ROCE is below target ROCE, in which case we assume that such losses are absorbed and accounted for in the setting of public policy objectives).

3.51 We assume that PSI can be supplied for commercial use at no cost, as all costs have been incurred in the collection and process of data that would be necessary even if PSI were not made available for commercial use. Thus under this assumption all costs are a function of the capital employed and target ROCE.<sup>40</sup> Given this, we can calculate profits as a function of revenues:<sup>41</sup>

---

<sup>40</sup> Note that this might overstate producer surplus, as we may be overstating capital employed and thus the resulting profits from returns on capital employed. However, we expect costs associated with the supply of PSI for commercial use to be small, and thus our estimates to be in the correct order of magnitude. Given that profitability is subject to shocks and that target profitability is typically defined as an average ROCE spanning over a number of years, we have used average target and actual ROCE for the last four to five years (depending on availability of data from individual PSIHs), which provides a more stable estimate for average profitability.

<sup>41</sup> This results from combining the two equations:

$$\text{Profits} = \text{Revenue} \cdot \frac{\text{actual ROCE} - \text{target ROCE}}{1 + \text{actual ROCE}}$$

3.52 The producer surplus is estimated using individual PSIH revenues and target and actual ROCE figures reported in the sample. This is then aggregated for each group and scaled up in order to account for PSIHs not included in the sample using the group ratio of total group revenues to aggregate reported income in the sample. Given that only PSIHs in Stratum 1 report target ROCEs, our approach is limited to the estimation of producer surplus generated in Stratum 1. Our estimates of producer surplus in Stratum 1 are presented in Table 3.9.

**Table 3.9: Estimated producer surplus (£m):**

	A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	Total
<b>Stratum 1</b>	24.1	24.9	16.5	0.0	<b>65.6</b>

### Assessment of aggregate economic value

3.53 Combining net consumer surplus from revenue-generating and free-of-charge products with producer surplus, we obtain our estimates

$$\text{Profits} = \text{Revenue} - \text{capital employed} \cdot (1 + \text{target ROCE}), \text{ and}$$

$$\text{actual ROCE} = \frac{\text{Revenue}}{\text{capital employed}} - 1$$

of economic value currently generated by use of PSI, presented in Table 3.10.

**Table3.10: Estimated economic value (£m): base case elasticity assumptions estimates (high elasticity assumptions estimates)**

	<b>A</b> <i>Ec./Bus./Leg.</i>	<b>B</b> <i>Geog.</i>	<b>C</b> <i>Env./Sci.</i>	<b>D</b> <i>Other</i>	<b>Total</b>
<b>Stratum 1</b>	114.7 (78.5)	199.6 (134.6)	183.2 (116.8)	0.8 (0.6)	<b>498.3</b> <b>(330.5)</b>
<b>Stratum 2</b>	N/A	N/A	N/A	N/A	<b>16.5</b> <b>(9.9)</b>
<b>Stratum 3</b>	19.8 (11.9)	0.0 (0.0)	43.3 (26.0)	5.5 (4.2)	<b>68.7</b> <b>(42.1)</b>
<b>Total</b>					<b>583.5</b> <b>(382.5)</b>

3.54 In summary, we estimate a lower bound for the current economic value of PSI in the UK of around half a billion pounds.

## 4 DETRIMENT ANALYSIS

4.1 In this chapter we consider the potential detriment from inefficient exploitation of PSI data, which captures the difference between the economic value that would be generated under efficient exploitation of PSI and the economic value generated under current use of PSI. Throughout, we focus on detriment with regard to commercial exploitation of PSI, rather than any failure of PSIHS to meet their core public service obligations.

4.2 In order to assess the potential detriment for each PSIHS group, we consider:

- the potential sources of detriment that can arise
- the likelihood that each type of detriment occurs within each PSIH group, and
- the potential magnitude of detriment where this is likely to occur.

## **Types of detriment**

- 4.3 There are three main types of potential detriment that need to be considered.

### **Type A – Unduly high prices**

- 4.4 Where market power is held upstream in the collection of information, one form of abuse would be the charging of unduly high prices to customers. This in turn leads to use of PSI being below socially efficient levels. There would be a loss of net consumer surplus, although this would be partially offset by high profits being earned by the PSIH. This category of detriment includes excessive charging in both downstream and upstream markets.
- 4.5 Market power in the upstream market may not necessarily result in excessive profits, as these might be dissipated through high costs. However, given limited cost data, we have no means of identifying high costs. Therefore, we have to assume there are no high costs associated with the supply of PSI for commercial use and that detriment only arises where there are high profits. This means that we may miss some cases of Type A detriment where there are no obvious high profits.

## **Type B - Distortion of downstream competition through a restraint on upstream demand for PSI**

- 4.6 Where PSIHs have a strong position in the provision of PSI in the upstream market, they may effectively leverage their dominance to the downstream market by limiting access to PSI by competitors. Competition in downstream markets can be distorted through a number of behaviours by the PSIH:
- Refusal to supply without objective justification, particularly where the PSIH is the primary collector and holder of unrefined data and access to such might be considered an essential facility.
  - Discrimination across those seeking access to unrefined PSI, especially between businesses refining information and the PSIH's own downstream business (see Appendix B on how the concept of non-discrimination has been enforced through regulation in a network industry).
  - Restrictions on the usage of PSI, such as restricting the use of PSI for the provision of downstream services in direct competition with those offered by the PSIH.
  - Margin squeeze on downstream providers through unduly high pricing of the upstream product.
- 4.7 These behaviours may be motivated by a desire to protect or exploit market power upstream and so may be associated with excess profits. However, even if the PSIH does not have a strong profit motive, it may still engage in such behaviours. For example, an organisation might have an objective of growth and so try to bring refined activities in-house, rather than supplying unrefined information to businesses.
- 4.8 Similarly, PSIHs might fail to supply unrefined products because they consider them to have little commercial value to businesses, rather than with the objective of leveraging market power to the

downstream market. This problem may be particularly relevant amongst PSIHs in Stratum 3. Furthermore, a clear profit motive might reduce the incentives for such behaviour, as profits might be higher if refining information were undertaken more efficiently by businesses. Conversely, a public sector body might be resistant to the change or additional cost or complexity that might come from providing unrefined products for businesses to create refined products. Therefore, there is a wide range of reasons why PSIHs might engage in such behaviours.

4.9 Regardless of what form the distortion of downstream competition takes, it may result in:

- A lack of price competition in refined information products, potentially leading to unnecessarily high prices in the downstream market.
- Less pressure on costs for the PSIH's own downstream operations, as those are effectively protected from competitive pressures.
- Delayed or stifled innovation of new products and services derived from the PSI.

### **Type C - Detriment relating to the failure to commercially exploit information**

4.10 Although not specifically a competition concern, an important form of detriment is the failure of some of the PSIHs to exploit the information they hold in the first place. This may be a particular feature of the smaller PSIHs or those that do not regard their information as being valuable enough to make their information publicly available.

4.11 Type C detriment is distinct from type B detriment. The latter concerns restricting the supply of unrefined information to distort downstream competition (often to favour the PSIH to the

disadvantage of businesses refining information), whereas the former concerns not making any PSI available for commercial exploitation at all (whether by the PSIH itself or by businesses).

### **Scope for detriment and its potential sources**

- 4.12 Competitive conditions both upstream and downstream are relevant for determining the type of detriment that may emerge. Where there is competition in the upstream market, it is unlikely that there is any type A detriment in the economic value from the commercial use of PSI. Type A detriment results in unduly high profits, and hence in our assessment we only consider this type of detriment for PSIHs for which we have profit data (data on target and actual ROCE), that is, Stratum 1. We make no attempt to identify cases in which excessive profits might be masked by excessive costs.
- 4.13 Where competition upstream is limited and there is no form of quasi-regulation on the pricing of raw PSI, there is likely to be scope for type B detriment as downstream refined information providers rely on access to the PSIH's unrefined information. For this reason, this problem is unlikely to affect PSIHs in the OPSI group (Stratum 2), as these provide unrefined PSI free of charge and on an unrestricted basis. Trading Funds may be prone to type B detriment, in that they may have incentives to internalise growth in the development of refined information products, thus, we consider PSIHs in Stratum 1 to be likely candidates of this sort of detriment. PSIHs in Stratum 3 may also be a source of this type of detriment, especially where they may consider that the unrefined PSI they hold may be of little commercial interest to businesses and thus limit access to the downstream market by not offering an upstream product.
- 4.14 The incentives and structure of the PSIH are also relevant in considering the potential for detriment. In particular, Trading Funds are likely to have a motive to exploit PSI, so type C detriment is less likely. As noted above, type C detriment is more likely in the case of

smaller PSIHs (or which may have limited guidance on PSI in their sector). Intuitively, this type of detriment may be most likely to be prevalent in stratum 3, given their relatively modest supply of PSI compared to PSIHs in other the other two strata.

- 4.15 To summarise, based on our consideration of the likely scope for detriment in each PSIH group, we have assessed the potential detriment of type A on Stratum 1, the potential detriment of type B on Strata 1 and 3, and the potential detriment of type C on Stratum 3.

### **Assessment of potential magnitude of detriments**

- 4.16 Having established the potential sources of detriment, and where we may expect each type of detriment to arise, we now consider how to estimate the potential resulting economic loss.

#### **Type A – Unduly high pricing**

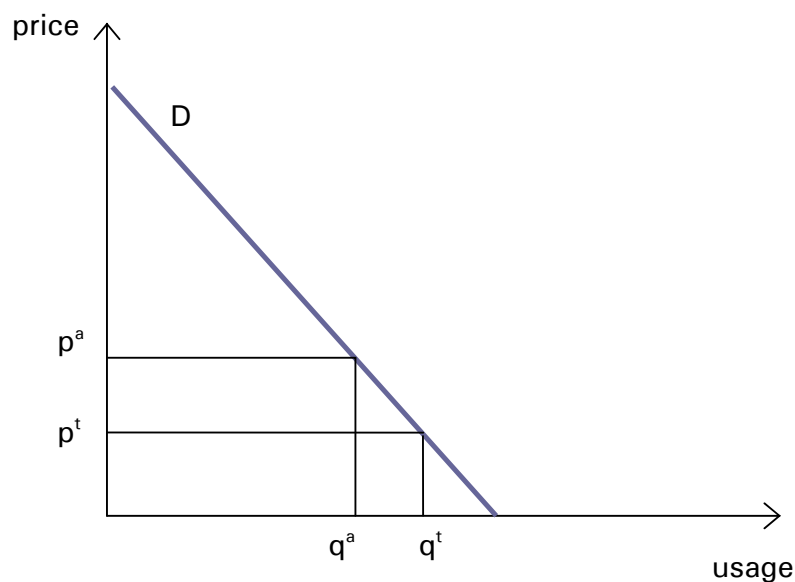
- 4.17 In order to assess the impact of type A detriment, we compare the social surplus (that is, consumer and producer surplus) under current pricing relative to competitive pricing. Higher prices result in lower usage of PSI, and the extent to which usage levels diverge from the efficient level and the consequent loss of welfare depends on the price responsiveness of customers to price changes. Where price responsiveness is large, the exercise of market power will have a greater impact on usage, and will thus result in a larger welfare loss. Therefore, we expect our estimates of the magnitude of detriment to be higher when we assume higher (in absolute value) elasticities.
- 4.18 We do not take marginal cost pricing as our benchmark for a competitive outcome, as most PSIHs have cost recovery targets, including a specified return on capital employed in the case of Trading Funds. Therefore, we consider the loss of welfare relative

to prices that would allow for cost recovery but no super-normal profits.

- 4.19 In order to assess the impact of unduly high pricing we look at the profitability of PSIHs. As noted above, our assessment draws on profitability data, and thus we have only calculated the potential magnitude of type A detriment for those PSIHs for which we have data on profitability, that is, PSIHs in Stratum 1.
- 4.20 Our competitive benchmark is defined as the prices that would allow PSIHs to meet their target ROCE exactly, but not exceed it. Therefore, we calculate the revenue that would allow PSIHs to exactly meet their target ROCE, and use this as our benchmark revenue. We then estimate type A detriment as the difference in social surplus obtained when PSIHs earn current revenues relative to social surplus were they to earn benchmark revenues.
- 4.21 In performing this calculation, we assume that there are no variable costs associated with the commercialisation of PSI and that all costs are fixed in relation to supply of PSI for commercial use. However, if there are variable costs associated with the supply of unrefined PSI, lower prices will increase demand and with this variable costs. Therefore, competitive benchmark prices might be somewhat higher than we calculate, as additional revenues would be required for recovering variable costs. However, given the strong economies of scale that characterise the supply of PSI, the cost of further supplying data for commercial use are likely to be small relative to the costs incurred in sourcing the data, and we expect our approach to provide a good approximation of the welfare loss.
- 4.22 The impact of reducing revenue is shown in Figure 4.1, where  $p^a$ ,  $q^a$  represent the actual implied price and quantity, and  $p^t$ ,  $q^t$  represent

the target (benchmark) price and quantity at which ROCE is equal to its target.<sup>42</sup>

**Figure 4.1: Modelling of type A detriment**



4.23 One complication is that although we know revenue for the PSIHs considered, we do not know the quantity of PSI demanded and prices. Indeed, it may be difficult to even define what we mean by the quantity of PSI supplied. However, as explained in our methodology for measuring current consumer surplus, assuming a particular form of the demand curve, there is a one-to-one relationship between revenue and consumer surplus. Therefore we only need to know the revenues at present and under the

---

<sup>42</sup> Note that starting from current prices ( $p^a$ ) and usage ( $q^a$ ), one might be able to decrease revenues to the target revenue level by either lowering prices (resulting in higher usage) or by raising them (resulting in lower usage). In our assessment of detriment from unduly high pricing we are interested in the case where prices are reduced in order to meet target revenues.

hypothetical competitive scenario where revenue falls until ROCE drops to its target value.

- 4.24 Benchmark revenues are easily calculated given our assumption that all costs are fixed. In this simple case, benchmark revenues would be equal to our estimate of capital employed plus the target return, which can be calculated using data on actual revenues, actual ROCE and target ROCE:<sup>43</sup>

$$\text{Benchmark revenue} = \text{Actual revenue} \cdot \frac{1 + \text{target ROCE}}{1 + \text{actual ROCE}}$$

- 4.25 In calculating the change in consumer surplus in cutting revenue from the current level to the benchmark level, we need to take account of the fact that the elasticity of demand is different at different prices given the assumption of a linear relationship between price and quantity.
- 4.26 As we are only interested in the relative change in prices and usage, the definition of units for measure the quantity of PSI is irrelevant. This allows a significant simplification in the calculation of the change in consumer welfare. We can assume an arbitrary slope for the demand function, as the slope of the demand curve can be changed to anything we want by taking different units for measuring quantities. For simplicity, we can without loss of generality assume a slope of -1. This means that the demand curve is given by the relationship

$$q = A - p$$

---

<sup>43</sup> As under our assumption of no variable costs from the supply of PSI for commercial use, revenue = capital employed · (1 + ROCE).

where A is the size of the addressable market (that is, demand at zero price). It is possible to derive the formula for the welfare change without using this trick, but the manipulations are much more complex.

- 4.27 We can calculate the price and quantity implied by our elasticity assumption at the current actual price ( $\varepsilon^a$ ) and actual revenues ( $R^a$ ) earned by the PSIH:

$$p^a = \sqrt{-R^a \cdot \varepsilon^a}$$

$$q^a = \frac{R^a}{p^a}$$

- 4.28 This means that the addressable market must equal:<sup>44</sup>

$$A = p^a + \frac{R^a}{p^a}$$

- 4.29 We now want to find the price that would correspond to a certain level of target revenue. Price and revenue are linked by the quadratic equation

$$R = (A - p) \cdot p = A \cdot p - p^2$$

- 4.30 From this, we can express price as a function of revenue:<sup>45</sup>

---

<sup>44</sup> The addressable market is the usage given by the demand function when prices are zero. If we define our linear demand function as  $q = A + b \cdot p$ , where  $q$  is the usage level and  $p$  prices, the addressable market is given by the intercept parameter  $A$ .

<sup>45</sup> Given that we are assessing the impact of unduly high pricing, we are interested only in a situation in which lower prices would lead to lower revenues (that is, the price elasticity is

$$p = \frac{A - \sqrt{A^2 - 4 \cdot R}}{2}$$

4.31 We can find the price ( $p^t$ ) yielding target revenues from the equation above. The elasticity of the demand curve at the lower benchmark price is given:

$$\varepsilon^t = - \frac{p^t}{q^t} = - \frac{p^t}{A - p^t}$$

4.32 Thus, the welfare impact from type A detriment ( $W^{dA}$ ) can be calculated as the increase in consumer surplus that would result if only target revenues were earned, minus the loss in revenue as this producer surplus would be lost:

$$W^{dA} = \frac{1}{2} \frac{R^t}{\varepsilon^t} - \frac{1}{2} \frac{R^a}{\varepsilon^a} - (R^a - R^t)$$

4.33 The results of our assessment are presented in Table 4.1.<sup>46</sup>

less than -1 in magnitude). This means that we are only interested in the negative solution of the square root.

<sup>46</sup>This assessment focuses only on excessive pricing from PSIHs in stratum 1, and is based on data available on individual PSIH's profitability and revenue data and our assumption of no variable costs for increasing the supply of PSI for commercial use. However, that some PSIHs in stratum 3 might also enjoy supernormal profits from PSI sales. Similarly, benchmark competitive prices for PSIHs in stratum 1 to be actually higher than those we assume, specifically where there may be a cost in increasing the supply of PSI for commercial use. In our sensitivity analysis in Appendix D, we explore the potential detriment if current market prices were 10 per cent above competitive levels.

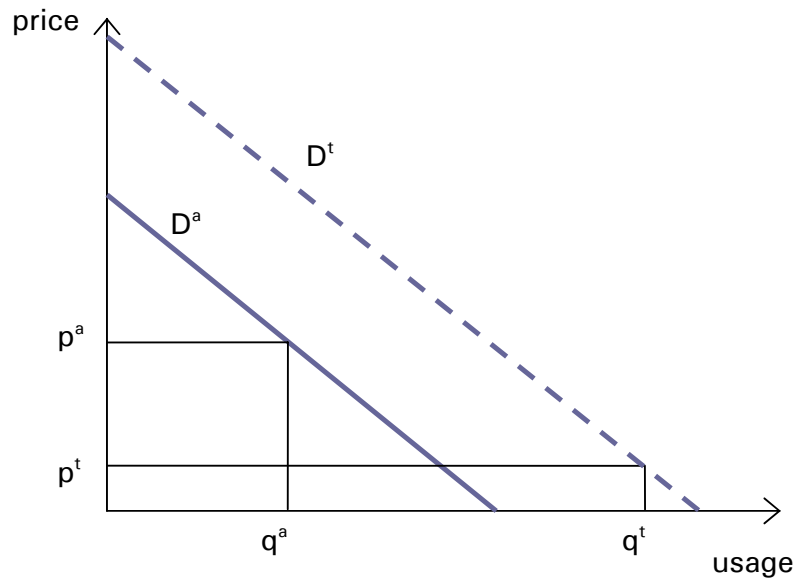
**Table 4.1: Assessment of type A detriment (£m): base case elasticity assumptions estimates (high elasticity assumptions estimates)**

	A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	Total
<b>Stratum 1</b>	6.1 (10.8)	6.7 (31.7)	5.8 (11.3)	0.0 (0.0)	<b>18.6</b> <b>(53.8)</b>

### **Type B – distortions of downstream competition**

4.34 Although the effect of type B detriment is felt in the downstream market (where distortions to competition may lead to unduly high pricing, poor quality, and/or narrower range of refined information products), it derives from the upstream market (access to raw PSI). We illustrate type B detriment in Figure 4.2, which shows the demand for unrefined products only.  $D^a$  represents the actual demand, artificially constrained at an amount less than potential demand  $D^t$  (for example by excluding some unrefined information users). In our assessment we calculate the increase in surplus that would result from allowing the market demand to expand to its natural level ( $D^t$ ).

**Figure 4.2: Modelling of type B detriment**



4.35 Provided the downstream market is competitive, the consumer surplus from the unrefined information product market already represents the potential benefits that consumers of downstream products enjoyed from refined products. Therefore, the increase in welfare resulting from the expansion of demand for unrefined information products already captures the welfare impact in refined information products.<sup>47</sup>

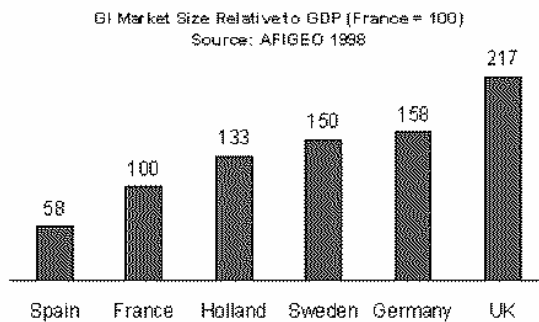
---

<sup>47</sup> In other words, there is no need to look into the impact in downstream markets – in fact, doing so would be double-counting for the loss in welfare.

- 4.36 Access regulation in telecoms provides a close parallel here. Oftel (and now Ofcom) have conducted various regulatory cost benefit analyses to look at the potential benefit of regulated access in the sector. This parallel is discussed further in Appendix B.
- 4.37 Clearly, the analysis of type B detriment crucially depends on the extent to which the demand for unrefined products may currently be constrained. Lacking benchmark data on the potential size of the market for unrefined PSI, it is difficult to conduct such an assessment. In particular, available benchmark figures on the economic value from PSI are usually based on revenues and include both unrefined and refined markets, therefore, we cannot easily compare the quantity of unrefined information purchases across different countries.<sup>48</sup> Given that the potential size of the market is

---

<sup>48</sup> One might expect the revenues earned by PSIHS effectively exercising market power to be above those from comparable PSIHS acting competitively. For this reason, comparisons of the size of PSI markets across countries might lead to the premature conclusion that PSIHS exercising market power are in fact succeeding in generating greater economic value from PSI. For example, consider the following representation of the GDP-adjusted economic value generated by PSI for a number of European countries. The UK appears to be performing significantly well relative to other countries. However, this may not just reflect greater use of PSI but rather the effect of UK PSIHS being able to extract greater revenues by exerting market power.



unknown, we only seek to demonstrate the likely order of magnitude of potential detriment where such problems arise.

- 4.38 In order to conduct our assessment we first need to identify the size of the market for unrefined PSI. The OFT survey of PSIHs asked questions on the revenues generated from the supply of 'value-added products'. Using responses in the sample we have estimated the split between revenues from unrefined PSI and downstream products for each group. The results for Strata 1 and 3 are presented in Table 4.2.

**Table 4.2: Split of revenues between unrefined and downstream products (£m): total revenues (revenues from unrefined products)**

	A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	Total
<b>Stratum 1</b>	50.5 (50.0)	164.6 (4.9)	97.3 (64.3)	2.3 (2.3)	<b>314.7</b> <b>(121.5)</b>
<b>Stratum 3</b>	4.7 (0.9)	0.0 (0.0)	10.2 (10.2)	6.6 (4.9)	<b>21.5</b> <b>(16.0)</b>
<b>Total</b>					<b>336.2</b> <b>(137.6)</b>

- 4.39 A potential indicator that type B detriment is likely to be significant might be the relative size of unrefined and refined revenues. We might expect type B detriment to be present where the revenues from unrefined products are a small part of total revenues. For example, the disproportionate weight of revenues from downstream

---

Source: PIRA International (October 2000), Commercial Exploitation of Europe's Public Sector Information: Report for the European Commission Directorate General for the Information Society.

products in group B of Stratum 1 might suggest that market power in the upstream market is successfully leveraged in the downstream market, which might appear to be reasonable given that a number of PSIHs in this group appear to enjoy substantial profits. However, this is not an unambiguous indicator, because such an uneven split between revenues from unrefined and downstream products could occur, for example, where PSIHs offer unrefined PSI free-of-charge and charge only for downstream products.

4.40 Nevertheless, the large difference in revenues from unrefined and downstream products earned by PSIHs in group 1B suggests that detriment of type B may be at play. For this reason we have considered the potential for type B detriment to be significant for this group. Specifically, we consider the hypothetical case where the demand for unrefined PSI from PSIHs in group 1B could be expanded by 50 per cent beyond current demand. Similarly, we have regarded the potential for detriment B to be at play in PSIHs in group 3A to be significant, as revenues from unrefined PSI seem to be a small proportion of all revenues, we have therefore considered the potential for expansion of demand for unrefined PSI also to be 50 per cent. For the remaining groups, where unrefined PSI appears to contribute the majority of revenues, we have modelled a more modest case, where we consider the welfare impact of demand for unrefined PSI being expanded by 10 per cent. We present sensitivities for these assumptions in Appendix D.

4.41 Our assessment is based on 'raw' PSI revenues reported by the PSIHs in the OFT survey. Using these as the base for our calculation and assuming that the elasticity of demand for raw products is no different than the elasticity of demand for value-added products,<sup>49</sup>

---

<sup>49</sup> Considering the firm-specific demand, one might expect the demand faced by the PSIH for raw products to be more inelastic than for value added products, especially where there might be no competition upstream but potential competition downstream. However, where PSIHs manage to successfully leverage market power in the upstream market to the downstream

we calculate the potential welfare impact of expanding demand. We then adjust the results to account for PSIHs not in the sample ratio of total group revenues to aggregate reported income in the sample.

- 4.42 The mechanics of this exercise are similar to those used for our assessment of the welfare impact of detriment A. First, we calculate actual prices, usage and demand parameters consistent with observed actual revenues (from raw products only) and our elasticity assumptions. Second, we assume that the demand for raw products expands in a parallel demand shift (maintaining the same slope). We then compute the new prices and usage given the new demand function.
- 4.43 In order to calculate our benchmark prices and quantities in the absence of detriment, we assume that the PSIH would set prices in order to earn the same revenues as in the present situation. We do not consider any reduction in total revenue following elimination of the detriment to avoid double-counting, as high prices have already been considered as type A detriment. Furthermore, we look at the impact of an outward shift in the demand curve starting from current revenues, rather than revenues achieving only the target ROCE. This is a conservative assumption, as the estimated detriment would be greater if we started with target revenues (which are lower) rather than current revenues.
- 4.44 The welfare impact of type B detriment is equal to the difference in consumer surplus between our benchmark and the actual allocation. Our results are presented in Table 4.3. These results are indicative and dependent on our assumptions specified above. For further information on the potential welfare loss from type B detriment, sensitivities on these assumptions are presented in Appendix D.

---

market, one can expect the demand faced by the PSIH for downstream products to be consequently inelastic.

**Table 4.3: Assessment of type B detriment (£m): base case elasticity assumptions estimates (high elasticity assumptions estimates)**

	A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	Total
<b>Stratum 1</b>	34.0 (30.3)	15.0 (16.0)	43.7 (40.2)	2.5 (3.2)	<b>95.3</b> <b>(89.7)</b>
<b>Stratum 3</b>	8.5 (7.0)	0.0 (0.1)	16.5 (14.2)	16.5 (21.7)	<b>41.5</b> <b>(43.4)</b>
<b>Total</b>					<b>136.8</b> <b>(133.1)</b>

### **Type C – failing to exploit PSI**

4.45 It is difficult to assess the potential impact of this type of detriment, as current revenues do not offer any guidance as to the scale of any potential problem. Detriment of type C, however, may be of particular concern where the PSIH records no commercial revenue or indeed any turnover, for example in the case of the smaller PSIHs. As noted above, we expect this problem to affect mainly Stratum 3, and thus we have focused only on PSIHs in this stratum.

4.46 In particular, we assess the potential welfare loss resulting from some PSIHs not providing PSI when such information might be valuable for commercial use. However, the potential scope for PSIHs in this stratum that already supply PSI for commercial use to expand their supply might be limited. For this reason, we only consider PSIHs who do not supply PSI at present, and measure the potential surplus that could be generated if they were to provide PSI to the same extent as other PSIHs in their group.

4.47 In order to conduct our assessment we have first estimated (based on data from the OFT survey of PSIHs) the proportion of PSIHs commercialising PSI in each group. This is shown in Table 4.4.

**Table 4.4: Proportion of PSIHs earning revenues from PSI:**

	A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	All
<b>Stratum 1</b>	80%	100%	67%	50%	<b>72%</b>
<b>Stratum 2</b>	N/A	N/A	N/A	N/A	<b>6%</b>
<b>Stratum 3</b>	5%	10%	4%	8%	<b>7%</b>

4.48 We observe that the estimated proportions for Stratum 3 are substantially smaller than for Stratum 1, though not too dissimilar to that observed for Stratum 2. However, Stratum 2 is unlikely to provide a good benchmark, as most of the PSI is supplied free of charge, and thus one can expect the proportion of income-generating PSIHs not to be reflective of the extent of usage of PSI held by this group. On the other hand, one may expect Stratum 1 to have a much higher potential for commercialisation of PSI, and therefore it would be unreasonable to assume that the proportion of PSIHs exploiting PSI in Stratum 3 could equal to that in Stratum 1.

4.49 In order to assess the potential impact of increasing the availability of PSI from PSIHs in Stratum 3, we have estimated the impact of increasing the proportion of income-earning PSIHs in this stratum to 25 per cent in all information type groups. Further sensitivities on this assumption are provided in Appendix D.

4.50 Although this assumption is not based on any empirical evidence, 25 per cent of PSIHs being commercially active does not seem unreasonable compared with the observed proportion of commercially active PSIHs in Stratum 1 (on average around 70 per

cent). This assumption would also seem reasonable given the findings of the PIRA study, which using the USA as a benchmark concluded that the market for PSI in the EU could potentially be some two to five times larger. Increasing the size of the market for PSI in Stratum 3 two to five times could be modelled as increasing the proportion of PSIHS generating revenue from current seven per cent to 14 per cent or to 35 per cent respectively. Therefore, an increase to 25 per cent of PSIHS being commercially active broadly accord with the middle of PIRA's range.

- 4.51 We assume that the increase in PSIHS commercialising PSI would have a proportionate impact on the economic value generated by PSIHS in Stratum 3, new income-generating PSIHS would generate surplus equal to the average surplus of current income-generating PSIHS in their group. Our results for the 25 per cent benchmark are presented in Table 4.5.

**Table 4.5: Assessment of type C detriment (£m): base case elasticity assumptions estimates (high elasticity assumptions estimates)**

	A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	Total
<b>Stratum 3</b>	104.2 (62.5)	0.1 (0.1)	243.6 (146.2)	16.5 (12.4)	<b>364.5</b> <b>(221.2)</b>

### Hindering innovation and forward looking assessment

- 4.52 Lack of innovation would result in a considerable increase in the magnitude of detriment. For example, hindering innovation may result in excessive costs for the supply of services, which in turn result in unduly high prices and lead to type A detriment. Similarly, lack of innovation might have an even greater impact in relation to refined information products, which is the main focus here.

- 4.53 So far, we have looked at two situations in which unrefined PSI might not be supplied: type B detriment, where some refined information providers are discriminated against and type C detriment, where the PSIH simply fails to commercialise PSI at all. In both cases, we have calibrated the potential detriment by comparing against existing outcomes.
- 4.54 However, this approach may fail to take account of the possibility that restrictions in the supply of unrefined PSI may impede the development of entirely new refined products. If innovation is restricted as a result of difficulty access unrefined PSI, this could have a major impact on consumer welfare as the benefit of new products and services is lost entirely or significantly delayed. Existing provision of refined information products is not a good guide to the potential for innovation. We have seen rapid advances in the exploitation of PSI with digitisation, such as GPS-based navigation, which we discuss in Appendix C.<sup>50</sup>
- 4.55 Taking into account possible lack of innovation could lead to very large estimates of the detriment caused. As such, we do not believe these should be included within our base case assessment of detriment but be considered rather as a sensitivity. However, where innovation might be hindered at present, we would expect the magnitude of type B and C detriment to be greater than our estimates.
- 4.56 In order to provide an indication of the potential impact of lack of innovation, we have provided sensitivities for our assessment of type B detriment where the potential demand for raw products in both Strata 1 and 3 could be two to five times greater across all information groups, as suggested in the PIRA study based on a comparison of the relative size of the EU and USA markets. Our

---

<sup>50</sup> Appendix C considers the development of the in-car satellite navigation market. These products rely on the use of an underlying map.

results are presented in Table 4.5. Further sensitivities on the potential expansion of demand are presented in Appendix D.

**Table 4.5: Assessment of type B detriment using greater potential market expansion to reflect innovation being currently hindered (£m): base case elasticity assumptions estimates (high elasticity assumptions estimates)**

Potential demand for unrefined PSI		A	B	C	D	Total
		<i>Ec./Bus./Leg.</i>	<i>Geog.</i>	<i>Env./Sci.</i>	<i>Other</i>	
Twice current demand	Stratum 1	461	34	583	17	1,095
	Stratum 3	20	0	223	115	359
	Total	481	34	806	132	1,454
Five times current demand	Stratum 1	3,643	257	4,597	125	8,623
	Stratum 3	159	3	1,761	839	2,761
	Total	3,802	261	6,357	964	11384



# APPENDICES

---

## A INTERNATIONAL CASE STUDY

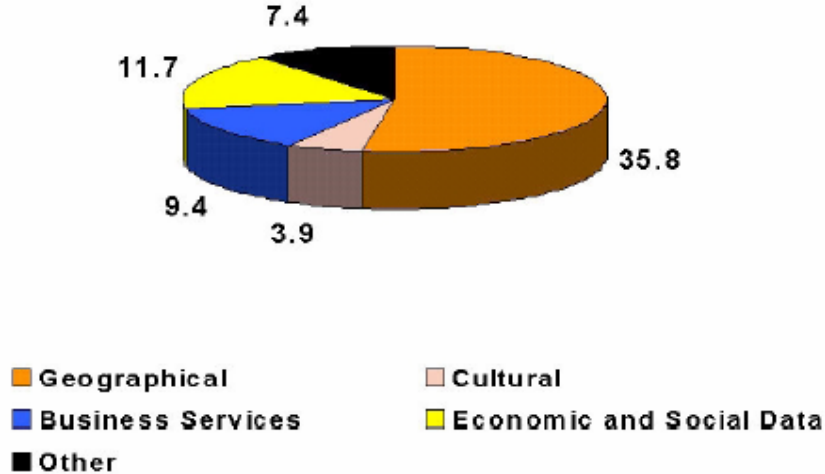
### Approach adopted in previous studies

- A.1 The principal study undertaken to date which attempts to measure the economic value of public sector information on an international scale is that conducted by PIRA for the European Commission, published in 2000. This study calculated (separately and combined) the economic value of public sector information in 15 EU countries. This included both PSI supplied to end users and supplied to intermediate users who subsequently add value and resell it. In calculating the former, PIRA added together the revenues from sales of raw information by the major public sector information holders. To calculate the latter, PIRA added together the various portions of revenues of refined information products that were attributable to the PSI incorporated within them and recouped through royalties.

### Economic value

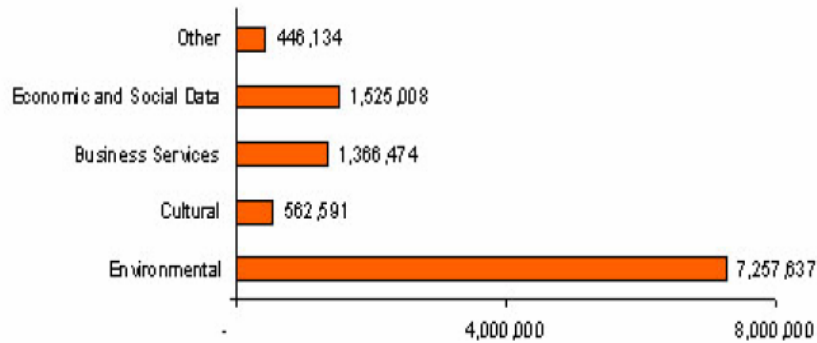
- A.2 PIRA calculated that, across the EU as a whole, governments invest approximately €9.5bn in PSI each year. By comparison, the US invests just under an estimated €19bn per year. For the European economy, the estimated economic value of this investment lies between €28 billion per annum and €134 billion per annum, with a central estimate of €68 billion. The central estimate represents nearly one per cent of EU GDP.

**Economic Value of Public Sector Information in the European Union, 1999 (€ Billion)**



- A.3 Within this total, the geographical information industries account for €36bn, next largest are industries exploiting economic and social data (€11.7 billion) followed by the area of company information (€9.4bn). The sale of geographic information already exceeds €2bn. (DG XIII (GI2000 initiative)).
- A.4 In comparison, estimates of the US PSI market suggest that it is up to five times the size of the EU market. PIRA report that the economic value for the whole information sector (much of which is built on exploiting PSI) in the US is €750bn.
- A.5 PIRA (2000) reported that, in addition to being the largest sector in the aggregate, the largest single component of the PSI investment total in every EU country is the geographical sector. This includes such categories as mapping, land registration, meteorological services, environmental data and hydrographical services. This sector takes over 37 per cent of the total investment in PSI in France, 41 per cent in Sweden and over 57 per cent in the United Kingdom. The economic value of PSI in the UK is shown by sector below:

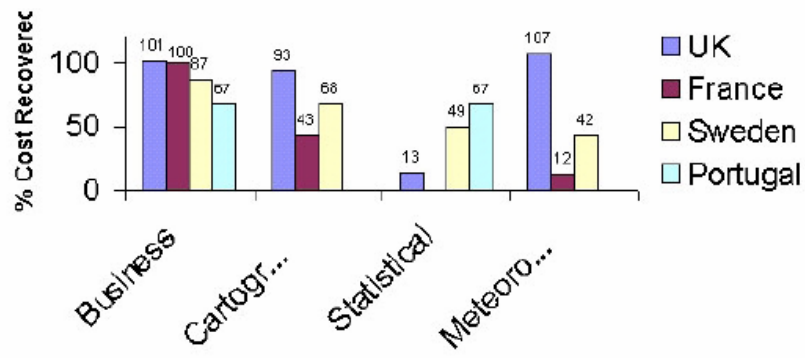
**Estimated economic value of PSI for the UK - by domain  
(€)**



A.6 The total economic values of PSI calculated for various EU countries are reported below:

Country	Economic value of PSI
United Kingdom	€11.2bn
France	€10.4bn
Sweden	€3.6bn
Portugal	€1bn

A.7 These economic values were generated in the context of different cost recovery strategies across countries. The United Kingdom government is the most consistent in setting high cost recovery goals for its PSI agencies, but several agencies in Sweden, including those dealing with company and land registration information also set prices close to average cost. In Portugal, the national statistical agency (INE), the geological institute (ING) and the official publisher are among the agencies set a target to recover 2/3 of their costs through charges.



## **B BT PRICE CONTROL AND ACCESS CHARGES CASE STUDY**

- B.1 A useful analogy to consider is the claimed benefits of access regulation in network industries. PSI is somewhat similar to network industries in that an infrastructure may be difficult to replicate, yet with access to the infrastructure there can be competition in downstream services.
- B.2 Sector regulators have conducted cost-benefit analyses when proposing regulatory interventions. These provide a rough indication of the scale of detriment that can occur where a monopoly is allowed to extend downstream through vertical integration. In other words, where competition downstream is distorted by monopoly provision upstream or where the monopoly position upstream is exploited by earning unduly high profits. These parallels are to the type A and B detriments that we have considered here in the case of access to PSI.
- B.3 Review of a cost benefit analysis (CBA)<sup>51</sup> undertaken in relation to the prices of retail and access tariffs of British Telecommunications (BT) is helpful in this context. In 2000, Oftel - the then sector regulator of the telecommunications sector in the UK (now Ofcom) – considered the costs and benefits of a price control on BT and of forcing it to create an access product which third party downstream providers could purchase in order to compete effectively in the downstream market.
- B.4 The CBA undertaken by Oftel sought to consider the costs and benefits associated with the proposal in order to determine whether or not regulation was justified. Some of these costs and benefits were quantified, although on the whole it is not possible to quantify all of these, for example those associated with innovation that might arise as

---

<sup>51</sup> Source: Oftel (Jan. 2002) 'Protecting consumers by promoting competition - Consultation on Oftel's review of the fixed telephony market'. It should also be noted that regulatory controls on many of BT's tariffs have been steadily removed over time, with controls on BT's retail tariffs having been removed completed this year.

a result of increased competition downstream. One of the main conditions considered by Oftel was the introduction of a cost-based wholesale access product combined with a price cap. The core benefits that Oftel noted was that the proposals were likely to reduce prices to customers, that wholesale access would increase the level of competition in the market, particularly from resellers and lead to cost efficiencies on the part of BT, and that there would be scope for increased innovation as a result of the measures.

## **Benefits**

- B.5 Oftel considered the returns that BT had been earning over the period and considered the extent to which profits it was earning were likely to be too high. It considered the effect of BT reducing its prices to the level of the costs that it incurred and to the point where BT was forced to meet its cost of capital. Oftel was of the view that BT had been earning high rates of return on calls and that the price cap would place downward pressure on call prices directly, whilst wholesale access would do so by increasing competition, particularly from resellers. It also considered that lower call prices would stimulate demand for calls.
- B.6 In relation to costs, Oftel considered that increased competition would be likely to increase the pressure on BT to make efficiency savings in its retail business.
- B.7 Oftel also considered that measures to stimulate competition would lead to customers having a greater choice of service providers, increased competition on price and quality and non-price benefits to consumers (such as being able to select services better suited to their needs). Oftel also considered that increased competition would lead to benefits in the form of increased innovation in the supply of retail products.

## **Costs**

- B.8 Oftel accepted that there were likely to be increased compliance costs associated with introducing price controls and measures to increase

competition. Although, it did note that in the long-term, measures to increase retail competition should have lower compliance costs than price capping (for example, in terms of monitoring).

- B.9 A further cost that Oftel considered was where BT's network and retail operations are subject to economies of scale (average cost of output declines as the volume of output increases), these could in part be affected if measures to increase competition lead to reductions in BT's output. However, Oftel considered these to be offset by other factors, such as for example reductions in prices being likely to stimulate the output of all operators.

### **Estimates of benefits of costs**

- B.10 Oftel estimated that the net annual benefit to consumers of reducing call prices to cost was estimated at some £430m per annum (at 2001-02 prices). It also noted that that implied a net benefit of about £2.4bn over a ten period from 2006-07. Oftel did not seek to quantify the additional efficiency savings which it considered were likely to result from increasing retail competition. However, it did note that the benefits were potentially significant with a 'saving of just one per cent in the costs of access and retail calls ... amount(ing) to more than £50m per annum'.
- B.11 For comparison purposes, in 2002, BT had revenues of the order of £18.4bn. The benefit quantified is approximately two per cent of BT's total revenue. To the extent that BT's market share was less than 100 per cent (BT's share of residential customers at the time was approximately 81 per cent and the share of the business customers was approximately 88 per cent), then the benefit to the total market would be correspondingly higher.

## **C INNOVATION IN IN-CAR SATELLITE NAVIGATION SYSTEMS**

C.1 In-car satellite navigation systems are a form of value-added product that relies heavily on the use of underlying maps. It is also a market that has developed rapidly over the past few years with an increase in the number of providers and product offerings. It provides an interesting object lesson in how competition in value-added services can be sustained if there is access to PSI required as an essential input. The development of these new services has been rapid and is likely to have created significant benefits for consumers.

### **Satellite navigation systems**

C.2 Satellite navigation systems essentially 'allow small electronic devices to determine their location (Longitude, Latitude, and Altitude) to within a few metres using time signals transmitted along a line of sight by radio from satellites'.<sup>52</sup> In-car navigation is one specific use of this type of system, but is one that relies more heavily on the use of mapping information, 'An automotive navigation system is a satellite navigation system designed for use in automobiles. Unlike other GPS systems, these use position data to locate the user on a road in the unit's map database. Using the road database, the unit can give directions to other locations along roads also in its database'.<sup>53</sup>

C.3 Satellite navigation systems were first developed in the US with the Global Positioning System (GPS), which at present is the only fully functional satellite navigation system (consisting of over 20 satellites).

C.4 More recently, the EC has been seeking to grow its share of the navigation market and in particular is doing so through the development of in-car navigation systems. Satellite navigation positioning is important

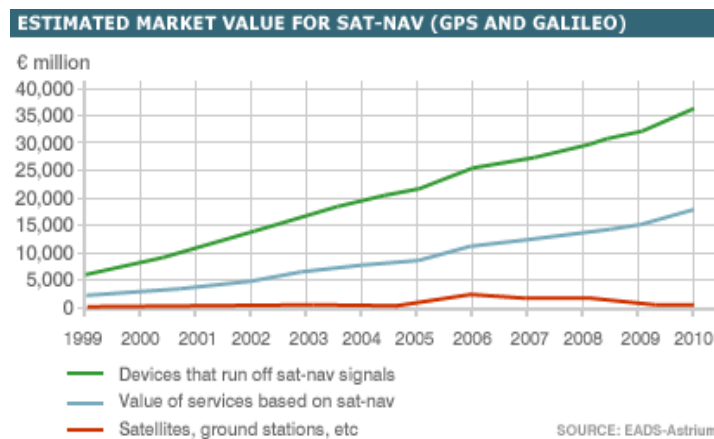
---

<sup>52</sup> Source: Wikipedia, [www.wikipedia.org](http://www.wikipedia.org)

<sup>53</sup> *ibid.*

to many sectors including, for example, personal navigation, transport and logistics, finance and banking, agriculture and fisheries, and public protection and security. In 2001 the global turnover for satellite navigation products amounted to €15 billion, 30 per cent of which was generated in Europe. By 2015 the market value is expected to rise to €140 billion.

C.5 The table below shows the estimated market value of the various services and markets that are associated with the use of satellite navigation systems. The indication again is that the market is growing and is set to grow significantly in the future.



Source: BBC website

C.6 The EC is also developing Galileo 'the new 3.4-billion-euro satellite navigation system currently being constructed by the EU bloc space industry'.<sup>54</sup> The system will be a global network of 30 satellites that will operate separately to but maintain compatibility (same frequencies) and interoperability (can be used together or separately) with GPS and

<sup>54</sup> Source: 'Sat-nav looks to smart ideas', BBC website [www.bbc.co.uk](http://www.bbc.co.uk) April 2005.

Glonass, the Russian satellite navigation system. Galileo is also expected to provide more enhanced accuracy than the US system.<sup>55</sup>

## Digital map data

- C.7 The map data stored in navigation systems currently originate from two main providers: Tele Atlas and Navteq. TomTom, an in-car navigation provider, for example supplies navigation solutions to a large market across Europe and the Americas and uses data provided by both Tele Atlas (as its main provider) and Navteq (for its Rider application, designed specifically for motorcyclists).
- C.8 Navteq is currently the market-share leader (67 per cent to 33 per cent depending on market) and is stronger than Tele Atlas in the in-car navigation market, although Tele Atlas is stronger in the fastest growing end of the market, digital maps for personal navigation devices.<sup>56</sup> Navteq was founded in 1985 in the US and, according to ESRI UK is 'the most widely recognised and trusted name in the digital mapping industry',<sup>57</sup> and with its comprehensive map database can deliver door-to-door directions throughout Europe and North America, offering digital map coverage in 52 countries across four continents.
- C.9 Tele Atlas was founded in 1984 in the Netherlands and is 'a leading provider of digital maps and dynamic location content for a variety of navigation, location-based services and geospatial products and database solutions.'<sup>58</sup> The Tele Atlas' database, Multinet, covers a high percentage of European, U.S. and Canadian roads, and the compatibility of Tele Atlas with major navigation systems and its open system design

---

<sup>55</sup> *ibid.*

<sup>56</sup> Source: [www.moneycentral.msn.com/content/P145762.asp](http://www.moneycentral.msn.com/content/P145762.asp)

<sup>57</sup> Source: [www.esriuk.com](http://www.esriuk.com)

<sup>58</sup> Source: [www.esriuk.com](http://www.esriuk.com)

have allowed it to become a key player in both consumer and business-to-business applications worldwide.

- C.10 For its UK products, Tele Atlas relies in part on information provided by Ordnance Survey, receiving data updates every six months from OS in order to help keep its dataset up to date. However, Tele Atlas also has its own field survey team which collects information and adds to the information provided by OS. The information is then enhanced with geo-referenced data such as points of interest, 3D Landmarks etc. The fully consolidated database is then published four times a year as a Tele Atlas Mapping Product in a format known as MultiNet. Finally, the data is then provided to the navigation application builders.<sup>59</sup>
- C.11 In car navigation units range from approximately £130 to £650 in price depending on the functionality and mapping requirements of the user.<sup>60</sup> Where a user It has been noted that information products feeding into navigation systems have also fallen in price to around a third of that from inception in the UK. As an example 'a full NAVTEQ base mapping dataset for the UK is now only £5,100, compared with £14,200 before'.<sup>61</sup>

---

<sup>59</sup> Source: [www.pocketgpsworld.com/teeatlas-visit-aug05.php](http://www.pocketgpsworld.com/teeatlas-visit-aug05.php)

<sup>60</sup> Source: 'Spend, The Ultimate Buyer's Guide', T3 Magazine, September 2006.

<sup>61</sup> Source: 'Price reductions mark fundamental change in digital map data market, Kingswood MapMechanics heralds new era of affordability with far keener pricing', MapMechanics, Data catalogue, the guide to digital map data.

## **D SENSITIVITY ANALYSIS**

D.1 Because of the lack of data on markets for PSI, our assessment relies on a number of assumptions. Clearly a wide range of reasonable alternative assumptions are possible. In this appendix, we undertake some sensitivity analysis to look at the implications of alternative assumptions.

### **Sensitivity of our assessment of Type A Detriment**

D.2 Our assessment of type A detriment is based upon the assumption that there are no variable costs for the provision of PSI for commercial use. It uses target and actual ROCE for individual PSIHs in Stratum 1 in order to estimate the impact of actual profits exceeding target profits. Given that we only had these data for some of the PSIHs in Stratum 1, the assessment is limited to this stratum.

D.3 Our base case assessment of type A detriment based on current profitability does not capture the potential for costs to be unduly high where lack of competition removes pressure to reduce costs. As a simple alternative to our base case approach, we investigate the possibility that prices generally exceed the competitive level by a certain proportion for all groups in Strata 1 and 3, reflecting productive inefficiencies. This is a simple alternative to our base case approach of determining how much prices would need to fall to reduce ROCE to its target level. However, here we are allowing for the possibility that ROCE might not exceed its target level and yet prices might be excessive due to excessive costs. Therefore, we are taking a more aggressive view than in the base case.

D.4 We have conducted the assessment of net consumer surplus gains, excluding changes in producer welfare. This may overstate the social welfare impact where current profits are substantial due to lack of competition, given that lower prices would reduce such profits. However, we would not expect the benefits from the fall in prices to be offset by substantial losses in producer surplus where lower prices are driven by cost savings.

D.5 In order to conduct this alternative assessment, we use a range of assumptions on the difference between actual and efficient (competitive) prices. The results, using our base case set of elasticities, are presented in the table below.

**Alternative assumptions for the assessment of type A detriment (£m): base case elasticity assumptions estimates**

	Difference between actual and competitive prices	A	B	C	D	Whole stratum
		<i>Ec./Bus./Leg.</i>	<i>Geog.</i>	<i>Env./Sci.</i>	<i>Other</i>	
<b>Stratum 1</b>	5%	2.7	9.0	5.3	0.1	17.1
	10%	5.5	18.3	10.6	0.3	34.7
	20%	11.2	37.6	21.6	0.6	71.0
<b>Stratum 3</b>	5%	0.6	0.0	1.3	0.9	2.8
	10%	1.2	0.0	2.6	1.8	5.6
	20%	2.5	0.0	5.4	3.8	11.6

D.6 These results suggest that the scope for detriment A may be substantially greater in the event that current prices do not result from excess profits but rather from excessive costs. For example, our estimates suggest that the aggregate impact of an across-the board reduction in costs (for both Strata 1 and 3) leading to a five per cent fall in prices would have a similar impact to suppressing profits for all PSIHs in Stratum 1.

D.7 The welfare gains from even greater cost reductions increase rapidly. This suggests that, especially were innovation in supply costs is hindered, the magnitude of detriment A might be substantially greater than our base case estimates. However, the sensitivity of our estimates to the difference between actual and competitive prices and costs suggest that the magnitude of detriment A is likely to be in the order of tens of millions of pounds per year.

## **Sensitivity of our assessment of type B detriment**

- D.8 We model type B detriment as a constraint on the demand for unrefined PSI. It is difficult to determine the magnitude of this effect, as demand in the absence of the constraint is not observable. For this reason, we have based our assessment on indicative figures for the potential market expansion if impediments to accessing unrefined PSI were removed.
- D.9 For our base case assumptions of the potential suppression of demand by PSIHs causing type B detriment, we considered unrefined PSI revenues as a proportion of all revenues in each group. Where unrefined revenues appear to be small in relation to refined revenues, this might indicate that the PSIH is leveraging market power to the downstream market and constraining supply of unrefined PSI. However, the same imbalance in revenues could be expected, for example, where there are costs of providing refined services and the PSIH supplies unrefined PSI free-of-charge and refined services at cost. For this reason, our assumptions are plausible but not unambiguous.
- D.10 In addition, and especially where innovation on refined information products may be hindered by current constraints on use of unrefined products, the potential for detriment B may be substantially larger than our base case estimates.
- D.11 We present our results for the detriment resulting from constraining demand for unrefined PSI based on a range of assumptions on the magnitude of such constraint, using our base case elasticity assumptions, in the following table. The sensitivities run include the cases where we assume that the market for unrefined PSI could potentially double or increase five times, which assumes that the market for unrefined PSI would increase in line with the total potential increase of the value of PSI in the EU suggested in the PIRA study.

**Welfare loss resulting from artificial restraints of the demand for unrefined PSI (£m): base case elasticity assumptions estimates**

Increase in demand for unrefined PSI		A <i>Ec./Bus./Leg.</i>	B <i>Geog.</i>	C <i>Env./Sci.</i>	D <i>Other</i>	Whole stratum
<b>Stratum 1</b>	10%	34.0	3.3	43.7	2.5	83.5
	25%	89.2	7.4	113.6	4.5	214.8
	50%	194.9	15.0	247.0	8.1	465.0
	100%	461.2	33.8	583.0	17.2	1,095.3
	(2 x current size)					
	400%	3,643.	257.1	4,596.	125.4	8,622.9
	(5 x current size))	4		8		
<b>Stratum 3</b>	10%	1.5	0.0	16.4	16.5	34.5
	25%	3.9	0.1	43.1	29.8	76.9
	50%	8.5	0.2	94.2	54.3	157.2
	100%	20.1	0.5	222.9	115.1	358.5
	(2 x current size)					
	400%	158.6	3.5	1,760.	838.8	2,761.5
	(5 x current size))			6		

D.12 The results show that our base case estimates for type B detriment are modest, in particular if we believe that the comparison between the size of the PSI market in EU and USA are a good indicator of the potential demand for unrefined PSI.

D.13 However, the magnitude of detriment that would result from assuming that the market for unrefined PSI in Stratum 1 could be expanded two to five times seems implausible given PSIHS in this stratum have commercial incentives and could benefit from increasing the supply of refined information products by supplying more unrefined PSI. This argues against taking the most aggressive case. Therefore, we believe

that the likely magnitude of detriment B is in the order of hundreds of millions of pounds per year.

### Sensitivity of our assessment of type C detriment

- D.14 Last, our assessment of type C detriment is based on an increase in the number of PSIHs commercialising the PSI they hold. Note that we do not contemplate the possibility that PSIHs currently commercialising PSI could do so more intensively, but rather only the possibility that PSIHs not currently commercialising PSI could commercialise it with similar results to other PSIHs in their group. We model this by increasing the proportion PSIHs generating revenue from PSI in Stratum 3, and assuming that these would contribute to surplus as the current average revenue-generating PSIH.
- D.15 For our base case, we assume that the proportion of PSIHs in Stratum 3 could increase from current seven per cent to around 25 per cent (less than half the proportion of revenue-generating PSIHs in Stratum 1). As alternatives to this assumption, we consider the findings from the PIRA study according to which the EU market for PSI could expand two to five times. If the number of PSIHs generating revenues in Stratum 3 were assumed to grow the same extent, this would be equivalent to the proportion making commercial use of PSI growing to approximately 15 per cent and or to 35 per cent respectively. The results using our base case elasticity assumptions are presented in the following table:

### Alternative assumptions for the assessment of type C detriment (£m): base case elasticity assumptions estimates

	Benchmark proportion of revenue-generating PSIHs in stratum 3	A	B	C	D	Whole stratum
		<i>Ec./Bus./Leg.</i>	<i>Geog.</i>	<i>Env./Sci.</i>	<i>Other</i>	
<b>Stratum 3</b>	15%	62.5	0.1	146.2	9.9	218.7
	25%	104.2	0.1	243.6	16.5	364.5
	35%	145.8	0.2	341.1	23.2	510.2

D.16 The results with the alternative assumptions suggest that our base case estimates are likely to be in the right order of magnitude. To the extent that potential growth in the PSI market in other Strata is limited, the potential growth of in the overall market of PSI suggested by the results from the PIRA study might imply an even stronger growth in Stratum 3. However, for all of these assumptions, the magnitude of type C detriment is likely to be in the order of hundreds of millions of pounds per year.