COMPETITION COMMISSION

Thermo Electron Manufacturing Limited and GV Instruments Limited merger inquiry

A report on the completed acquisition of GV Instruments Limited by Thermo Electron Manufacturing Limited

30 May 2007

Website: **www.competition-commission.org.uk**

Members of the Competition Commission who conducted this inquiry

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Chief Executive and Secretary of the Competition Commission

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The Competition Commission has excluded from this report information which the inquiry group considers should be excluded having regard to the three considerations set out in section 244 of the Enterprise Act 2002 (specified information: considerations relevant to disclosure). The omissions are indicated by [✂].

Thermo Electron Manufacturing Limited and GV Instruments Limited merger inquiry

Contents

Page

Summary

1. On 15 December 2006, the Office of Fair Trading (OFT) referred the completed acquisition of GV Instruments Limited (GVI) by Thermo Electron Manufacturing Limited, part of Thermo Electron Corporation (Thermo),[1] to the Competition Commission (CC) for investigation and report. The reference was made under section 22 of the Enterprise Act 2002 (the Act).

2. GVI and Thermo are the two largest suppliers of Isotope Ratio Mass Spectrometry (IRMS) instruments.

3. Mass spectrometry (MS) is an analytical technique used to identify the composition of a sample by determination of the atomic/molecular mass or masses within the sample. There are a number of major groups of MS instruments; IRMS forms part of the magnetic group of MS and is a small and mature sector. Global sales of original equipment and aftermarket support are estimated to be worth approximately $50 million a year. Customers include university science departments, research institutes and the nuclear industry.

4. There are four main categories of IRMS instruments:

   - Gas (also known as stable or light) IRMS;
   - Thermal Ionization MS (TIMS);
   - Multi-Collector Inductively Coupled Plasma MS (MC-ICP-MS); and
   - Noble Gas MS.

5. Prior to the acquisition, GVI and Thermo were both suppliers of Gas IRMS, TIMS and MC-ICP-MS instruments. GVI was also a supplier of Noble Gas MS instruments.

6. We considered the definition of the relevant markets for IRMS. We concluded that Gas IRMS, TIMS, MC-ICP-MS and Noble Gas MS constitute four separate relevant markets. As Thermo did not have a Noble Gas MS business before its acquisition of GVI, and we did not expect it to provide a competitive constraint on this market without the acquisition, we did not consider the effect of the merger on this market any further. We consider that there is a single systems market (mass spectrometer plus peripherals) for the Gas IRMS, TIMS and MC-ICP-MS markets. For the purpose of our analysis, we treated the relevant markets as global.

7. We examined competition in the relevant markets. We found that most sales took place by a tender process and we found that Thermo and GVI competed in the Gas IRMS, TIMS and MC-ICP-MS markets.

8. We also found that there were significant barriers to entry, which included both the cost and time required to develop a product and the need for both the company and its products to have a good market reputation. We found that these same features could act as barriers to expansion, such that a small 'fringe' provider would find it hard to expand rapidly.

9. During the course of our inquiry, one competitor, Nu Instruments (Nu), told us about its intention to enter the Gas IRMS market, and, in April 2007, it publicly announced

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[1]On 9 November 2006, Thermo merged with Fisher Scientific International Inc to form Thermo Fisher Scientific Inc.

its ‘Nu Horizon’ product. However, despite its intensive efforts, we considered that Nu was some years from sales of Gas IRMS products on any significant scale. Therefore, Nu’s entry into the market did not change our view that entry of sufficient speed and scale to provide a competitive constraint on the merged entity is unlikely.

10. We considered what would have been likely to occur if Thermo had not acquired GVI. This alternative scenario is referred to as ‘the counterfactual’.

11. Thermo submitted that, were it not for its acquisition of GVI, GVI would have imminently failed and gone into liquidation. Thermo considered that some of GVI’s assets might have been bought by small UK IRMS competitors, but argued that the increase in the competitive constraint on Thermo which would have arisen from these small acquisitions would not have been material. Thermo submitted that, compared with this counterfactual, its acquisition of GVI had not led to a substantial lessening of competition.

12. We obtained and considered evidence from several sources relating to GVI’s financial condition. We concluded that it was likely that GVI would have failed and that it was unlikely to have been successfully independently restructured. In our provisional findings we expressed our view at that time that GVI would, most likely, have gone into administration, where it would have been sold either as a whole or in parts. Following submissions from Thermo, and an insolvency practitioner instructed by Thermo, we consulted another insolvency expert who had some familiarity with the IRMS market, having handled the administration of PDZ Europa in 2004. This expert believed that GVI was most likely to have been marketed on an accelerated basis and then sold out of administration. He considered the likelihood of GVI having been put immediately into liquidation was ‘remote’. Having considered the evidence from Thermo, its insolvency practitioners, a further insolvency expert, and all the other relevant parties, we concluded that an administration was the most likely outcome for GVI.

13. The evidence from other parties suggested that there would have been a number of businesses interested in purchasing GVI as a whole, or some or all of its assets, had the business gone into administration. In particular, on a break-up basis we found that GVI’s Gas IRMS and TIMS assets would probably have been purchased out of administration, but we did not think that this was likely for GVI’s MC-ICP-MS assets.

14. We recognized that a purchaser of GVI’s Gas IRMS and TIMS assets might not have been able to impose as strong a competitive constraint on Thermo with these assets as GVI had imposed prior to the merger. However, we considered a range of outcomes and judged that any of the possible purchasers of these assets within our counterfactual would have been able to retain a substantial proportion of GVI’s pre-merger market share and would have maintained a substantial competitive constraint on Thermo.

15. In the Gas IRMS market we considered that Thermo’s market share would be likely to be very high with the merger, but, although high, would have been significantly less high under the counterfactual. We considered that the difference between these two scenarios represents a substantial lessening of competition, which may be expected to result from the merger.

16. In the TIMS market we considered that Thermo would have a monopoly with the merger, but, under the counterfactual, there would have been a competitor with a significant market share. We considered that the difference between these two scenarios represents a substantial lessening of competition, which may be expected to result from the merger.

17. In the MC-ICP-MS market, we do not believe that the merger, compared with the counterfactual, would lead to a substantial lessening of competition.

18. We conclude that the acquisition of GVI by Thermo constitutes a relevant merger situation, which may be expected to result in a substantial lessening of competition (SLC) in both the Gas IRMS market and the TIMS market, in the UK.

Remedies

19. Following the publication of the summary of our provisional findings and the Notice of possible remedies (the Notice) on 22 March 2007, we consulted parties and published a remedies working paper in April 2007.

20. We believe that divestiture of GVI as a whole would provide the most effective remedy to the SLC, and note that it is the remedy which would most closely replicate the competitive situation in the market prior to the merger. We consider that this remedy would present fewer composition risks than partial divestiture. We also consider that this remedy is proportionate. We have considered whether there are any relevant customer benefits, which might be sufficiently affected by the proposed remedy, to lead us to modify it, but we do not believe that there are. We therefore conclude that full divestiture of GVI is a reasonable and practicable remedy, which will most effectively address the SLC and the adverse effects resulting from the SLC.

21. However, we acknowledge that partial divestiture, were it to be feasible, may be an effective remedy and would be less intrusive than divestiture as a whole. We consider that the feasibility of a partial divestiture in this case could be tested by the market. We therefore recommend that Thermo be required to divest either GVI as a whole, or its Gas IRMS and TIMS assets, and to enter into a binding agreement with a purchaser(s) approved by the CC. The CC would only approve a purchaser as suitable if it could form the expectation that it has the necessary financial resources, incentives, and access to appropriate expertise and assets to enable the divested business to develop as an effective competitor in the relevant market. In the event that the business is not sold in whole or in parts to a suitable purchaser(s), we recommend that a Divestiture Trustee is appointed.

22. The parties to a merger may have significant incentives to run down or neglect the business or assets of a divestiture package in order to reduce future competitive impact. In order to protect against asset risk, we consider it important to maintain the safeguards contained in the interim undertakings given to us by Thermo, and therefore we have required the appointment of a Monitoring Trustee to ensure compliance with those undertakings until the final determination of the reference.

Findings

1. Introduction

1.1 On 15 December 2006, the OFT referred the completed acquisition of GVI by Thermo Electron Manufacturing Limited, part of Thermo Electron Corporation (Thermo), to the CC for investigation and report. The reference was made under section 22 of the Act. See Appendix A for the terms of reference and conduct of the inquiry.

1.2 This document, together with appendices, constitutes the report that we are required to publish under section 38 of the Act. Further information, including summaries of main party and third party submissions which are not commercially sensitive, can be found on our website. We cross-refer to these documents where appropriate.

2. Background

Mass spectrometry

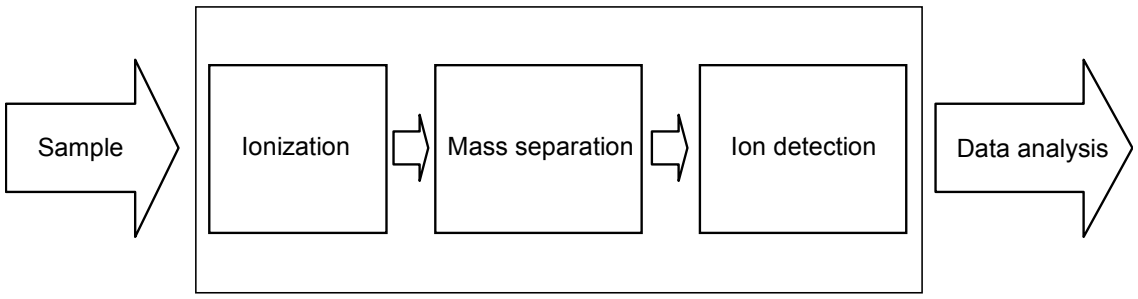
2.1 Mass spectrometry is an analytical technique used to measure the masses of individual molecules that have been converted into ions. It is a versatile technique which has uses in many areas of science and technology, such as life sciences, pharmaceuticals, environmental control, the nuclear industry, the oil industry, medicine, forensic science, earth sciences and planetary exploration.

2.2 An MS is an instrument which measures, with extreme precision, the mass of individual molecules that have been converted into ions in a sample, and thus identifies the composition of the sample. An MS does not measure the mass of molecules directly; rather, it measures the mass-to-charge ratio of ions in the sample, from which the mass of molecules can be derived. In order to do this, the sample must be ionized[2] and the ions of different mass separated by either deflecting the ion flow in a magnetic field, filtering the ions in a radio frequency field, measuring their time of flight, or measuring their frequency of oscillation in a magnetic or electrostatic field. Both the ion masses and their relative abundance are measured. All MS instruments perform three basic functions: ionization, mass separation and detection. As the ionized particles must not collide with other particles, this process is all conducted in a vacuum. An MS instrument also has an amplifier to increase the signal from the detector, and a data system in which to store the signal information and evaluate it. A schematic of an MS is shown below.

[2]Ionization is the process of converting a sample to gaseous ions, ie converting neutral atoms and molecules into those with a positive or negative charge.

FIGURE 1

How mass spectrometers work

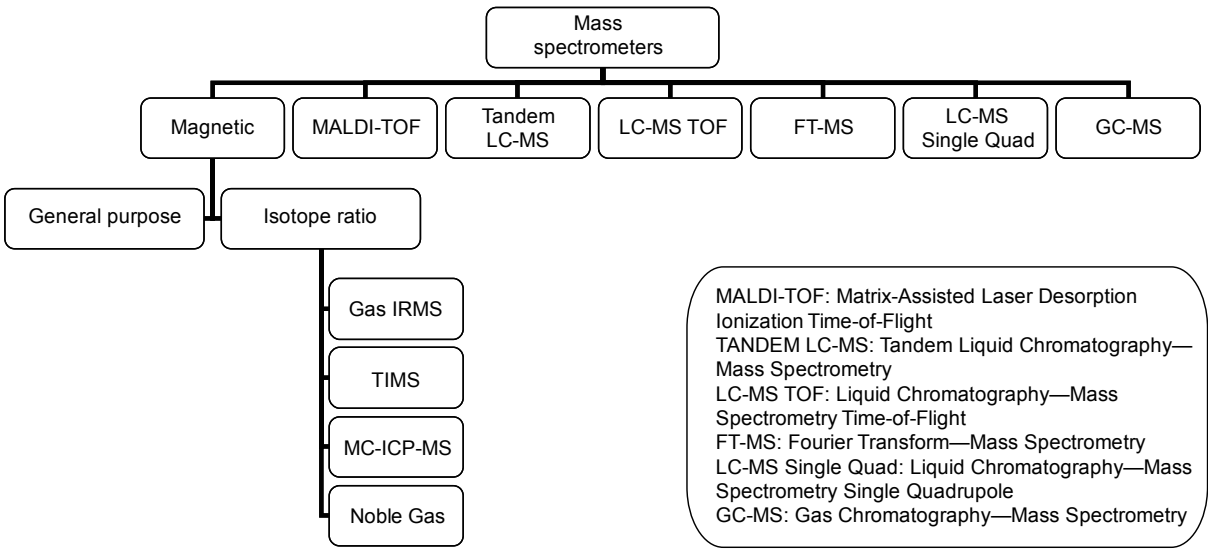


Source: American Society for Mass Spectrometry.

2.3 Although all MS perform the same basic functions, there are many different types of MS. These are illustrated in Figure 2.

FIGURE 2

Types of mass spectrometer



Source: Global Assessment Report, 9th edition, July 2006, Strategic Directions International.

Isotope ratio mass spectrometry

2.4 Most chemical elements have more than one isotope. These isotopes are chemically identical but vary in mass from one another because they have a different number of neutrons. For example, the most commonly occurring form of carbon is the isotope carbon 12 (which contains six protons, six neutrons and six electrons), but just over 1 per cent of naturally occurring carbon is carbon 13, a different isotope which contains an extra neutron. Measurement of isotope ratios can provide information about a chemical sample, such as its source or its age. For example, cane and beet sugar are chemically identical but can be distinguished by the ratios of their carbon isotopes using IRMS. Similarly, IRMS can be used to distinguish naturally occurring testosterone from synthetic testosterone, for use in sports doping investigations.

2.5 The isotope ratio of an element is the ratio of the quantity of the different isotopes of the element in a sample. Isotopes of some elements are radioactive and so the isotope ratio of these elements in a sample will change over time as the radioactive isotopes decay. Other elements have stable isotopes and the isotope ratio of these elements will tend to be constant. However, the isotope ratio of even stable elements will change through phase transitions such as evaporation and condensation, or melting and freezing.

2.6 IRMS instruments may be divided into four categories, all of which perform the same basic function but do so in different ways. The different characteristics of each category of instrument tend to determine the applications for which the instruments may best be used.

2.7 Gas IRMS instruments (also called 'stable' or 'light' IRMS) analyse stable elements, with a sample being introduced in gaseous form. This technology is generally used to analyse lighter elements such as hydrogen, oxygen, nitrogen, carbon and sulphur.[3] A large number of peripheral preparation devices are used with Gas IRMS instruments to convert the sample into a clean gas to be analysed. The two main types of peripheral are gas chromatographs and elemental analysers (approximately 70 per cent of Gas IRMS sales are made with an elemental analyser). Gas IRMS has the largest installed base of the various types of IRMS instrument and is used in a wide variety of applications, including climate change research and assessment of food authenticity.

2.8 TIMS instruments introduce the sample as a salt, either as a solid or in solution. The salt is placed on a filament, through which an electric current is then passed. The sample is heated until ionization occurs. TIMS instruments can simultaneously measure all isotopes of an element in a sample using multi-collector technology. TIMS instruments are mostly used with heavy elements, such as uranium, lead or strontium, some of which have radioactive isotopes. Because the rate of decay of a radioactive isotope is known, TIMS instruments may be used to date samples. TIMS instruments are extremely sensitive and can be used to detect very low concentrations of an isotope in a sample and so are used, for example, to perform checks on nuclear plant workers at risk of radioactive contamination.

2.9 MC-ICP-MS instruments also introduce the sample as a salt but use inductively coupled plasma to heat the sample up to 10,000ºC, until ionization occurs. Like TIMS, MC-ICP-MS instruments employ multi-collector technology to measure simultaneously all isotopes of an element in a sample. MC-ICP-MS may be used on heavy elements and may also be used on some lighter elements such as calcium, boron and iron.

2.10 TIMS instruments are generally more sensitive than MC-ICP-MS instruments and are capable of analysing much smaller samples, or detecting elements which are only present in low concentrations. These two types of instrument also differ as regards the cost of consumables: MC-ICP-MS uses argon to feed the sample through the analyser, which is very expensive, whereas TIMS simply needs a fresh filament for each sample. However, MC-ICP-MS can process a high volume of samples, using an automated sample feed, whereas each TIMS sample must be applied to a filament individually in a sterile environment, which can be a time-consuming process. Though in some cases a sample may be analysed with the same effectiveness on either instrument, in many cases the analysis requires one or other instrument.

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[3] It may be used to analyse noble gases, but only rarely.

2.11 Noble Gas MS instruments analyse the isotope ratios of helium, neon, argon, krypton and xenon. They are extremely sensitive instruments and may be used on very small samples. The applications for these instruments include the dating of minerals (using argon), tracing the sources of gases deep in the earth, and planetary and nuclear research. The installed base of Noble Gas MS instruments is much smaller than that of other IRMS.

2.12 All IRMS instruments require a controlling software package. Each supplier of IRMS provides software with its instrument, though this software may not always support peripherals supplied by another manufacturer.

2.13 IRMS instruments can typically last for up to 20 years. They are generally supplied with a warranty, during which period the manufacturer (or agent) will service the instrument. After this period, many customers, particularly university departments, perform their own maintenance. Alternatively, the manufacturer may continue to provide service support, or the customer may use a specialist servicing firm, particularly if the manufacturer of its instrument has since ceased trading.

The IRMS sector

2.14 The IRMS sector is small and mature. Global sales of original equipment and aftermarket support are estimated to be worth approximately $50 million a year. The market is forecast to grow at an average rate of 1.5 per cent a year to 2010.[4]

2.15 The two largest suppliers of IRMS instruments are Thermo and GVI, with no other suppliers of comparable size.

2.16 Thermo supplies two models of Gas IRMS instrument (the Finnigan[5] MAT[6] 253 and the lower specification Delta V), along with a range of peripherals, a TIMS instrument (Triton), and an MC-ICP-MS instrument (Neptune). Thermo does not supply a Noble Gas instrument. All Thermo's IRMS instruments operate with its proprietary Isodat software and are assembled at the former MAT site in Bremen, Germany.

2.17 GVI supplies a Gas IRMS instrument (IsoPrime), a TIMS instrument (IsoProbe T), an MC-ICP-MS instrument (IsoProbe P) and two Noble Gas MS instruments (Helix and Argus). Some of the technology on which GVI relies, including the MassLynx[7] software which operates all of GVI's instruments, is licensed from Waters Corporation (Waters), pursuant to a software licence entered into between Micromass Limited, a subsidiary of Waters, and GVI.[8] GVI subcontracts the majority of the product manufacture and assembly of its products but tests all instruments prior to shipping at its factory in Wythenshawe, near Manchester.

2.18 Many of the smaller suppliers of IRMS instruments have historical links with GVI, or its predecessor companies, and most of these are still located in the North-West of England.

2.19 Mass Spec Solutions was founded in 2003 and has designed its own Gas IRMS instrument and peripherals. In 2006, Mass Spec Solutions sold [✂] instruments [✂].

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[4] *Global Assessment Report*, 9th edition, July 2006, Strategic Directions International.
[5] Thermo acquired the Finnigan Corporation, the leading supplier of MS instruments, in 1990.
[6] Atlas MAT (Mess und Analysen Technik) was a German supplier of MS instruments that Finnigan Corporation had acquired in 1981.
[7] Now renamed as IsoVantage.
[8] Prior to 2003, the business which became GVI was part of Micromass, a subsidiary of Waters. The software licence was entered into when Micromass sold its IRMS business by means of a management buyout in 2003.

2.20 SerCon was formed in 2000 by a group of IRMS service engineers. In 2004, it bought the assets of PDZ Europa out of liquidation and now supplies new Gas IRMS instruments and peripherals. It also supplies refurbished IRMS systems. In 2006, it supplied [✂] instruments.

2.21 Nu entered the market in 1995 with an MC-ICP-MS instrument, which it developed in collaboration with Oxford University's Department of Earth Sciences and the Open University. It subsequently also developed a Noble Gas instrument. In 2006, Nu sold [✂] Noble Gas and [✂] MC-ICP-MS instruments. Following the merger of Thermo and GVI, Nu has embarked on developing its own Gas IRMS instrument.

2.22 Compact Science and Technology supplies small and 'rugged' Gas IRMS instruments for specialist remote applications, such as oil or space exploration. In 2006, it sold [✂] Gas IRMS instruments.

The transaction

2.23 On 20 July 2006, Thermo Electron Manufacturing Ltd, a subsidiary of Thermo, acquired 100 per cent of the issued share capital of GVI for £11.6 million.

2.24 Thermo is a large US company producing a broad range of scientific analytical instruments, as well as software and services. In 2005, Thermo generated revenues of approximately $3 billion and had 11,000 employees. On 9 November 2006, Thermo merged with Fisher Scientific International Inc to form Thermo Fisher Scientific Inc, with revenues of approximately $9 billion and 30,000 employees.

2.25 GVI began as an independent company in March 2003 when a management team bought out Micromass Ltd's inorganic mass spectrometry business. Previously, this business had been part of Fisons plc (Fisons). (In 1995, Thermo bought Fisons but Fisons' mass spectrometry business was divested separately, due to the competition concerns of the Federal Trade Commission.) Fisons had previously acquired its IRMS business from Vacuum Generators (VG). GVI's Gas IRMS product (the IsoPrime) was developed by VG and sold by all subsequent owners of this business. At the same time as the buyout from Micromass, the management team acquired Analytical Precision Products Ltd, a supplier of Gas IRMS, and HtX Ltd, a developer of Noble Gas MS. In 2005, GVI generated a turnover of approximately £10 million, and had fewer than 100 employees.

2.26 Thermo explained its rationale for the acquisition: '[It] enables Thermo, already a leading IRMS manufacturer, to offer additional solutions in high precision isotope ratio determination used in earth sciences, medical and life sciences applications. In particular, GVI will add the capability of Noble Gas Isotope Mass Spectrometry to Thermo's product offering'.[9]

2.27 Under the terms of the transaction, approximately £[✂] of the consideration was used to settle GVI's outstanding debts.

2.28 A further £[✂] of the consideration was placed in an escrow account to settle any adjustment between the reference balance sheet and the completion balance sheet. The reference balance sheet, on which the transaction valuation was based, was the statutory balance sheet at 28 February 2006; the completion balance sheet at 20 July 2006 was to be prepared by the acquirers and agreed with the vendors. Any change in the value of the business between these two balance sheets was to be accounted

[9]Thermo Scientific website, archive of press release on 20 July 2006.

for out of the escrow account. On 22 November 2006, Thermo met with the former GVI directors to agree the completion balance sheet and negotiate the release of the escrow fund. As a result, the full £[✂] placed in escrow was repaid to Thermo.

Undertakings

2.29 On 25 October 2006, Thermo gave interim undertakings to the OFT under section 71 of the Act. When the merger was referred in December 2006, the CC adopted the interim undertakings. We considered whether any further changes were necessary to prevent pre-emptive action by the parties which might prejudice the reference or impede the application of effective remedies at the end of the inquiry. As a result, on 26 February 2007, the CC accepted revised undertakings given by Thermo Electron Manufacturing Limited and Thermo Fisher Scientific Inc (the US parent company)—see Appendix A. On 10 May 2007 the CC sent Thermo directions requiring the appointment of a Monitoring Trustee, for the purpose of securing compliance with the undertakings pending final determination of the reference (see paragraph 8.65).

3. Jurisdiction

3.1 Under section 22 of the Act, we are required to decide whether a relevant merger situation has been created. A relevant merger situation is created where two or more enterprises have ceased to be distinct within the statutory period for reference and either the share of supply test or the turnover test specified in the Act is satisfied.

3.2 The acquisition of GVI by Thermo in July 2006 resulted in the enterprises carried on by, or under the control of, GVI ceasing to be distinct from enterprises carried on by, or under the control of, Thermo. The OFT and Thermo agreed an extension to the four-month statutory period for reference (to 17 January 2007). In the event, the reference was made on 15 December 2006, just under five months after the merger. The reference was therefore made within the statutory period.

3.3 The relevant share of supply test in section 23(3) of the Act is met if Thermo increased its share of supply of goods of any description in the UK to at least one-quarter as a result of the merger, or if it already supplied at least one-quarter and increased its share as a result of the merger. The application of the share of supply test is different from the definition of market shares undertaken as part of any analysis of competition within an economic market.

3.4 Thermo supplied copy tenders and other data to us which showed the number of IRMS instruments sold by Thermo and GVI (UK and worldwide) in 2003, 2004, 2005 and 2006. The CC used cumulative sales figures for these four years to capture any fluctuations in shares arising from the low volume. Estimates drawn from the sales data show that Thermo accounted for approximately [✂] per cent of UK IRMS sales before the merger. Following the merger, Thermo is estimated to have at least a [✂] per cent share of UK supply. As the share of supply test requires the merged entity to have a share of supply over 25 per cent as set out in paragraph 3.3, this test is met, and we do not have to consider whether the turnover test is met.

3.5 For the reasons set out in paragraphs 3.2 to 3.4, we concluded that there is a relevant merger situation within the meaning of the Act. This was not disputed by any party during the course of our inquiry.

4. Market definition

4.1 This section sets out our definition of the relevant product and geographic markets for the supply of IRMS.

4.2 The CC's guidelines on merger references state that the key to market definition is substitutability. In defining the market we are seeking to identify the extent to which customers can readily switch between products, or suppliers can readily switch their facilities between the supply of alternative products in response to a change in price imposed by a hypothetical monopolist.[10] The guidelines note that market definition is not an end in itself, but rather a framework within which to analyse the effects of a merger on competition.

4.3 In addition to evidence from the main parties and their competitors, we sent a questionnaire to over 100 IRMS customers. We received answers to the questionnaire from approximately 50 customers, 30 from within the UK.

Key features of the IRMS sector

4.4 Prior to identifying the relevant market(s) for these products, we summarize some key features of the IRMS sector that we take into account when defining the relevant market(s).

4.5 Suppliers of IRMS told us that customers include science departments of universities, research institutes and the nuclear industry. This is consistent with GVI and Thermo's sales data. Thermo estimates that in Europe, more than [✂] per cent of all sales are made through tenders. Customers may consult suppliers to help draw up the specification and then invite tenders to meet their requirements, either through the formal European public procurement process (in cases where the value exceeds £144,371) or through private tendering. The tender is then judged based on a number of factors typically including specifications, delivery time, cost and quality of demonstration results. Prices differ between customers due to variation in tender specification and individual sales negotiations.

4.6 Irrespective of the customer type, price does not appear to be the only driver of customer choice. Customers told us that the main factors determining their choice of supplier are product specification and functionality and that they want the most appropriate equipment for their specific research needs. Once these needs are met, other factors (price, reliability, reputation and support services) are considered. For some customers it is also important to have access to the leading edge technology in their specific field.

4.7 Product development also appears to be an important driver of competition. Although the IRMS sector is mature and not characterized by rapidly changing technology, there has been some recent innovation, in particular in sample introduction techniques and other peripherals.

Product market definition

4.8 There are four main categories of IRMS instruments:

- Gas (also known as stable or light) IRMS;

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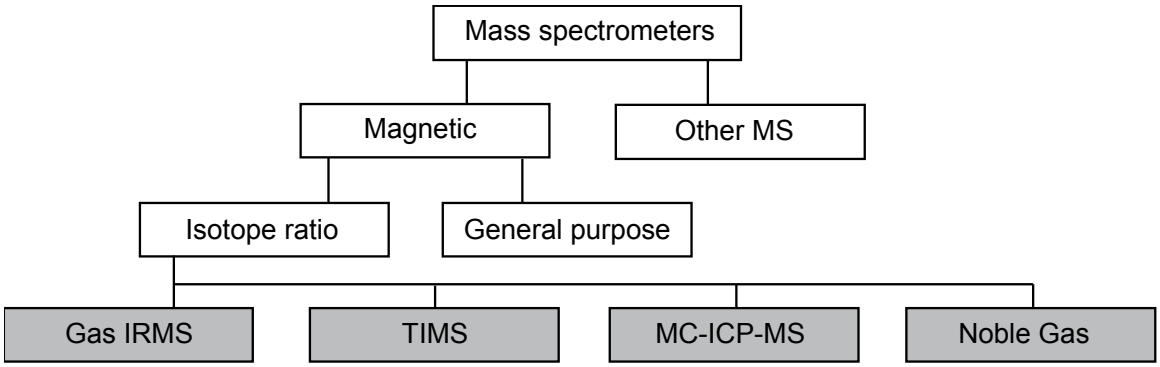
[10] *Merger references: Competition Commission Guidelines, CC2*, June 2003.

- TIMS;
- MC-ICP-MS; and
- Noble Gas MS.

FIGURE 3

Types of mass spectrometers



Source: CC, based on information from Thermo.

4.9 Product specification and functionality play an important role in defining the product market. We first consider each category of IRMS and then assess whether the market(s) should be broadened to include other mass spectrometers (including non-IRMS) and alternative technologies.

Demand-side substitution for individual categories of IRMS

Gas IRMS

4.10 Gas IRMS (also called 'stable' or 'light' IRMS) instruments analyse stable elements, samples of which are introduced in gaseous form. Because of the different nature of these samples, a large number of peripheral preparation devices are available, which connect to Gas IRMS instruments, to convert all forms of samples into clean gases. The multitude of peripherals available means that the configuration of a Gas IRMS instrument has immense variability. We consider peripherals in paragraphs 4.38 to 4.44.

4.11 Gas IRMS instruments are used by a diverse range of scientific disciplines. We highlight any differences in customer views relating to substitutability below.

FIGURE 4

Customers of Gas IRMS

[✂]

Source: CC based on Thermo and GVI information.

4.12 Both Thermo and customers told us that other IRMS machines could not be substituted for Gas IRMS instruments as their functionality was significantly different. Therefore we do not widen the product scope to include TIMS, MC-ICP-MS and Noble Gas MS machines.

4.13 With regard to alternative technologies, Thermo told us that the following technologies are potential substitutes for Gas IRMS:

(a) other MS systems including Gas Chromatography (GC) MS and Liquid Chromatography (LC) MS systems;[11]

(b) nuclear magnetic resonance spectrometry;[12] and

(c) instruments based on optical analysers, such as infrared spectroscopy.

4.14 No customers named LC-MS as a possible substitute for Gas IRMS. One customer indicated that GC-MS may be a substitute for Gas IRMS for some medical work, but suggested it achieved a less precise result. Another customer confirmed that although substitution was possible, GC-MS and Gas IRMS did not provide the same results. Additionally, two customers told us that GC-MS and Gas IRMS were not interchangeable and suggested that the techniques were in fact complementary. Some customers have said that GC and LC instruments are peripherals to Gas IRMS instruments, rather than substitutes for them.

4.15 Only one customer suggested that nuclear magnetic resonance spectrometry was a possible substitute for Gas IRMS for some applications. This customer noted that, generally, Gas IRMS could not be substituted with alternative technologies.

4.16 Suppliers, customers and Thermo told us that instruments based on optical analysers could be substituted for Gas IRMS machines in a number of applications and highlighted the development of infrared-based technologies (optical analysers). Thermo and some customers told us that use of Gas IRMS for breath testing within the medical industry could be replaced by infrared-based technologies which were less expensive and easier to use. Other customers told us that, even in this application, the alternative technology struggled to match the performance of Gas IRMS in terms of precision.

4.17 We recognize that alternative technologies may be substituted for Gas IRMS for certain applications, but we have received mixed customer responses to the viability of such substitution. Most customer responses indicated that there is no substitute for Gas IRMS, and Thermo told us that it would be three to five years until alternative technologies would be competitive. Moreover, those customers that are able to switch cannot constrain the pricing of Gas IRMS to other customers because prices are individually negotiated. For these reasons, we consider that alternative technologies would not prevent a hypothetical monopolist of Gas IRMS profitably imposing a small but significant non-transitory increase in price.

4.18 We also considered whether Gas IRMS should be defined at a narrower level, segmenting the market between dual inlet and continuous flow models. However, Thermo and SerCon told us that customers could switch between the two models and the majority of dual inlet models were sold with continuous flow functionality. For the purposes of market definition, we therefore do not segment the market between different models of Gas IRMS. Rather, we consider model variations within the competitive assessment analysis—see paragraphs 5.5 to 5.10.

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[11]Gas chromatography and liquid chromatography are separation techniques used to separate mixtures into individual components. GC-MS and LC-MS combine the GC and LC front-end separation technique with a mass spectrometer. *Global Assessment Report*, *9th Edition*: The Laboratory Analytical & Life Science Instrument Industry, 2006–2010, September 2006.

[12]Nuclear magnetic resonance is a physical phenomenon based on the quantum mechanical magnetic properties of an atom's nucleus. It can provide detailed information on the topology, dynamics and three-dimensional structure of molecules in solution and the solid state.

TIMS and MC-ICP-MS

4.19 TIMS instruments use a heat process to perform the ionization function, with the sample introduced into the instrument on a filament through which an electric current is then passed. MC-ICP-MS uses inductively coupled plasma heated to about 10,000ºC as the ion source. TIMS and MC-ICP-MS differ in their ionization process, but are used in applications relating to earth sciences, the nuclear industry and metrology.[13]

4.20 We first consider the substitution between TIMS and MC-ICP-MS and then consider substitution between both TIMS and MC-ICP-MS and alternative technologies.

4.21 For certain applications, both TIMS and MC-ICP-MS may be used interchangeably. Thermo told us that it was difficult to evaluate the proportion of customers that could substitute a TIMS and MC-ICP-MS machine. In order to assess this, we drew on customer evidence in response to our questionnaire (see paragraph 4.3 and Appendix A).

4.22 Customer views have been relatively consistent on the degree of substitutability. The choice between TIMS and MC-ICP-MS is dependent on individual research need. Some samples or elements may be analysed on either instrument, some may be better analysed on a TIMS instrument than an MC-ICP-MS instrument or vice versa. In other cases, they are seen as performing complementary functions, which is consistent with the evidence that many institutes own equipment of both types. Of the 19 TIMS customers who responded to our questionnaire, 15 also owned an MC-ICP-MS instrument.

4.23 We were told by some customers and IRMS suppliers that MC-ICP-MS technology had been expected to replace TIMS. However, despite MC-ICP-MS instruments being in the market for the last ten years, this has not occurred.

4.24 Customers told us that product specification and reliability were the primary factors considered when deciding whether to purchase a TIMS or MC-ICP-MS instrument. Product specification is influenced by the chemical element which is to be measured and the precision (sensitivity and accuracy) which is required. We consider these factors in turn.

4.25 First, we consider the chemical element which is to be measured. TIMS and MC-ICP-MS use different methods of ion generation, such that, although an MC-ICP-MS instrument can be used for almost all elements, a TIMS instrument has a more restricted use. The machines also vary in their sample introduction techniques: MC-ICP-MS instruments can achieve high volume throughput, using an automated sample feed, whereas TIMS samples must be applied to a filament in a sterile environment, which is a time-consuming process.

4.26 Second, we consider precision (sensitivity and accuracy). TIMS are more sensitive than MC-ICP-MS and are capable of analysing much smaller samples or elements present in low concentrations. Customers and Thermo told us that TIMS could be considered to be more precise than MC-ICP-MS.

4.27 As noted above, MC-ICP-MS instruments have only existed for about ten years whereas TIMS is a more mature technology. We were told by a few customers that, as a consequence, TIMS instruments were superior in terms of reliability.

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[13]Metrology is defined by the *International Bureau of Weights and Measures* (BIPM) as '... the science of measurement, embracing both experiment and theoretical determinations at any level of uncertainty in any field of Science and Technology'.

4.28 With regard to price, some customers submitted that a TIMS instrument was cheaper than an MC-ICP-MS instrument. However, the sales data provided by Thermo suggests that the prices are similar. The TIMS instrument selling price, for both Thermo and GVI, is between £[✂] and £[✂] (Thermo told us that this variation mostly depended on the collector configuration), while the price of an MC-ICP-MS instrument varies from £[✂] to £[✂]. The apparent inconsistency between the submissions from customers and from Thermo may be explained by an MC-ICP-MS instrument having higher running costs and therefore being, in total, more expensive for a customer (MC-ICP-MS requires liquid argon, which is expensive, compared with TIMS which only requires a fresh filament for each sample).

4.29 We consider that there is some possibility of substitution between TIMS and MC-ICP-MS. Some elements in some samples may be analysed on either instrument, but some may be better analysed on a TIMS instrument than an MC-ICP-MS instrument, or vice versa. In other cases, the instruments perform complementary functions. Moreover, even those customers who are able to substitute between the two instruments cannot constrain the prices offered to other customers because prices are individually negotiated. For these reasons, we consider for the purposes of product market definition that TIMS and MC-ICP-MS constitute separate markets.

4.30 We next consider the level of substitution between TIMS, MC-ICP-MS and alternative technologies. Two potential substitutes have been cited by Thermo: secondary ion MS (also known as ion microprobe MS) and quadrupole ICP-MS (or high-resolution ICP-MS).

4.31 Thermo told us that secondary ion MS could be used to date rocks, with very similar results to TIMS and MC-ICP-MS, but said that such systems were significantly more expensive. No customers named secondary ion MS as a substitute technology.

4.32 Thermo also said that quadrupole ICP-MS, or high-resolution ICP-MS, could replace MC-ICP-MS, but recognized that such systems were unlikely to achieve the level of precision required to be considered interchangeable by most TIMS or MC-ICP-MS users. Agilent, Perkin Elmer and Varian were named by Thermo as suppliers of this technology. However, Perkin Elmer submitted to us that it did not sell this product into the IRMS sector. We were told by one supplier that, although the quadrupole ICP-MS could measure isotope ratios, it was much less precise and was approximately one-fifth of the price of the MC-ICP-MS. For these reasons, the supplier did not believe that the technologies competed.

4.33 Customer responses indicated that alternative technologies are not a substitute for TIMS and MC-ICP-MS instruments. Indeed, we received no evidence that alternative technologies constrained the TIMS or MC-ICP-MS markets. For these reasons, we consider that alternative technologies would not prevent a hypothetical monopolist of TIMS or MC-ICP-MS profitably imposing a small but significant non-transitory increase in price.

Noble Gas MS

4.34 Noble Gas MS instruments analyse the isotope ratios of helium, neon, argon, krypton and xenon. Thermo submitted to us that there was no alternative technology that could be substituted for Noble Gas MS because of different functionality; this view was supported by customer responses. We therefore consider that a hypothetical monopolist of Noble Gas MS could profitably impose a small but significant non-transitory increase in price.

Supply-side substitution for individual categories of IRMS

4.35 The definition of supply-side substitution (for the purposes of market definition) requires it to be possible for suppliers of one product to commence production of another, and gain a significant volume of sales in response to an increase in price, normally within one year and without significant investment.[14]

4.36 For Gas IRMS, Thermo told us that the base technology was mature and stable, and not protected by patents. For TIMS, MC-ICP-MS and Noble Gas MS, Thermo said that entry was more complex given the technological requirements and the relatively small size of the markets. Competitors indicated that entry into any of the IRMS markets would take in excess of a year and require significant capital investment. We consider the potential for entry and expansion in more detail in paragraphs 5.28 to 5.68.

4.37 We do not consider it likely that a supplier could move swiftly and without significant investment to enter any of the IRMS markets in response to an increase in price.

Peripherals

Gas IRMS peripherals

4.38 There are a large number of peripheral inlet and preparation systems available for Gas IRMS instruments to convert a sample into a clean gas. The wide range of peripherals available means that the configuration of a Gas IRMS instrument has immense variability. However, the majority of Gas IRMS sales are made with either an elemental analyser or a gas chromatograph.

4.39 In this section we examine whether the Gas IRMS instrument and its peripherals should be considered as a single systems market (one market for the Gas IRMS and peripherals) or separate markets.

4.40 If customers view the buying decision as the purchase of a system that includes the Gas IRMS instrument along with the purchase of peripherals, then an increase in the price of one of the system components (eg peripherals) could cause a reduction in the sale of the Gas IRMS instrument itself and a reduction in the sale of peripherals. If the supplier of the system were to try to raise the price of one of the components of the system, the total cost of owning and operating the entire system would go up, which could lead to lost sales of the system itself. The majority of customers who responded to our questionnaire told us that they bought peripherals at the same time as the Gas IRMS instrument. This is consistent with Thermo's estimate that less than 5 per cent of its sales of peripherals are subsequent to the sale of the associated instrument. Thermo told us that peripherals typically accounted for [✂] to [✂] per cent of the price paid by the customer for their Gas IRMS system. Moreover, customers said that they engaged in 'whole-life costing', considering the price of the peripheral when purchasing the IRMS instrument, which is consistent with the sophisticated nature of customers and the relatively high cost of peripherals. We consider that these factors suggest a single systems market.

4.41 Although suppliers offer peripherals that are relatively similar in performance, there can be problems with the interoperability between different manufacturers' equipment. Thermo told us that, for any peripheral to attach to an IRMS instrument, it was

[14]The definition is in *CC2*, paragraph 2.21.

necessary to purchase an interface.[15] While interfaces are developed for an application rather than for a particular supplier's product, they are still proprietary. Thermo and the majority of customers have submitted that they cannot readily interchange between different manufacturers' peripherals, due to compatibility and software issues (the interface). However, a few customers told us that such issues could be overcome and that there was a range of peripherals that were available from third-party suppliers.

4.42 We consider that whether Gas IRMS instruments and peripherals are considered as a single systems market or as multiple markets will not affect our analysis of the competitive effects of the merger. For the purpose of this analysis, we consider that the evidence of whole-life costing is persuasive and we therefore consider there to be a single systems market.

TIMS and MC-ICP-MS peripherals

4.43 Fewer peripherals are available for TIMS and MC-ICP-MS than for Gas IRMS. For TIMS, Thermo told us that peripherals typically accounted for [✂] to [✂] per cent of the end-user selling price, and for MC-ICP-MS it was about [✂] to [✂] per cent. The majority of customers who responded to our questionnaire told us that they purchased peripherals with the IRMS instrument and engaged in whole-life costing. However, it has been put to us that third-party suppliers are present.

4.44 We consider that, although there are limited numbers of peripherals sold with TIMS and MC-ICP-MS instruments, whether the instrument and peripherals are considered as a single systems market or multiple markets will not affect our analysis of the competitive effects of the merger.

Aftercare

4.45 All IRMS suppliers appear to offer maintenance and servicing ('aftercare').

4.46 Thermo told us that Thermo and GVI systems typically came with a one-year warranty, during which period the manufacturer (or agent) would service the customer's instrument. Manufacturers would also service the machines they had supplied outside of this period, but for a fee. Other firms specialized in MS servicing, such as ProVac, which provided service support within the Gas IRMS market, and Analytech and Spectromat, which provided service support for the TIMS market. Thermo told us that it was not aware of any third-party companies which offered servicing for the MC-ICP-MS market. In addition, many customers used their own technicians to service and maintain their instruments, with technical support and spare parts supplied by the manufacturer (GVI estimated that [✂] per cent of customers in each category of IRMS were serviced in this way).

4.47 Self-provision of servicing, or the use of a third party, does not remove the dependence on the manufacturer. There are some elements of servicing—notably the provision of spares—that are likely to be available only from the manufacturer. For these reasons, while we recognize that there are some additional competitive forces in the aftercare market, we believe that self-provision and third-party provision of servicing are no more than a weak competitive constraint on the original equipment manufacturer, whether servicing is bought at the same time as the IRMS instrument or not.

[15]The interface not only includes the software but also the necessary hardware to connect together a peripheral with an MS.

Geographic market

4.48 This section considers the geographic market for the relevant IRMS market(s). The geographic market is the area over which a hypothetical monopolist could profitably increase prices without losing customers to suppliers outside the geographic area.[16]

4.49 Products in the markets under consideration are supplied on a worldwide basis. Production is typically concentrated in one country for global distribution. GVI is based in the UK and approximately [✂] per cent of its sales are exports. We received evidence that the majority of competitors' sales were also international.

4.50 The conditions of competition appear to be similar on a worldwide basis. Thermo told us that there was no material difference in the applications, types of customer or distribution mechanisms for IRMS between the UK and the rest of the world. The IRMS suppliers are the same throughout the world and suppliers told us that there was limited regional price variation.

4.51 On the demand side, buying patterns appear to be similar throughout the world. The types of customers are similar throughout the world, being predominantly universities and other research institutions with similar needs. Customers are sophisticated purchasers and told us that they searched for IRMS instruments on an international basis. These factors suggest a worldwide market.

4.52 We considered whether the geographic scope might be narrower, with a national or European dimension, on the grounds that customers have a preference for local service support. Customers might only switch to suppliers who can provide this service. However, there is no evidence that the provision of local servicing and maintenance constrains suppliers' activities.

4.53 Although there are some elements pointing to different competitive conditions across the world, the factors mentioned above indicate that competition occurs on a worldwide basis. For the purpose of our present analysis, we therefore treat the relevant markets as global.

Conclusion on market definition

4.54 We conclude that Gas IRMS, TIMS, MC-ICP-MS and Noble Gas MS constitute four separate relevant markets. On the demand side, there is limited substitutability with other products due to product specification and functionality. Moreover, those customers that are able to switch cannot constrain the pricing of the IRMS instrument because prices are individually negotiated. On the supply side, we consider it unlikely that a supplier of one product could move swiftly and without significant investment to enter any of the markets in response to an increase in prices. We consider that there is a single systems market (mass spectrometer plus peripherals) for the Gas IRMS, TIMS and MC-ICP-MS markets. For the purpose of our present analysis, we treat the relevant markets as global.

5. Competition in the relevant markets

5.1 Having identified the relevant markets, we now consider competition in the markets served by GVI and Thermo prior to their merger, as a guide to assessing how competition might develop if the merger were permitted to take effect without any

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[16] *CC2*, paragraphs 2.24 and 2.25.

remedial measures being taken. We first describe the suppliers of IRMS and then discuss factors affecting rivalry in the relevant markets, including market shares and the following features:

- the sales process and bidding market characteristics;
- price competition; and
- non-price competition.

5.2 We then discuss opportunities for market entry and expansion, and countervailing buyer power.

The suppliers

5.3 We first consider the markets where Thermo and GVI competed for the same customers, and the extent to which other suppliers of IRMS instruments also competed. The suppliers in each market are shown in Table 1.

TABLE 1 **IRMS suppliers and their products**

Gas IRMS	*TIMS*	*MC-ICP-MS*	*Noble Gas MS*
Thermo	Thermo	Thermo	GVI
GVI	GVI	GVI	Nu
SerCon	JSC Selmi*	Nu	
Mass Spec Solutions			
Compact Science			
Hitachi*			

Source: CC from information supplied by companies.

*Thermo told us that these companies were active. See discussion below.

5.4 Market shares are summarized in Table 2 and more detail is given in Appendix B. In Gas IRMS, both Thermo and GVI have a market share several times that of the next largest supplier. In TIMS, Thermo and GVI are the only two suppliers. Market shares provide an indication of market power but we recognize that they do not provide a precise measure. We have used a market share based on four-year cumulative sales volumes to try to abstract from fluctuations created by small annual sales volumes. Concentration in each of the relevant markets is very high and the merging parties were the two largest suppliers in two of the relevant markets, the Gas IRMS and TIMS markets.

TABLE 2 **Worldwide market shares based on four-year cumulative sales, 2003 to 2006**

per cent

Supplier	*Gas IRMS*	*TIMS*	*MC-ICP-MS*
By volume			
Thermo			
GVI			
SerCon			
Nu			
Mass Spec Solutions			
Compact Science and Technology			
Combined Thermo and GVI			
Market size (units)*		✂	
By value			
Thermo			
GVI			
SerCon			
Nu			
Mass Spec Solutions			
Compact Science and Technology			
Combined Thermo and GVI			
Market size (£'000)*			

Source: CC calculations of market shares based on sales information from the suppliers.

*This is the average yearly total market size, obtained by dividing total sales in each market over 2003 to 2006 by four.
Notes:
1. Data based on date of shipment.
2. Nu's 2006 estimate is the average of its 2003, 2004 and 2005 sales.

Gas IRMS

5.5 Thermo and GVI are the principal suppliers in the Gas IRMS market. Thermo supplies the MAT 253 and Delta range, while GVI supplies the IsoPrime.

5.6 Thermo told us that its products were superior in terms of quality and performance to any of GVI's products and that GVI was a weak competitor in terms of research and development (R&D) and innovation.

5.7 Thermo's MAT 253 is the most expensive Gas IRMS instrument, with an average end-user price between £[✂] and £[✂]. This high price is consistent with Thermo's description of the model being a top-of-the-range instrument. Thermo's Delta products are priced lower, with end-user prices ranging from £[✂] to £[✂], similar in price to GVI's IsoPrime, which has end-user prices ranging from £[✂] to £[✂]. In terms of product performance, Thermo provided us with internal documentation that we believe demonstrates that [✂]. Moreover, customer responses indicate that they perceive GVI and Thermo as close competitors. This is consistent with bidding information provided by Thermo, which shows that GVI competed against Thermo irrespective of the Thermo product specified. The documentation provides examples of GVI winning tenders even when competing against Thermo's MAT 253 product.

5.8 While we recognize that there may be differences in models and that some customers may require a specific model for their research needs, we consider that all models compete within the same market. We consider that any distinction would not affect our analysis of the competitive effects of the merger, given that GVI and Thermo are each other's closest competitors.

5.9 Other suppliers include SerCon, Mass Spec Solutions and Compact Science. The smaller suppliers jointly represent approximately [✂] per cent of the market. Thermo

cited Hitachi as a competitor, telling us that it had supplied Gas IRMS machines to the Japanese Government. However, no Gas IRMS is listed on the Hitachi website and a summary of the Gas IRMS contracts for which Thermo has tendered omits any reference to Hitachi as a competitive bidder. Additionally, no customers named Hitachi as a competitor. For these reasons, we do not consider that Hitachi constrains pricing in this market.

5.10 Thermo cited SerCon and Mass Spec Solutions as active competitors in this market. An internal document provided by Thermo compares SerCon's product with GVI's IsoPrime and its own Delta model. Moreover, customers cite SerCon as an alternative supplier. [✂] For these reasons we consider that SerCon produces a comparable product. Mass Spec Solutions and Compact Science and Technology are new entrants in the Gas IRMS market, both representing [✂] share of supply [✂]. We consider that the current competitive constraint exerted by these suppliers is limited given their size. We consider the potential for expansion in more detail under barriers to entry and expansion.

TIMS and MC-ICP-MS

5.11 Thermo suggested that the Ukrainian company, JSC Selmi, was a manufacturer of TIMS instruments. However, Thermo was not able to provide an estimate of JSC Selmi's sales and the company is not cited as a competitive bidder within any tender information provided by Thermo. No customer named JSC Selmi as a competitor. Indeed, customers told us that Thermo and GVI were the only active suppliers in the TIMS market.

5.12 In the MC-ICP-MS market, Thermo, GVI and Nu are active suppliers. Thermo told us that GVI exerted a weak competitive constraint within this market and we recognize that, between 2003 and 2006, GVI sold only four MC-ICP-MS instruments worldwide. Nonetheless, GVI had been investing in the MC-ICP-MS product (annual investment ranged from £[✂] to £[✂]), illustrating its continuing interest in the product. We also consider that GVI's market share may underestimate its market presence for the following reasons:

- customers name GVI as an active competitor in this market; and
- GVI is listed as a competitive bidder in the tender data provided by Thermo (GVI bid for 64 MC-ICP-MS contracts between 2003 and 2006).

Noble Gas MS

5.13 Although Thermo is not active in the supply of Noble Gas MS, we considered whether it constrained GVI in terms of potential competition. [✂] For these reasons, we believe that Thermo did not constrain GVI's activities in this market and we do not consider the Noble Gas MS market further.

The sales process

5.14 IRMS instruments are high-value products: a Gas IRMS system, including peripherals, costs approximately £[✂] to £[✂]; a TIMS system costs between £[✂] and £[✂]; and an MC-ICP-MS system costs £[✂] to £[✂]. Suppliers compete to sell small numbers of high-value products on infrequent occasions (especially in the TIMS and MC-ICP-MS markets, where only [✂] systems are sold annually).

5.15 Thermo estimated that in Europe more than [✂] per cent of all sales were through tenders (in accordance with the formal European public procurement process). Thermo told us that the tender would specify a range of requirements; suppliers that could comply with the tender requirements might submit a quotation; and all the tenders received were then judged by the customer, based on a number of factors including specifications, delivery time, cost and quality of demonstration results. Customers confirmed this description of the sales process.

Bidding market characteristics of Gas IRMS, TIMS and MC-ICP-MS

5.16 It is sometimes argued that competition in markets in which prices are determined through a bidding mechanism can, if other conditions hold, result in competitive outcomes with relatively fewer firms than might otherwise be the case. We compared the bidding characteristics of the relevant markets with the bidding characteristics in which economic theory suggests these results arise. A number of criteria are necessary to satisfy the 'typical definition of an ideal bidding market'.[17] These criteria include:

(a) competition is of a 'winner takes all' type, such that each supplier wins all or none of the order;

(b) competition is 'lumpy', so that each contest is large relative to a supplier's total sales in a period, such that there is an element of 'bet your company' in any contest;

(c) competition begins afresh for each contract and for each customer, such that when contests are repeated there is no lock-in by which the outcome of one contest determines another;

(d) entry of new suppliers into the market is easy; and

(e) a 'bidding system' or 'bidding process' is involved.

5.17 We consider each condition in turn.

5.18 IRMS sales transactions are characterized by more or less formal bidding processes that may perhaps satisfy conditions *(a)* and *(e)*: 'competition is winner takes all' and a 'bidding process'.

5.19 For TIMS and MC-ICP-MS markets, because of the nature and use of the products, demand from each customer is infrequent, which is indicative that competition may be lumpy, satisfying condition *(b)*. For Gas IRMS, the market is characterized by many transactions that are small relative to total sales and we therefore consider that condition *(b)* is not met in this market.

5.20 Whether the relevant markets meet criterion *(c)*, 'competition begins afresh', is debatable. Repeat purchases are limited for the majority of customers given the lifespan of the IRMS (10 to 20 years) but there are examples of research institutes purchasing more than one IRMS. Moreover, we note that suppliers do have an incumbency advantage by winning previous contracts, which establishes a reputation within the market.

[17] Klemperer P, *Bidding Markets*, CC, June 2005, p4.

5.21 We consider that criterion *(d)* does not hold given that there are barriers which restrict entry (see paragraphs 5.28 to 5.68).

5.22 For these reasons, it is clear that, while the IRMS markets display some of the characteristics of 'idealized bidding markets', they do not possess all the characteristics described above. Therefore, we do not consider that the expected outcomes in such markets—that two firms can provide enough competition to ensure competitive outcomes—can be expected here. However, we do recognize that the competitive influence exercised by small suppliers may be to some extent greater than indicated by their market shares. Additionally, we note that the characteristics of the market may facilitate entry by providing opportunities for new suppliers (although some of the responses to our questionnaire suggested that it is difficult). Nevertheless, in the light of the evidence indicating that the criteria for 'idealized bidding markets' are not satisfied in relation to IRMS markets, we consider that any reduction in the number of competitors bidding for a tendered contract may have an adverse impact on competitive outcomes.

Price competition

5.23 For all types of IRMS instrument, we have been told by customers and suppliers that price is not the most important factor in a customer's purchasing decision. What matters most to customers is the effectiveness of the IRMS machine for its intended scientific purpose.

5.24 However, customers have told us that the tender process does put pressure on prices, and price remains a factor in the purchase decision. In particular, we have observed pressure being applied to prices at the stage when academic funding needs to be approved, as referees for research grants often have a well-informed view on prices.

Non-price competition

Competition in supplying systems—marketing and aftercare

5.25 The ability to meet high technical quality standards and to set up and maintain equipment is seen as important by customers. In the majority of cases (GVI estimated 80 per cent for each category of IRMS), service support is provided by the users, with technical support and spare parts supplied by the supplier.

Research and development

5.26 Customers expect suppliers to be able to provide equipment which will be well suited to their specific research. We were told that although major advances in IRMS were infrequent, refinement of design features of existing products was more common. Product development is important because many researchers expect to be able to operate at the leading edge of their particular field. While product characteristics cannot be altered in the short term, product development appears to be an important driver of competition in this market. The importance of product development in providing a competitive advantage implies that suppliers need to invest in product and process R&D, and to maintain collaborative links with knowledgeable customers.

5.27 Thermo told us that the potential for further development in the Gas IRMS market was [✂]. The base technology for IRMS products has not progressed significantly in recent years. Thermo told us that development was currently focused on [✂]. Variations between suppliers in R&D spending and in the R&D-to-sales ratio is

shown in Table 3. A breakdown of the R&D-to-sales ratio for each category of IRMS, for Thermo and GVI, is presented in Appendix C.

TABLE 3 **R&D-to-sales ratios (worldwide)**

£'000

	GVI			*Thermo*			*Nu‡*		
	Revenue	*R&D**	*Ratio (%)*	*Revenue*	*R&D†*	*Ratio (%)*	*Revenue*	*R&D*	*Ratio (%)*
2002	[redacted]								
2003									
2004									
2005									
2006									

Source: CC estimates based on information from the suppliers.

*GVI R&D spend includes Gas IRMS, TIMS, MC-ICP-MS, Noble Gas MS, software and infrastructure.
†Thermo total R&D includes Gas IRMS, TIMS, MC-ICP-MS, Noble Gas MS and special IRMS.
‡Nu includes MC-ICP-MS and Noble Gas MS.
Note: Thermo revenue data: 2006 average £1 = €1.467.

Barriers to entry and expansion

5.28 In this section we consider whether entry and expansion can be expected to occur within such a timescale that it bears on the incentives and decisions of the existing IRMS suppliers in the market; and also whether successful entry and expansion can be expected to be sustainable or provide an effective competitive constraint on the merged firm.[18] We analyse:

- the history of entry;
- barriers to entry;
- the likelihood of entry in response to a price increase; and
- barriers to expansion for existing IRMS suppliers.

History of entry

5.29 The evolution of the IRMS sector over the last ten years is illustrated in Table 4.

[18] *CC2*, June 2003.

TABLE 4 **Entry and exit in IRMS**

Year	*Entry*	*Exit*
1996	Micromass—private management buyout	Fisons (Thermo acquired Fisons—sold IRMS VG Mass Lab to Micromass)
1997	Waters acquired Micromass	-
2000	SerCon founded: consumables and servicing only (ex Europa employees)	-
2001	Compact Science and Technology: Gas IRMS only	-
2003	Micromass sold its IRMS business to GVI (management buyout)	-
2004	SerCon: purchased IP rights and manufacturing rights of PDZ Europa	PDZ Europa liquidation
2005	Mass Spec Solutions: Gas IRMS and peripherals	-
2006	Thermo acquired GVI	-
2007	Nu: advertised a new Gas IRMS product on its website	-

Source: Thermo and other companies.

5.30 In the Gas IRMS market, new entry has occurred on a small scale. Compact Science and Technology entered in 2001 and Mass Spec Solutions sold its first product in 2005. SerCon expanded from being a servicing and maintenance provider to supplying Gas IRMS in 2004, after purchasing the intellectual property rights and manufacturing rights of PDZ Europa, which had gone into administration. Nu has also recently indicated its intention to enter the market (see paragraphs 5.52 to 5.55).

5.31 GVI began as an independent company in March 2003, when a management team from within Micromass Ltd bought its inorganic mass spectrometer business (see paragraph 2.25). We consider that GVI's ability to enter and establish itself within the Gas IRMS market was facilitated by the long history and established reputation of the IsoPrime product.

5.32 There has been no new entry in the TIMS and MC-ICP-MS markets within the last ten years.

Barriers to entry

5.33 The main barriers to entry highlighted in responses to our questionnaire include:

- product development: capital costs;
- technological barriers: know-how and R&D;
- set-up costs, eg local marketing and servicing support; and
- reputation.

Product development

5.34 Responses to our questionnaire indicate that the largest barrier to entry is the technical know-how required to develop a competitive product. A new entrant would need to hire staff with the appropriate expertise.

(a) Gas IRMS

5.35 For the Gas IRMS market, Thermo told us that a significant part of the market could be readily addressed with simple technology, which was mature, stable and not protected by patents. This is consistent with responses to our questionnaire, which said that the relevant patent restrictions could be worked around.

5.36 Entry costs depend on a new entrant's product offering. At the lower end, a new entrant could develop a Gas IRMS to connect to pre-existing third-party peripherals; at the higher end, a new entrant could develop a Gas IRMS instrument and the range of peripherals offered by Thermo and GVI. Thermo estimated that entry would cost £700,000 for a Gas IRMS and a basic set of peripherals; existing IRMS suppliers and related suppliers[19] estimated that it would cost around £1 million to £3 million to enter. We recognize that the cost of entry may be lower or higher than £1 million to £3 million, depending on the in-house skills of the entrant and the extent of peripherals developed. However, the cost for most potential entrants would be high relative to the size of the market and the level of sales they are likely to achieve in their first few years.

5.37 In terms of time taken, existing IRMS suppliers estimate that it would take two to three years to develop a Gas IRMS instrument and a basic set of peripherals, which is consistent with Thermo's estimate of two years.

(b) TIMS and MC-ICP-MS

5.38 Thermo told us that entry into the TIMS market was difficult. The technology required to manufacture TIMS instruments was more sophisticated and demanding than it was for Gas IRMS instruments, and the development cost would be high. Two related suppliers estimated that it would cost at least £2 million to enter this market, but Thermo estimated that it would cost £3 million to £7 million. Thermo said that TIMS was the area of IRMS which had shown the least recent innovation in terms of technical development, and the only relevant intellectual property was a small number of patents owned by Thermo and Waters relating to the collector technology.

5.39 IRMS suppliers told us that the TIMS market did not appear to be commercially attractive to new entrants due to the small (approximately [✂] systems a year worldwide) and fluctuating sales volumes.

5.40 Thermo told us that, as with TIMS, there were few relevant patents relating to MC-ICP-MS instruments but the cost of development was high and know-how was demanding. Thermo estimated that development costs were in the region of £3 million to £7 million, while related suppliers estimated that it would cost £2 million to £4 million. Additionally, similarly to TIMS, the MC-ICP-MS market does not appear to be commercially attractive to new entrants due to the small (approximately [✂] systems a year worldwide) and fluctuating sales volumes.

Technological barriers: know-how and research and development

5.41 The need to have access to know-how and expertise, as well as the need to invest in R&D, could act as barriers to entry. A new entrant would need to invest and produce an innovative product to establish credibility with customers.

5.42 Thermo and GVI's average annual R&D expenditure in the relevant markets is just under £[✂] a year. A new entrant would need to spread its development costs over a sufficient volume of new sales to make this fixed cost investment worthwhile.

[19]Related suppliers include other mass spectrometer suppliers (including IRMS and non-IRMS), suppliers of the alternative technologies considered under the market definition analysis, IRMS assemblers, and IRMS servicing and maintenance providers.

Set-up costs, eg local marketing and servicing support

5.43 Responses to our questionnaire indicated that sufficient infrastructure needs to be in place to sell and support products on a worldwide basis.

5.44 Thermo and GVI employ dedicated sales specialists and agents to sell their products. We were told that customers in certain parts of the world, such as Asia and the Far East, will not purchase a product unless a local agent or representative is present. Additionally, we were told that the sales process might include some product demonstration using samples provided by the customer (especially TIMS and MC-ICP-MS). A new entrant with no installed customer base would, therefore, need to have its own demonstration equipment, which would represent an additional cost as, without an established reputation, it is likely to take a new entrant significant time to build up a substantial installed base.

5.45 Existing IRMS suppliers and related suppliers have commented that after-sales support is important to customers, especially when purchasing from an unproven company. However, the high set-up costs of establishing a local marketing presence and available engineering support could deter new entrants.

Reputation

5.46 Customers told us that the reputations of both the product and the company influenced purchasing decisions. We note that IRMS systems are expensive and the product a customer buys will be used for many years, or even decades. As customers make infrequent purchases, they are likely to be reluctant to risk buying a new product, or a product from a new entrant, without a proven track record. Rather, customers appear to recognize and respect an established and proven product, such as the IsoPrime, even if the company selling the product evolves through different ownership and different names over time. Indeed, historical evidence from the market, such as the continued success of the IsoPrime, despite the company which sells it having changed, and the continued respect for the Europa 20:20 instrument, despite the failure of the company which designed it, suggests to us that it is the reputation of the product which is particularly significant. For a new entrant, it therefore might be difficult to establish a sufficient reputation with customers for its product to gain a foothold in the market, and might be equally difficult subsequently to build scale. Current suppliers in the industry and other third parties supported this view. One way of addressing the need for a strong product reputation may be to develop innovative products in conjunction with a prestigious university. Alternatively, a new entrant could establish a relationship with a distributor which does have a strong market reputation and seek to use this reputation to gain acceptance.

5.47 Customers of IRMS instruments are sophisticated purchasers. We have been told by suppliers and customers that scientists discuss with each other the relative merits of different equipment when considering what to buy, and that information flow is facilitated by the development of informal networks of friends and colleagues, such as the Isogeochem discussion forum.[20] Nu told us that it managed to grow in the MC-ICP-MS market because of personal contacts, as potential customers knew and trusted the instrument designer. New entrants need to establish credibility with the user community to enter the relevant markets.

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[20]We were told that customers were generally members of a few small, exclusive, worldwide associations or clubs, and new suppliers quickly became known and quickly established a reputation. Moreover it was evident from customer responses that customers knew each other and told us that the IRMS was a small world. Isogeochem is an email discussion list and reference website for Stable Isotope Geochemistry.

Potential new entrants

5.48 In this section we consider the reactions of potential entrants in response to a price increase. We note that there are two routes of potential entry:

- entry by a company not active in any related market; and
- entry by a related supplier.

5.49 We note also that the incentives for the first new entrant to compete against the merged entity are likely to be different to those for subsequent entrants, as the initial prospect of competing against an effective monopolist is likely to be more attractive than the subsequent prospect of competing against two large incumbent providers in a small market. However, the barriers to entry are similar in both cases.

5.50 Given the costs associated with product development, technological barriers, know-how, set-up costs and the need to build a reputation, we consider that entry by a company not active in any related market is unlikely.

5.51 Related suppliers include other MS suppliers (including IRMS and non-IRMS), suppliers of Gas IRMS peripherals, suppliers of the alternative technologies considered under the market definition analysis (see paragraphs 4.13 to 4.17), IRMS assemblers, and IRMS servicing and maintenance providers. Such suppliers may overcome some of the barriers to entry discussed above, for example company reputation and technical know-how, by reasons of their current activities. We contacted 38 IRMS and related suppliers (that had been cited to us by Thermo, customers and competitors) to analyse the likelihood of entry in any of the relevant markets in the event of a 5 per cent increase in price.

(a) Gas IRMS

5.52 During the course of our inquiry, subsequent to the publication of our provisional findings, Nu announced its own Gas IRMS product, called the Nu Horizon. Nu explained to us that, following its successful entry into the MC-ICP-MS market and Noble Gas MS market, it had been observing and considering whether to enter the Gas IRMS market. However, it was only after Thermo's acquisition of GVI in July 2006 that Nu embarked upon a rapid product development programme in this market to compete against the merged entity. By [✂] 2007, Nu had designed and acquired the parts to assemble a prototype Gas IRMS instrument. It had recruited two former GVI scientists and a dedicated Nu Horizon salesman. [✂] Nu told us that [✂] sell its first unit of a continuous flow Gas IRMS instrument, controlled by its own proprietary software, and coupled to a third party elemental analyser, [✂]. We note that these estimates from Nu are consistent with the estimates for the timescale of new entry discussed in paragraph 5.37.

5.53 Thermo submitted in its response to our provisional findings that Nu's announcement of its new product showed that entry into the Gas IRMS market was not only possible but well under way. Thermo submitted that Nu's entry in the Gas IRMS market would increase the competition in the market, and [✂] (discussed further in Section 6, relating to the counterfactual). Thermo highlighted that the Nu Horizon product, as announced, [✂], and submitted that Nu's established reputation in the Noble Gas MS and MC-ICP-MS markets, and the experience of Nu's founder in the Gas IRMS market, would enable Nu to build its reputation in the Gas IRMS market quickly. Thermo also submitted that Nu's ability to enter a market quickly and successfully was demonstrated in Nu's recent entry into the Noble Gas MS market.

5.54 We consider that, although Nu has demonstrated an ability to focus resources and utilize its expertise to develop a core Gas IRMS instrument, it is still at the early stages of developing a Gas IRMS product and a full portfolio of peripherals, and is some years from sales of Gas IRMS products on any significant scale. The product Nu has designed may eventually be successful but [✂], and Nu does not yet have a worldwide sales force through which to sell it, [✂]. Further, without any sales, and without the capability of serving a global market, the product has no credible reputation, even to achieve sales in the UK where Nu is best known. Although Nu is well respected in related product markets, and has some corporate reputation in the earth sciences community, it does not have any track record in Gas IRMS and is not widely known in the Gas IRMS community. Nu's founder has previously worked in Gas IRMS, and therefore has much relevant expertise, but he has not been selling Gas IRMS products to this community for many years. The differences between the IRMS markets in which Nu currently operates (Noble Gas MS and MC-ICP-MS) and the Gas IRMS market it is seeking to enter are significant: in its existing markets, a large market share can be achieved with very small volumes of sales, and products may often be individually tailored; but in Gas IRMS, Nu will have to demonstrate an ability to mass produce a standard, well-respected product. Given this difference in business models, Nu's previous achievements are an unreliable indicator for its future success. For these reasons, although we recognize the potential long-term benefits to customers arising from a further company being active in the Gas IRMS market, Nu's entry into the market does not change our view, as expressed in the provisional findings, that entry of sufficient speed and scale to provide a competitive constraint on the merged entity is unlikely. Rather, we believe that Nu's entry, and [✂] before it will be able to compete effectively against Thermo in the Gas IRMS market, provides confirmation of the estimates for the timescale of new entry stated above (see paragraph 5.37).

5.55 Thermo also submitted that, even before Nu achieved significant volumes of sales of the Nu Horizon and a large market share, its presence in the market could impose an effective competitive constraint on Thermo as many customers would choose to wait, prolonging their purchase decision until Nu's product was established and proven. In a similar way, Thermo submitted that another reason why Nu's small initial market share might underestimate the competitive constraint imposed on Thermo by Nu was because Nu might be expected to bid aggressively as it entered the market, so as to achieve sales quickly and establish its reputation in the market. We recognize that market shares can provide a limited indication of a company's competitive effects in the market (see paragraph 5.12). We also accept that customers may 'wait and see' before making their purchasing decision, and that a new entrant may offer discounts on initial sales. However, as no tested Nu Horizon product yet exists, we do not have a strong basis for concluding that customers will ultimately buy Nu's product after waiting, even if it is offered at a discounted price. We also note that customers will only wait so long and cross-subsidization from other products will not last indefinitely. Nu's [✂] launching its product [✂], and possibly offering early sales at a discounted price, may disrupt the market but we cannot form an expectation that its presence in the market without a proven product will provide any form of effective competitive constraint.

5.56 Therefore, we continue to believe, as we stated in the provisional findings, that the barriers to entry in this market are such that entry of sufficient scale to provide an effective competitive constraint on the merged firm is unlikely to occur within a timescale to bear on the incentives and decisions of the existing IRMS suppliers.

(b) TIMS and MC-ICP-MS

5.57 The evidence we received suggested that there is no company that would enter the MC-ICP-MS or TIMS market in response to a 5 per cent price rise. Indeed, there does not appear to be any suitable company with the appropriate reputation and skills which is likely to enter these markets in the near future, considering the barriers to entry which we have identified.

5.58 In response, Thermo submitted that, with its existing expertise in the MC-ICP-MS market, Nu could very quickly and successfully enter the TIMS market.

5.59 Nu submitted that, although it could utilize some aspects of its MC-ICP-MS designs in developing a TIMS product, it would still take a long time and significant cost to develop a successful product in this market. Nu estimated that it would take it at least two years, more probably three years, to develop a reliable and fully-functional product, partly due to the long sample test times for a TIMS instrument. It would probably take a company without Nu's expertise in MC-ICP-MS much longer. Given that the TIMS market is small, with few annual sales, and given Nu's current interest in the Gas IRMS market, Nu told us that it did not currently consider entry into the TIMS market as an attractive business proposition.

Conclusion on barriers to entry

5.60 Based on our consideration of barriers to entry, we consider that a company seeking to enter any of these markets would incur high initial investment costs (that cannot be recovered) in relation to the size of the market. The time needed to develop products and the time then needed to build a reputation for those products would act as barriers to entry. In addition, the need to achieve sufficient scale to justify the fixed cost of development may deter a new entrant.

5.61 Despite these barriers, we were told by Nu that it was in the process of entering the Gas IRMS market (see paragraph 5.52). However, we consider that entry is unlikely to occur on a sufficient scale, by this company or by any other company, in any of the IRMS markets, within such a timescale that it would bear on the incentives and decisions of the existing firms in the market. Equally, we are not persuaded that the prospect of entry can be relied upon to impose a significant competitive constraint on the merged entity.

Barriers to expansion

5.62 Barriers to expansion affect the ability of existing IRMS suppliers to increase their capacity. In this section, we consider technical and physical barriers to expansion and consider the likelihood of expansion by existing IRMS suppliers within any of the relevant markets.

5.63 Suppliers currently active in the Gas IRMS market include SerCon, Mass Spec Solutions and Compact Science and Technology. Nu is in the process of entering the market [✂]. SerCon is [✂]. In 2006, Mass Spec Solutions had a share of supply of [✂]. In the same year, Compact Science and Technology made [✂] sales ([✂]) but it now [✂]. In contrast to Thermo and GVI, these suppliers are extremely small. GVI had a market share of approximately [✂] per cent, with an annual turnover of approximately £[✂].

5.64 In the MC-ICP-MS market, Nu is also active.

5.65 Existing IRMS suppliers have already overcome many of the barriers to entry, having invested in their core product development, established their distribution network, and having begun to build their individual reputation.

5.66 However, in order to expand, the small suppliers need to continue to develop the products they offer so as to be able to serve the broader needs of the market. To be able to constrain the activities of the merged entity, suppliers recognized that they would need to develop an equivalent product range to the large incumbents, including a portfolio of peripherals. We were also told that the reputation barrier continued to limit a supplier's ability to generate sales and to achieve scale. Further, two existing IRMS suppliers told us that staffing requirements acted as a barrier to expansion, with there being a limited pool of technically capable people.

5.67 We consider that any expansion which is achieved is likely to be at the expense of competitors' sales, as the specialist and mature nature of the relevant markets suggests that expansion of the markets is unlikely.

Conclusion on barriers to expansion

5.68 The need to build a reputation, and the need to achieve sufficient scale to justify the fixed cost of development, can both act as barriers to expansion. We consider that existing IRMS suppliers will struggle to achieve market penetration to the level necessary within such a timescale as to impose a competitive constraint on the merged entity.

Buyer power

5.69 Countervailing buyer power is the power that 'buyers, either because of their size or commercial significance to their suppliers, may have the ability to prevent the exercise of market power by suppliers'.[21] Here we consider whether any IRMS customers might have countervailing buyer power.

5.70 We note that, because of the infrequency of purchases, coupled with the fact that there are no individual orders of significant size, a buyer's negotiating power is likely to be limited. However, IRMS customers appear very well informed about the products they purchase. Customers form a relatively small group with strong international contacts, and they are ready to exchange information about products with each other. We also note that some customers, particularly in prestigious institutions, are in a relatively strong negotiating position because they collaborate with suppliers in terms of product development.

5.71 While we recognize that some buyers are sophisticated and well informed, we do not consider that the buyer power in these markets is sufficient to constrain the merged entity.

Potential for coordinated effects

5.72 We consider whether features known to be conducive to coordinated behaviour are present in the relevant markets.

5.73 Although the relevant markets for IRMS are highly concentrated following the merger, we consider that coordinated effects are unlikely. The incentives to undercut a

[21] *CC2*, paragraph 3.58.

prevailing level of prices to win a high-value tender are high and, due to the lack of transparency in the market and the infrequency of purchases, the ability to retaliate is low. Moreover, the fact that the merged entity would have a large market share, even by comparison with its nearest competitor, leads us to believe that the risk of pricing coordination is not high.

6. The counterfactual

6.1 The CC guidance states: 'In applying the SLC [substantial lessening of competition] test, the Commission will evaluate the competitive constraints on firms with the merger compared with the situation that would have been expected to prevail without the merger (sometimes referred to as the "counterfactual")'.[22]

6.2 Thermo submitted that the counterfactual to the merger situation created by Thermo's acquisition of GVI was that GVI would have imminently failed and gone into liquidation. Thermo did not believe that GVI would have gone into administration due to the extra funding which would have been required from GVI's bank and the unlikelihood of a buyer being found for the entire business. Thermo stated that some of GVI's assets may have been bought by small UK IRMS competitors, but argued that the increase in the competitive constraint on Thermo which would arise from these small acquisitions would not be material. As such, Thermo believed that its acquisition of GVI did not represent an SLC compared with this counterfactual.

6.3 The CC guidance outlines the criteria against which a claim that the target company was failing should be assessed. The guidance provides that the following conditions should be satisfied:[23]

- the business must be unable to meet its financial obligations in the near future;
- the business must be unable to restructure itself successfully; and
- there should not be a less anti-competitive alternative to the merger.

The failing firm test—part 1: imminent failure

6.4 We obtained evidence of GVI's pre-disposal trading performance and its net assets at the time of its sale to Thermo. We also gathered the views of various interested parties, including GVI's bank, its management and directors, and its customers and competitors. A summary of this evidence is presented in Appendix D.

6.5 Our analysis has shown that, at the time of its acquisition by Thermo, GVI was:

- losing money;
- unable to satisfy its existing orders;
- under significant pressure from its various trade creditors, with some suppliers taking court action and all significant supplier accounts on hold;
- juggling its cash payments, including payments to staff; and

[22] *CC2*, paragraph 1.22.
[23] *CC2*, paragraphs 3.61 to 3.63.

- at the limit of its financing, with its bank planning imminently to send in investigating accountants if the sale did not proceed.

6.6 In our view, this evidence presents a compelling case that the business was rapidly in decline and leads us to expect that, in the absence of a significant restructuring or a sale, it would have failed in the near future. If the business had not been sold, GVI's bank or its creditors are likely to have forced the company into some form of insolvency proceeding.

The failing firm test—part 2: no viable restructuring

6.7 There are two overlapping aspects of a possible restructuring of GVI: operational and financial. For GVI to have survived, it would have required both forms of restructuring: an operational restructuring to establish a profitable business model, principally by reducing its cost base; and a financial restructuring to gain new funds for the business, investing in working capital to re-establish supplies, and also reducing costs on interest payments. Prior to the sale to Thermo, GVI explored both options. A summary of the evidence we reviewed with regard to GVI's restructuring efforts is presented in Appendix E.

6.8 GVI's internal considerations of a possible restructuring programme recognized the need for significant redundancies. GVI had also been approached by at least one turnaround investor, willing to invest new funds. However, it is not clear that either of these possibilities would have occurred sufficiently quickly or, if they had occurred, that they would have transformed the company and its trading relationships with suppliers and customers sufficiently quickly to ensure the successful ongoing viability of the business without it first becoming insolvent. Rather, in our view, in spite of these restructuring efforts, unless the company received significant equity investment (probably representing a sale of the business, and therefore considered below), it remains highly likely that the company would have failed.

The failing firm test—part 3: no less anti-competitive alternative

6.9 Given that the company was on course to fail and was not likely to be successfully restructured as an independently viable business, the third criterion of the failing firm assessment considers whether there was the possibility of a sale of the business or its assets to one or more other businesses, which would have represented a less anti-competitive alternative to the merger. If not, this criterion also considers whether the remaining competitors would have competed for the company's share of the market to give a less anti-competitive alternative to the merger.

6.10 We identified and sought to contact 42 companies which we considered might have been interested in GVI's business or its assets. A summary of the evidence we gathered is presented in Appendix F.

6.11 Thermo submitted that:

- Thermo was only approached after a year of conversations with a number of other firms;

- Thermo was the only firm not only to make a formal indicative offer, but also to take steps towards the conclusion of a deal;

- Thermo was therefore the most likely, if not the only, prospect for GVI to prevent bankruptcy; and

- there was no strong prospect that failure of GVI would have brought about a market structure that could be considered significantly more competitive.

6.12 Although there was some competitive interest in acquiring the entire business of GVI as a going concern prior to and at the time of the sale to Thermo, we consider that it is unlikely that any of these parties would have concluded an acquisition sufficiently quickly to pre-empt the bank sending in investigating accountants.

6.13 In our provisional findings we suggested that, following a report from these accountants and due to some interest from potential buyers, GVI's bank was likely to have been willing to continue funding the business for a short period and the business would have gone into administration, before being sold, either as a whole or in parts.

6.14 Following the publication of our provisional findings, Thermo submitted that, due to the costs involved and the unlikelihood of a successful sale of the company as a whole on a timely basis, GVI's bank would not have been willing to fund a period of administration and increase its potential exposure. Thermo submitted evidence from an insolvency practitioner from Ernst and Young, which suggested that the potential return to GVI's bank from administration would not have exceeded the costs of the process (his report is in Appendix G). Thermo therefore believed that the business would have gone directly into liquidation.

6.15 Following this submission, we sought a further opinion from another insolvency practitioner, from Grant Thornton, as to what would have been the most likely outcome once the bank's investigating accountants had reviewed the company. His report to us is in Appendix H. This report sets out his opinion that the GVI business is likely to have been sufficiently viable to undertake an accelerated sales process, also known as a distressed M&A (mergers and acquisitions) procedure. Through this process, a buyer might have offered a sufficiently high price to avoid the need for the company to go into insolvency. However, this outcome would have been relatively unlikely. More likely would have been the outcome that the business would find a buyer but only subject to the company first going formally into administration before the transaction completed, ie there would be a 'pre-packaged sale'. This method would allow the business to continue operating for a short period, possibly on a limited basis, and would then use an insolvency proceeding to achieve the best outcome for all parties. If the administrator believed that there was more aggregate value to be achieved in breaking up the business, this outcome would also be possible. The insolvency practitioner from Grant Thornton considered that a pre-packaged sale from administration would have been the most likely outcome for the business, had the sale to Thermo not occurred.

6.16 Our investigations found that there were three companies ([✂]) which might have been interested in acquiring the business as a whole, at an appropriate price, all of which had the resources to complete a quick transaction and all of which had a management team which could credibly conclude a transaction. Given that these three potential acquirers consist of one company which was already involved in GVI's sale process, one active trading partner [✂], and one active competitor [✂], there is good reason to consider that the investigating accountants would have quickly identified these three buyers too. Further, there might have been some secondary interest for the business from a potential management buyout (MBO) team from within GVI. On the basis of these submissions, and having considered the views of both Thermo's insolvency expert (Ernst and Young) and the insolvency practitioner whom we consulted (Grant Thornton), we consider that the prospect of achieving a significantly higher value for the sale of the business as a whole, compared with the value which could be achieved on the liquidation of assets, is likely to have been

sufficient for GVI's bank to be willing to fund the business for a short period, either before or during administration, even taking into account the costs of such a process.

6.17 Thermo provided estimates regarding the costs of an administration, including the necessary payments to employees, other overheads, creditors and the prescribed part calculation, and including an estimate for the bank's required return (in Appendix G). However, the costs of an administration are only one side of the equation. On the other side are the potential sale proceeds from buyers of the business. Thermo's analysis of the potential returns from a sale of the business drew on a comparison with PDZ Europa's administration in 2004, and concluded that the total expected return from a sale of GVI was just £[✂]. However, we consider that the situation of PDZ Europa's administration was very different to that of GVI. Even before PDZ Europa went into administration, the majority of the staff had left and it had no orders on its books. Therefore, we do not believe that the experience of PDZ Europa can be used as a meaningful comparator to GVI. More significantly, we also note that Thermo's analysis assigned no value to the core assets, which each of the potential acquirers of GVI's business told us it was most looking to buy, namely GVI's intangible assets: the product brands and reputations, the designs, and the remaining know-how. As discussed in paragraph 5.46, it is these intangible assets, including product brands and reputations, which need to be addressed in order to successfully enter the market. Indeed, even in the case of PDZ Europa, approximately 80 per cent of the value that was achieved on the sale from administration was attributed to its intangible assets.

6.18 Thermo also submitted that GVI's bank [✂], the fact that many administrations result in ultimate liquidation, and the fact that the directors had failed in their sale process to date. However, we have identified three potential acquirers all interested in buying GVI in such a situation, and believe that any administrator would have identified them too. The fact the former GVI directors either did not identify these potential acquirers or did not conclude a transaction with the parties which had expressed an interest is in part explained by the fact that Thermo moved quickly and was willing to pay £11.6 million for the business. It is clear that the sale process carried out by the former GVI directors was not comprehensive as we have identified credible companies, which would have been potential acquirers of the business, which the former GVI directors did not even approach.

6.19 Thermo also submitted that a company which was seriously interested in acquiring a business, or its assets, would not have waited until it had been placed into administration before expressing its interest. However, evidence that we have received from the potential acquirers suggests that some of them were waiting for this situation. Indeed, given the state of GVI at the time of its forecast failure, there appear to us to be good reasons why potential acquirers would wait, due to the expectation that an insolvency proceeding might remove many of GVI's liabilities and the expectation that the price required to acquire the business might come down.

6.20 Thermo also submitted that the CC should consider the possible detrimental effects in the Noble Gas MS market, were Nu to have been the successful acquirer of the whole of GVI. Thermo noted that Nu's acquisition of GVI would have resulted in Nu having a monopoly in this market, which it submitted would have resulted in a worse competitive situation than that arising from the merger. However, an acquisition of the whole of GVI by Nu is only one of the possible outcomes that we consider within our counterfactual. Further, we consider that it is reasonable to assume, in the counterfactual, that, had GVI failed and had it then been bought as a whole by Nu, and if Nu had not immediately divested the Noble Gas MS activities it had acquired, customers in this market could have complained to the OFT and the OFT might have investigated. We recognize that there is some uncertainty surrounding what might

have happened to GVI's Noble Gas MS assets in the event that Nu had acquired GVI as a whole, but we do not consider that we have grounds to form an expectation that there would have been a loss of competition in the Noble Gas MS market.

6.21 An alternative to the sale of the whole company of GVI would have been the sale of the parts of GVI's business on a break-up basis, as outlined above, but still out of administration. Depending on the interest from buyers, the aggregate value from the sale of parts may have exceeded the value from the sale of the whole. In this scenario, we found that there would have been a number of different buyers interested in sections of GVI's business, according to GVI's different products. The assets which would have been acquired would have been the product designs, the product brands, the rights to manufacture the product, the customer base and the order log for each product. If possible, most of the acquirers would also have sought to recruit some of GVI's former employees, according to the relevant product, though this may have been difficult. Having discussed the level of interest in GVI's assets with each of the potential buyers, we consider that the most likely possible buyers for each of the collective sets of assets would have been as follows:

- GVI's Gas IRMS product (the IsoPrime) would probably have been bought by one of the larger companies interested in GVI as a whole, or by one of several small companies, all currently operating in the IRMS sector, with some interest also from a potential MBO team from within GVI.

- GVI's TIMS product (the IsoProbe T) would probably have been bought by one of two companies operating in the IRMS sector, though, again, a potential MBO team from within GVI would also have been interested. The likelihood of a successful acquisition appears less than for GVI's IsoPrime assets as there are only two parties which are likely to have been interested, but both would have had a strategic reason to pursue a purchase.

- GVI's MC-ICP-MS product (the IsoProbe P) is unlikely to have been bought by any company, causing GVI's market share of new sales to be split between Thermo and Nu (the two remaining suppliers in the market), and the servicing of GVI's existing customers to be transferred to Thermo, Nu and other specialist service companies.

- Because Thermo did not have a Noble Gas MS business before its acquisition of GVI, and we do not expect that it would provide a competitive constraint on this market without the acquisition, we do not consider the counterfactual in relation to the Noble Gas MS market.

6.22 In response to the provisional findings, Thermo submitted that the two scenarios of administration and liquidation were very different, as assets out of liquidation were significantly more impaired and consequently had a much lower value to the acquirer than if the business was acquired as a whole. As stated in paragraph 6.14, Thermo believed that GVI would have gone directly into liquidation. On this basis, Thermo stated that, although it recognized that there might have been several potential buyers of GVI's assets out of liquidation, they were all small companies and would have faced significant difficulties in integrating GVI's assets into their existing operations. Most of these companies would not have had the resources to rectify GVI's legacy problems, such as its customers with unfulfilled orders or its unpaid supplier base, and were unlikely to have had access to GVI's employees to facilitate their acquisition of GVI's relevant know-how. Thermo submitted that the acquisition of GVI's assets by any of these companies would have caused only a very small increase in its market share and an unsubstantial increase in the competitive

constraint that it would offer against Thermo. Thermo argued that there was therefore not a substantially less anti-competitive alternative to the merger.

6.23 We agree that GVI's assets, if sold out of liquidation, would be significantly more impaired than if sold on a pre-packaged basis out of administration. However, our view, supported by the opinion of an insolvency expert (see Appendix H), is that the likelihood of a liquidation of GVI's business as the eventual outcome for GVI, had it not been acquired by Thermo, was remote. Rather, we consider that the business was far more likely to have been sold out of administration, either as a whole or on a break-up basis. Further, if a pre-packaged process was followed (as described in paragraph 6.15), as we consider likely based on the evidence we have seen, the aim would have been to retain the value in the business, including its employees, and the business would only have been put into administration towards the end of the sale process. In this situation, we recognize that GVI's assets would have lost some of their value, and some employees would have left, but we believe that the significant value in GVI, in particular in its intangible assets, would have been retained.

6.24 Subsequent to the publication of our provisional findings, Nu announced the launch of its Nu Horizon Gas IRMS instrument (as described in paragraph 5.52). Using the CC's provisional finding that it takes two to three years to develop a Gas IRMS product, Thermo inferred that Nu must have been developing its product prior to the merger of Thermo and GVI in July 2006, and so submitted that Nu must be considered as another competitor in the counterfactual. However, as also explained in paragraph 5.52, Nu only decided to enter the Gas IRMS market after Thermo announced its acquisition of GVI, in recognition of the market situation resulting from the merger. Nu submitted that it made no efforts to embark on a development programme with a view to entering the Gas IRMS market prior to Thermo's acquisition of GVI. Rather, Nu confirmed that, had Thermo not acquired GVI, and if GVI had subsequently failed, it would have sought to acquire the assets of GVI, so as to facilitate its entry into this market, rather than enter with its own product. If Nu had not been the successful acquirer of GVI and if the actual acquirer of GVI's business or its assets had successfully replicated GVI's business, effectively reinstating the market situation prior to July 2006, there is no reason to believe that Nu would still have entered the Gas IRMS market on its own.

6.25 We conclude that we believe the business is most likely to have been sold out of administration, either as a whole or on a break-up basis according to GVI's different principal product lines. We include both these possible outcomes within our counterfactual.

7. Effects of the merger

7.1 In this section we examine the competitive effects of the merger in relation to the relevant markets. We first set out the counterfactual and then compare the competitive situation in the relevant markets following the merger to this counterfactual. We assess the Gas IRMS, TIMS and MC-ICP-MS markets separately. We are not required to consider the effects of the merger in the Noble Gas MS market as Thermo was not operating in this market pre-acquisition.

Comparison between the counterfactual and the merger situation

7.2 As set out in Section 6, we believe that GVI would almost certainly have failed in the near future and been sold out of administration. We believe that either the whole of GVI's business or GVI's Gas IRMS and TIMS assets would then have been bought by one or more acquirers.

7.3 We recognize that, through a period of accelerated M&A or actual administration, the assets of GVI would become partially impaired. However, we believe that the potential acquirers of GVI's assets would have moved quickly to retain whatever value was in the assets they were acquiring, and would in particular have sought to secure key staff as quickly as possible.

7.4 Had GVI been sold as a whole out of administration, we believe that any of the three possible acquirers of the company would have had sufficient management experience and available finance to have been able quickly to achieve a high level of market share with GVI's business. We believe that any of these three acquirers would have substantially replicated the competitive constraint which GVI was imposing on Thermo prior to the merger, even if the acquirer was not immediately able to equal GVI's prior market share.

7.5 Had GVI been sold on a break-up basis out of administration, we recognize that GVI's assets are likely to have been more impaired than if the company had been sold as a whole. We also recognize that some of the smaller possible acquirers of GVI's assets may have had limited experience of such transactions, and restricted levels of finance, such that they would have encountered challenges in utilizing GVI's former assets within their existing businesses. Some of these possible acquirers are existing suppliers in the relevant market and might have sought to merge GVI's products with their own, thus potentially withdrawing some of GVI's products from the market. However, we believe that the most likely reason why GVI's business would have been sold on a break-up basis is if doing so was expected to have achieved a greater aggregate value than selling the company as a whole. If so, the acquirers would have had to have considered that they were able to retain the substantial elements of value in GVI's assets. Furthermore, all of the smaller potential acquirers of GVI's assets have a close knowledge of the relevant markets and many of them have expressed the view that GVI, under its former executive management, was significantly underperforming. Such comments suggest that GVI's assets, under better management, could have achieved greater potential. If one of these companies acquired GVI's former assets, it is possible that they may have utilized them in a way which would have imposed a greater competitive constraint on Thermo than had been imposed by GVI prior to the merger.

7.6 The level of competitive constraint imposed on Thermo by each of the potential counterfactual acquirers of GVI's business or assets would have varied. Some acquirers would have been expected to utilize the assets to impose a high level of incremental constraint and others would have been expected to impose a much lower level of constraint. We might expect the successful acquirer to have been that company with most to gain from acquiring the assets, and the company with most to gain to have been the company which would have imposed the greatest competitive constraint on Thermo. However, we do not conclude on that basis. Rather, from our discussions with each of the companies, we believe that, under our counterfactual, any of the identified potential acquirers of GVI's whole business or its Gas IRMS and TIMS assets would have utilized them in a way such as to substantially increase the competitive constraint which they imposed on Thermo.

7.7 We considered whether Nu's entry into the Gas IRMS market subsequent to Thermo's acquisition of GVI changed our understanding of the competitive effects of the merger. However, as stated in paragraph 5.61, we do not believe that it changes our understanding of barriers to entry, and, as stated in paragraph 6.24, we do not believe that it changes our understanding of the counterfactual. If Nu does enter the Gas IRMS market successfully, and starts to sell its new product, the number of companies in the market would be the same as in the counterfactual situation. However, the competitive conditions would be qualitatively very different. [✂], but we

cannot form an expectation that Nu may impose any effective competitive constraint on Thermo in the relatively near future, in the UK or more widely (as discussed in paragraphs 5.54 to 5.56). Even with Nu's entry, we remain of the opinion that the actual market situation is substantially less competitive than the situation under the counterfactual, in which either Nu or another acquirer would have used GVI's business or assets to provide a competitive constraint to Thermo.

7.8 It is our view that, in the counterfactual, an acquirer of GVI's assets would have been able to overcome the significant barriers to entry identified in paragraphs 5.33 to 5.47. GVI's Gas IRMS product, in particular, had an established reputation and a heritage which gave GVI a strong market position and made the business very attractive to prospective acquirers. Thermo paid £11.6 million for GVI. If Nu, or any other potential counterfactual acquirer, had acquired GVI's Gas IRMS business, it would have obtained a well-respected product, an established customer base and an instant large market share. Nu, or any other acquirer, would no doubt have sought to build on this solid market position. In contrast, we do not believe that we have any reliable basis to conclude that Nu's new product will overcome these same barriers. Nu might be successful and might grow to a size similar or even greater than that of GVI pre-merger, but its new product might equally fail or it might become one of the several peripheral competitors in the Gas IRMS market. Rather, Nu's submission that it would have sought to acquire GVI's assets in the counterfactual, instead of developing its own product, is testimony to GVI's assets offering an opportunity to overcome barriers to entry which any new entry is less certain to achieve.

Gas IRMS market

7.9 In the merger situation, Thermo holds a market share [✂] per cent (with an increment of approximately [✂] per cent).

7.10 The merger substantially reinforces Thermo's market-leading position. Based on our consideration of barriers to entry and expansion and countervailing buyer power, we do not consider that either of these factors would be sufficient to constrain the merged entity.

7.11 For these reasons, we consider that the merger, compared with the counterfactual, would enable Thermo to increase prices or engage in other conduct likely to affect customers adversely, such as to reduce product development and service levels.

TIMS market

7.12 The merger results in the number of competitors being reduced from two (GVI and Thermo) to one, the merged entity. Based on our consideration of barriers to entry and countervailing buyer power, we do not consider that these would be sufficient to constrain the merged entity.

7.13 We consider that the merger, compared with the counterfactual, would enable Thermo to increase prices or engage in other conduct likely to affect customers adversely, such as to reduce product development and service levels.

MC-ICP-MS market

7.14 The outcomes within the counterfactual vary depending on the identity of the acquirer, and whether GVI's MC-ICP-MS product exits the market.

7.15 In the merger situation, the combined market share of Thermo and GVI is approximately [✂] per cent. Based on our consideration of barriers to entry and expansion and countervailing buyer power, we do not consider that either of these factors would be sufficient to constrain the merged entity. We believe that if [✂] or [✂] were to have acquired GVI, its position in the market would have enabled it to constrain Thermo. We consider that the merger, compared with the counterfactual that the business would have been acquired by [✂] or [✂], would enable Thermo to increase prices or engage in other conduct likely to affect customers adversely, such as to reduce product development and service levels.

7.16 However, compared with the counterfactual that the business would have been acquired by [✂], or that GVI's product would have exited the MC-ICP-MS market, we do not believe that the merger significantly reduces the degree of rivalry in the market.

7.17 We therefore believe that there is only an SLC in the scenario that either [✂] or [✂] would have acquired GVI. We do not form an expectation that this counterfactual scenario is likely to have occurred and therefore we do not consider that the degree of rivalry in the counterfactual is likely to have been greater than following the merger. As such, we do not consider that the merger, compared with the counter-factual, would enable the merged entity to increase prices or engage in other conduct likely to affect customers adversely, such as to reduce product development and service levels.

Conclusion

7.18 We conclude that the acquisition of GVI by Thermo constitutes a relevant merger situation. We also conclude that the acquisition of GVI by Thermo may be expected to result in an SLC in the markets for Gas IRMS and for TIMS in the UK (but not in the markets for MC-ICP-MS or Noble Gas MS).

8. Remedies

Introduction

8.1 Having determined that a relevant merger situation has been created that has resulted or may be expected to result in an SLC in two markets in accordance with section 35(1) of the Act, we now turn to remedies. On 22 March 2007, we published a Notice of possible remedies (the Notice) and invited comments.

Remedy questions

8.2 If the CC expects an SLC to result from a merger, it must answer the following questions:[24]

(a) Should the CC itself take action to remedy, mitigate or prevent the SLC or any adverse effects resulting or expected to result from the SLC?

(b) Should the CC recommend the taking of action by others, eg government, regulators and public authorities, for the purpose of remedying, mitigating or preventing the SLC or adverse effects resulting or expected to result from the SLC?

[24]Section 35(3) of the Act.

(c) In either of the above cases, what action should be taken? The CC should state the action that should be taken and what it is designed to address.

8.3 In considering these questions, the Act requires the CC: ' … in particular [to] have regard to the need to achieve as comprehensive a solution as is reasonable and practicable to the substantial lessening of competition and any adverse effects resulting from it'.[25]

8.4 The CC's guidance[26] indicates:

- The remedial action that the CC will decide should be taken will always depend on the facts and circumstances of the case. When deciding what an appropriate remedy is, the CC will consider the effectiveness of different remedies and their associated costs and will have regard to the principle of proportionality.

- The CC must have regard to the reasonableness of any remedy and this will include consideration of the costs of any action it may decide is appropriate.

- The CC will aim to ensure that no remedy is disproportionate in relation to the SLC or other adverse effect.

- If the CC is choosing between two remedies which it considers would be equally effective, it will choose the remedy that imposes the least cost or that is least restrictive.

Relevant customer benefits

8.5 The Act states that the CC may, in deciding the question of remedies: 'in particular have regard to the effects of any action on any relevant customer benefits in relation to the creation of the relevant merger situation concerned'.[27]

8.6 The CC's guidance indicates that if the CC is satisfied that relevant customer benefits (RCBs) would result from a merger that also led to an SLC, it will consider whether to modify the remedy that it would otherwise put in place.[28] In other words, the CC will first identify which remedy it considers appropriate and, second, decide whether, in view of any RCBs, it wishes to modify that remedy. RCBs are discussed further in paragraphs 8.56 to 8.61.

Nature of the SLC

8.7 We have concluded that the acquisition of GVI by Thermo constitutes a relevant merger situation and that it may be expected to result in an SLC in the markets for Gas IRMS and TIMS in the UK.

Remedy options

8.8 In the Notice, we invited views on structural remedies. We said that, while we did not consider that behavioural remedies were likely to be effective in addressing the SLC and its resulting adverse effects, we remained willing to consider any practical

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[25]Section 35(4) of the Act.
[26]*CC2*, paragraphs 4.8 and 4.9.
[27]Sections 35(5) and 36(6) of the Act, quoted in *CC2*, paragraph 4.34.
[28]*CC2*, paragraph 4.45.

alternative remedies to divestiture that the main party or others believe would address the SLC effectively.

8.9 We first consider structural remedies and then turn to a behavioural remedy proposed by one party as an alternative.

Structural remedies

8.10 The Notice invited views on whether divestiture would be effective in addressing the SLC and the scope of the divestiture package. We were of the view that divestiture of GVI as a whole would address the SLC, but invited views as to whether an equally effective divestiture package could be assembled from the parts of GVI necessary for the supply of Gas IRMS and TIMS, which would be equally effective. We also sought views as to how the possible risks of such an approach, for example in separating the necessary assets, could be successfully addressed. We now consider these two options:

(a) divestiture of the whole of GVI; and

(b) divestiture of those parts of GVI which are necessary to supply Gas IRMS and TIMS instruments.

Divestiture of GVI as a whole

Thermo's view

8.11 Thermo told us that while the divestiture of GVI as a whole might be feasible, it would be wholly disproportionate to the SLC identified, bearing in mind the size of the relevant markets and in particular the low sales volumes and values in the UK. In support of this argument, Thermo cited the CC's guidance, which states that 'in exceptional circumstances the CC may conclude that no action is appropriate even where an SLC has been identified'. The guidance gives an example of such circumstances, where 'the costs of any practicable remedy seem disproportionate in the light of the size of the relevant market'.[29] We consider this argument in paragraphs 8.19 and 8.20.

Third-party views

8.12 Nu told us that, had it been approached by GVI's management at the time of the acquisition by Thermo, it would have considered bidding for the business and believed that it could have readily absorbed both GVI's Gas IRMS and TIMS products into its portfolio. Such an acquisition at that time would have facilitated Nu's ambition of entering the Gas IRMS market. In these circumstances, Nu believed that it would have achieved 30 to 40 per cent of all new Gas IRMS sales, which would have represented a larger market share than that of GVI prior to its sale to Thermo. However, following Thermo's acquisition of GVI, Nu decided to develop its own Gas IRMS product, such that the acquisition of GVI would no longer significantly enhance its ability to enter this market.

8.13 Mass Spec Solutions told us that it doubted whether any instrument company would be interested in acquiring GVI as a whole. Mass Spec Solutions also did not believe that the business would be attractive to a financial purchaser.

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[29] *CC2*, paragraph 4.6.

8.14 [✂]

8.15 Analytech told us that it considered it unlikely that the divestiture of the whole of GVI would address the SLC effectively. In Analytech's view, GVI was failing prior to its acquisition by Thermo and had since been weakened further, so it was no longer a viable takeover proposition.

8.16 Tesla Engineering (Tesla) told us that, in the event of a divestiture, it would be very interested in considering acquiring the GVI business as a whole. The decision would depend on the current state of the business. It said that it had been in touch with GVI senior management in 2006, with a view to making an acquisition bid, but, when it realized another prospective purchaser was bidding significantly in excess of its valuation, it withdrew. Tesla's ability to complete a transaction and effectively operate GVI is considered in paragraphs 8.29 and 8.31.

8.17 Glenrose also told us that it would consider acquiring the GVI business as a whole, if it were for sale. Glenrose emphasized that the business may have changed substantially since it made successive bids for the company in 2005/06, and that further due diligence would be needed, but said that it would be very interested to review it. Glenrose's ability to complete a transaction and effectively operate GVI is considered in paragraphs 8.30 and 8.31.

Our reasoning

8.18 We first consider Thermo's arguments regarding proportionality and then consider the effectiveness and risks of a full divestiture remedy.

Proportionality

8.19 The CC's guidance[30] outlines the way in which we consider proportionality when reviewing alternative remedies:

- the CC aims to ensure that no remedy is disproportionate in relation to the SLC or other adverse effect (paragraph 4.9 of the guidance);
- if the CC is choosing between two remedies which it considers would be equally effective, the CC will choose the remedy that imposes the least cost or that is least restrictive (paragraph 4.9);
- the CC will generally include in its consideration of costs the costs of implementing a remedy but, for completed mergers, the parties' costs arising from a divestment are regarded as avoidable (as the parties could seek pre-clearance from the OFT) and therefore the CC will not, in the absence of exceptional circumstances, accept that the cost of divestment should be considered in the setting of remedies (paragraph 4.10); and
- similarly, the social costs of possible staff redundancies will not be considered, or the cost of forgone economies (which will rather be considered under relevant customer benefits) (paragraph 4.11).

8.20 The fact that the relevant UK markets are small does not detract from the need to remedy an SLC once the OFT has determined that the market is of sufficient

[30] *CC2*, p41.

importance to justify making a reference. We also note that, in considering the costs of a remedy in relation to proportionality, we will not, in accordance with our guidance, take into account the costs of divestment. However, it may be possible to structure a partial divestment which still addresses the SLC, but is less costly to the parties and less restrictive. If this is the case, requiring full divestment may not be proportionate. We consider the effectiveness of partial divestment as a remedy in paragraphs 8.36 to 8.44.

A full divestiture remedy

8.21 A divestiture of GVI as a whole would reverse the merger. It would remove the product overlaps and therefore, if successfully implemented, would represent a comprehensive, effective remedy to the SLC we have identified.

8.22 Given that the full divestiture of GVI would effectively address the SLC, we next consider whether, in practice, it is likely to be successfully implemented. The CC's guidance[31] distinguishes three categories of risk associated with divesture remedies: composition risks, purchaser risks, and asset risks, which we now consider in turn.

Composition risks

8.23 Composition risks are risks that the scope of the divestiture package may not be appropriately configured to attract a suitable purchaser, or may not allow a purchaser to operate effectively and viably in the market.[32] The reduction of composition risk is one reason why generally we prefer the divestiture of an existing stand-alone business to the divestiture of part of a business.

8.24 The measures put in place by the OFT on 25 October 2006 required Thermo to hold separate and maintain the GVI business. However, these measures took effect several months after the acquisition had been completed. In the intervening period, many GVI staff had left, including its directors and a large proportion of its R&D staff, and its sales network was partially dismantled. The CC accepted interim undertakings from Thermo on 26 February 2007, which have, to an extent, mitigated Thermo's integration of the businesses: GVI now has its own dedicated General Manager, it has re-engaged some former GVI sales agents and re-established relationships with its suppliers (enabling the fulfilment of orders placed with GVI prior to the acquisition), and the flow of confidential information between GVI and Thermo has been restricted. We therefore consider that GVI is close to being a stand-alone business.

8.25 A further potential composition risk is that GVI uses software and some technical patented technology licensed from Waters. As such, any new owner of GVI that does not have its own appropriate software or relevant technical designs would either need to negotiate a licence with Waters or quickly produce its own 'work-around' solution. [✂] Waters no longer operates in the IRMS sector, and we believe it would have a commercial incentive to generate revenue by negotiating a licence.

8.26 Overall, we consider that a divestiture package comprising GVI as a whole would provide a purchaser with sufficient assets to enable it to compete effectively in the market.

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[31] *Application of divestiture remedies in merger inquiries, Competition Commission Guidelines, CC8*, December 2004, paragraph 2.4.
[32] *CC8*, Part 2.

Purchaser risks

8.27 Purchaser risks are risks that a suitable purchaser may not be available or that the divesting party will dispose of the package to a weak or otherwise inappropriate purchaser.

8.28 Our guidance provides criteria for assessing the suitability of prospective purchasers. These are stated to include their independence, their capability and the absence of competitive concerns. We have received indications from two companies that they would be interested in acquiring GVI as a whole and, in our view, both these companies may be suitable and credible purchasers.

8.29 Tesla is a manufacturer of components used in scientific and medical instruments. In 2006, it had a turnover of £22 million and profits in excess of £5 million. Its Radway division was a supplier to GVI and, through this relationship, it gained a good understanding of the GVI business. Tesla's Chairman was a director of Analytical Precision Ltd, which was absorbed into GVI at the time of the MBO in 2003, and, prior to that, was an executive director of VG Instruments until its acquisition by Fisons.

8.30 Glenrose is an investment vehicle owned by several high net worth ex-Thermo executives, who are now largely retired. The company currently has two subsidiaries, the largest being Eberline Services, which has revenues of approximately $30 million. The strategic intent of Glenrose is to acquire a portfolio of analytical instrument companies and to add value through the expertise of the directors and possibly some portfolio synergy.

8.31 In our view, both these companies are likely to have the resources to be able to quickly operate GVI as an effective stand-alone business.

8.32 The risk that Thermo might seek to divest GVI to a weak or otherwise inappropriate purchaser is mitigated by the requirement that the CC must approve the purchaser before Thermo can complete a transaction.

Asset risks

8.33 Asset risks are risks that the competitive capability of a divestiture package will deteriorate prior to completion of the divestment, for example through the transfer of confidential information, or the loss of customers or key members of staff.

8.34 We identified these risks at an early stage of the inquiry and put in place interim measures, as described above. However, once the prospect of a divestiture remedy became likely, we required Thermo to appoint a Monitoring Trustee, with no links to Thermo, in order to reduce the ongoing asset risk.

Our conclusion

8.35 We consider that the divestiture of GVI as a whole would effectively address the SLC. We acknowledge that there may be purchaser and composition risks associated with this remedy, but we consider that a suitable purchaser is likely to be found who will operate the business as an effective competitor to Thermo.

Partial divestiture of GVI

8.36 In the Notice, we invited views as to whether an appropriate divestiture package could be assembled from the parts of GVI necessary to supply the Gas IRMS and TIMS markets.

Thermo's view

8.37 Thermo told us that GVI had never been managed on a line-by-line basis. Rather, it had a central administration and accounting function, and many development staff worked on multiple products. Thermo submitted originally that dividing the GVI business according to its product lines was not therefore practicable [✂]. However, subsequently, Thermo modified its view. We consider these views in paragraph 8.39.

Third-party views

8.38 Mass Spec Solutions told us that it would be interested in acquiring the staff and assets associated with GVI's Gas IRMS product line. Analytech told us that it would be interested in acquiring the drawings, intellectual property and key staff associated with GVI's TIMS product line.

Our reasoning

Composition risks

8.39 We were mindful of the possible difficulties in identifying and separating the GVI resources necessary for the effective supply of its Gas IRMS and TIMS products. However, having considered the particular assets which would be critical and discussed these with Thermo and potential purchasers, we believe that it should be possible to identify and isolate the specialist engineering staff and product managers associated with each of the products, together with the relevant product designs, customer base and order log, and so assemble a package that would enable a purchaser to compete effectively in the Gas IRMS and TIMS markets.

Purchaser risks

8.40 In considering potential purchasers of a partial divestiture package, we are mindful of the risk that a purchaser of the assets associated with either product line may currently supply the same type of instrument and may, at some point in the near future, cease supplying the GVI product in favour of its own.

8.41 One company has indicated its interest in acquiring GVI's Gas IRMS assets: Mass Spec Solutions. Mass Spec Solutions has developed its own Gas IRMS instrument, with a range of peripherals, and has its own control software package, which is also capable of operating GVI's IsoPrime product. Mass Spec Solutions' management unsuccessfully bid for the Micromass business when it was offered for sale in 2003, raising approximately £[✂] at the time, and has many years of experience in the Gas IRMS market. We therefore consider that Mass Spec Solutions may be a suitable purchaser of GVI's Gas IRMS assets.

8.42 Analytech has indicated its interest in acquiring GVI's TIMS assets. Analytech provides maintenance and upgrade services for GVI's TIMS instrument users, and has developed software capable of operating GVI's Isoprobe T instrument. Analytech's technical director is a former GVI employee. Analytech has a detailed

understanding of the TIMS technology and knowledge of GVI's TIMS customer base. We therefore consider that Analytech may be a suitable purchaser of GVI's TIMS assets.

Asset risks

8.43 The asset risks associated with partial divestiture of GVI's assets are the same as those associated with the divestiture of GVI as a whole (see paragraphs 8.33 and 8.34).

Our conclusion

8.44 We consider that the partial divestiture of GVI's Gas IRMS and TIMS assets would effectively address the SLC. We also consider that suitable purchasers may be found who would utilize GVI's Gas IRMS and TIMS assets as effective competitors to Thermo. However, we acknowledge that this remedy would still be subject to purchaser risks and we recognize that there may be greater composition risks associated with this remedy than with the alternative remedy of the divestiture of GVI as a whole. It is for this reason that our guidance states that 'the CC will generally prefer divestiture of an existing business that can compete effectively on a stand-alone basis independently of the merger parties, to divestiture of part of an operating unit or a collection of assets'.[33] We note also that Thermo told us in early April that this remedy would, in practical terms, require [✂]. Subsequently, it told us that it might be possible to sell GVI's Gas IRMS and TIMS assets separately. We consider that divestiture of GVI as a whole would be the remedy which would most closely replicate the competitive situation in the market prior to the merger and we consider that a suitable purchaser for GVI as a whole is likely to be found, who will operate the business as an effective competitor to Thermo. We therefore consider that full divestiture is more likely to represent an effective remedy than partial divestiture. However, we also note that a partial divestiture, were it to be feasible, may be a less intrusive remedy than full divestiture. We return to this issue in paragraph 8.64.

Behavioural remedies

A licensing remedy

8.45 One party suggested licensing as an alternative behavioural remedy which it believed would be effective in addressing the SLC.

8.46 The party told us that, in order to be able to offer a Gas IRMS instrument capable of meeting the full range of applications demanded by customers, a supplier needed to be able to offer an interface with the large number of peripheral inlet and preparation systems available from third parties. While the majority of Gas IRMS instruments were sold with an elemental analyser and a gas chromatograph, there were many other peripheral devices, each of which would require an interface to enable it to connect to the basic Gas IRMS instrument.

8.47 In order for a Gas IRMS instrument to connect to a peripheral device, it needs a hardware connection and a software solution to control the interface, ensuring that there is no distortion in the sample preparation. GVI owns both the hardware and software technologies for interfacing to its Gas IRMS instrument.

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[33] *CC8*, paragraph 3.3.

8.48 The party suggested that Thermo be required to license to its competitors the designs of GVI's interface hardware and GVI's proprietary interface control software. If such a licence was made available on a non-discriminatory basis to any interested party, it might ensure that any company with its own Gas IRMS instrument could immediately offer a connection to a full range of third party peripherals, and hence offer a wider suite of applications. The party further suggested that the licence be made available to any competitor so that it might have a wider impact than a simple divestiture of the underlying intellectual property (IP) rights.

8.49 To remedy the SLC in the TIMS market, the same party suggested that Thermo be required to license the designs and drawings of GVI's TIMS instrument.

Views of third parties

8.50 We put the suggested licensing remedies to third parties, and received the following comments.

8.51 Nu told us that the hardware and software which enabled a Gas IRMS instrument to interface with peripherals supplied by other manufacturers could 'be easily developed by anyone who has any technical ability or knowledge in the field' and dismissed the suggestion that licensing this technology from GVI would enable more effective competition. Nu also rejected the effectiveness of any suggested licence of GVI's TIMS design rights.

8.52 In contrast, Analytech considered that licensing TIMS technology could effectively address the SLC. However, given that Analytech had already developed its own software for GVI's TIMS instrument, it considered that owning the full IP associated with the instrument would give it more of an incentive to develop it further.

Our reasoning

8.53 Our guidance states that the CC will seek to choose the remedial action that will restore the competition that has been, or is expected to be, lessened as a result of the merger.[34]

8.54 We consider that a licensing remedy in respect of Gas IRMS would not be effective in addressing the SLC as it will not restore the competition lessened by the merger. The majority of small competitors in the Gas IRMS market are already capable of serving the majority of potential customers, who require either an elemental analyser or a gas chromatograph, but only achieve small volumes of sales. Further, we have been told that designing the necessary hardware and developing the necessary software for most other peripherals is not particularly complex.

8.55 Similarly, we do not consider that a licensing remedy would effectively address the SLC in the TIMS market. A licensing agreement would offer licensees less of an incentive to continue developing the technology than if they owned the IP themselves, and hence risk freezing technological development in the market. In addition, granting IP rights to several suppliers in such a small market might actually inhibit expansion by any of them.

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[34] *CC2*, paragraph 4.23.

Relevant customer benefits

8.56 In the Notice, we invited views on possible RCBs resulting from the merger.

8.57 RCBs are defined by section 41(5) of the Act as:[35]

- lower prices;
- greater choice;
- higher quality; and
- higher levels of innovation.

Relevant customers may be customers at any stage in the supply chain and the benefits do not have to arise in the same market in which the SLC is expected.[36] In order to be considered an RCB, the benefit must result from the merger, be unlikely to accrue without the merger occurring, and must accrue within a reasonable timeframe.[37] The test of an RCB is applied strictly.

8.58 If the CC finds that the merger had led to, or could be expected to result in, RCBs, it could take account of the effect of possible remedial action on the achievement of the RCBs. Where there is an SLC and an RCB, the CC may seek to reduce the detrimental effects of the merger, while preserving all or most of the customer benefits.

8.59 In deciding whether to modify a remedy in light of RCBs, the CC will consider factors including:[38]

- the size and nature of the expected benefits;
- for how long the benefit is expected to be sustained; and
- whether, as a result of the reduction of competitive pressure in the market, any immediate benefit to customers will be eroded in the future.

8.60 Thermo highlighted the following customer benefits, which it stated had arisen as a result of the merger:

(a) honouring of the order backlog and preservation of customer deposits;

(b) payment of all outstanding liabilities to GVI's creditors, including key suppliers;

(c) repair and replacement of flawed instruments already delivered to customers;

(d) maintenance of an after-sales service and support for all GVI customers;

(e) maintenance of competition in the Noble Gas MS market; and

(f) completion of the development of a new Noble Gas MS instrument.

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[35] See also *CC2*, paragraph 4.37.
[36] *CC2*, paragraph 4.39.
[37] *CC2*, paragraph 4.38.
[38] *CC2*, paragraph 4.45.

8.61 However, of the benefits stated above, *(a)* and *(c)* are past benefits, and creditors (as identified in *(b)*) are not customers. Therefore, these benefits do not fall within the statutory definition and are not RCBs, and they cannot be taken into account when considering whether to modify the proposed remedy. There appear to us to be strong grounds to consider that the acquirer of GVI will maintain GVI's after-sales service and support *(d)*, continue to compete in the Noble Gas MS market *(e)*, and complete the development of GVI's Noble Gas MS instruments *(f)*. Therefore, we conclude that the proposed remedy should not prevent relevant customer benefits accruing to GVI customers in the future.

Action to be taken by the CC

8.62 We have considered behavioural remedies, including the licensing proposals put to us, and we conclude that behavioural remedies would not be effective in addressing the SLC or the adverse effects identified.

8.63 We believe that divestiture of GVI as a whole would provide the most effective remedy to the SLC, and note that it is the remedy which would most closely replicate the competitive situation in the market prior to the merger. We consider that this remedy would present fewer composition risks than partial divestiture (as set out in paragraph 8.44). We have considered whether the presence of any RCBs would cause us to modify our remedy (as set out in paragraphs 8.56 to 8.61) and we do not believe that there is any reason to do so. We therefore conclude that full divestiture of GVI is a reasonable and practicable remedy, which will most effectively address the SLC and the adverse effects resulting from the SLC.

8.64 However, we acknowledge that partial divestiture, were it to be feasible, may be an effective remedy and would be less intrusive than divestiture as a whole. We consider that the feasibility of a partial divestiture in this case could be tested by the market. We therefore recommend that Thermo [✂] market both GVI as a whole and its Gas IRMS and TIMS assets, and to enter into a binding agreement with a purchaser(s) approved by the CC. The CC would only approve a purchaser as suitable if it could form the expectation that it has the necessary financial resources, incentives, and access to appropriate expertise and assets to enable the divested business to develop as an effective competitor in the relevant market. In the event that the business is not sold in whole or in parts to a suitable purchaser(s) [✂], we recommend that a Divestiture Trustee is appointed [✂].

8.65 The parties to a merger may have significant incentives to run down or neglect the business or assets of a divestiture package in order to reduce future competitive impact. In order to protect against asset risk, we consider it important to maintain the safeguards contained in the interim undertakings given to us by Thermo, and therefore we have required the appointment of a Monitoring Trustee to ensure compliance with those undertakings until the final determination of the reference.